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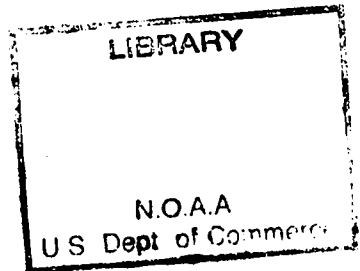
UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF FISHERIES

REPORT
OF THE
UNITED STATES
COMMISSIONER OF FISHERIES

FOR THE FISCAL YEAR 1940

WITH
APPENDIXES

CHARLES E. JACKSON
Acting Commissioner



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 1.

The Bureau of Fisheries was transferred on July 1, 1939, from the Department of Commerce to the Department of the Interior; on June 30 1940, it was consolidated with the Bureau of Biological Survey to form the Fish and Wildlife Service.

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BUREAU OF FISHERIES

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Report of the
Acting Commissioner
of
Fisheries
1940



UNITED STATES DEPARTMENT OF THE INTERIOR

Harold L. Ickes, Secretary

BUREAU OF FISHERIES

Charles E. Jackson, Acting Commissioner

Report of the Acting Commissioner of the Bureau of Fisheries, 1940, reprinted from the Annual Report of the Secretary of the Interior, 1940, pp. 291-329]

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NOTE.—The complete report of the Secretary of the Interior, 1940, also may be obtained from the Superintendent of Documents, Washington, D. C., price 75 cents.

BUREAU OF FISHERIES

Charles E. Jackson, *Acting Commissioner*

ORIGINALLY established on Feb. 9, 1871, as the United States Commission of Fish and Fisheries, an independent agency, and re-designated the Bureau of Fisheries on July 1, 1903, when it was by law included in the newly created Department of Commerce and Labor, this Bureau has completed 69 years of active service in the field of fishery conservation.¹

During the past year encouraging progress was made in the development of practical programs of fishery management and in securing State and private cooperation in support of these programs. Biological investigations contributed much fundamental information that will assist in maintaining the productivity of the fisheries. Technological investigations contributed substantially to the development of better methods for the preservation of fishery products and to the more complete utilization of byproducts. Statistical studies provided a measure of abundance for most of the commercial and game species, thus furnishing a basis for regulation and assisting in the orderly production and distribution of fisheries commodities.

During periods of world disaster, such as wars and famines, the problem of supplying wholesome and nutritious foods in sufficient quantities is of paramount importance to the Nation—not only as it affects the armed forces, but the country as a whole. Such a condition prevailed during the last World War and is likely to again occur should similar conditions arise.

Under authority of the Secretary and the absolute control of the Bureau of Fisheries, the Alaska salmon in 1917 provided the fisheries resource from which the pack was increased over that of 1916 by about 25 percent, or 2,520,128 cases. This increased production on short notice is indicative of the ability of the Bureau to so regulate these fisheries as to constantly maintain a reserve upon which to draw.

¹ This, the Sixty-ninth Annual Report of the Bureau of Fisheries, is the first submitted to the Secretary of the Interior and the last to be made as the Bureau of Fisheries. In accordance with the President's Reorganization Plan No. II, this Bureau was transferred from the Department of Commerce to the Department of the Interior on July 1, 1939; and by Reorganization Plan No. III it was merged with the Bureau of Biological Survey on June 30, 1940, to form the Fish and Wildlife Service.

The Bureau has remained cognizant of the real and potential value of this vast food resource which has been intrusted to its keeping and, although continually providing the markets of the world with a canned fishery product of unquestioned excellence, it has constantly maintained a balance sufficient that should the need arise, production can again be stepped up to the required level.

In carrying on the work of the Bureau it has been necessary to maintain a number of vessels which, although designed primarily for specialized fishery activities, could readily be converted for use by the Navy in times of national emergency. The Bureau fleet could be augmented by hundreds of fishing craft and thus form a defense unit that would contribute materially to the conduct of naval operations.

SUMMARY

Data on the 1938 catch of fishery products were collected in all sections of the United States and Alaska except the Mississippi River area. The combined catch in the areas surveyed shows a decline of 2 percent in volume and 7 percent in value as compared with the catch in the same sections during the preceding year. Decreased catches were made in each of the geographical sections except the Chesapeake Bay and South Atlantic and Gulf States. Marked declines in the value of the catch occurred in the New England, South Atlantic and Gulf, and Pacific Coast States, and in Alaska. The value of the pack of canned fishery products in all sections declined 21 percent as compared with 1937; byproducts decreased 17 percent; cured fish about 5 percent; and packaged fish, 2 percent.

The total catch of fishery products in the United States and Alaska, as based on the most recent surveys, amounted to 4,253,445,000 pounds, valued at \$93,547,000. Slightly more than 130,000 fishermen were employed in making this catch.

The production of canned fishery products in the United States and Alaska during 1938 amounted to 667,527,840 pounds, valued at \$83,445,889; the output of byproducts was valued at \$30,576,367; the production of frozen fishery products, excluding packaged products, amounted to 117,125,519 pounds, valued at \$7,800,000; and fresh and frozen packaged fish and shellfish, 216,661,255 pounds, valued at \$27,243,645. Based on surveys for 1938 in all sections except the Mississippi River area, and for 1931 in that area, the production of cured fishery products amounted to 102,617,256 pounds, valued at \$14,865,530. It is estimated that about 680,000,000 pounds of fresh fishery products (excluding packaged fish and shellfish) valued at about \$50,000,000 were marketed during 1938. The total marketed

value to domestic primary handlers of all fishery products in 1938 is estimated at \$214,000,000.

INTERNATIONAL RELATIONS HALIBUT INVESTIGATIONS

Under authority of the treaty of January 29, 1937, the International Fisheries Commission continued the regulation of the Pacific halibut fishery and carried on the scientific investigations of the halibut and its fishery, which form the basis for regulation.

The representation of the United States on the Commission was changed during the year. Mr. Frank T. Bell, who had been a member of the Commission since July 31, 1933, resigned effective January 31, 1940. Mr. Charles E. Jackson, Acting Commissioner of the United States Bureau of Fisheries, was appointed to succeed him. The membership of the Commission at the end of the year was: Mr. L. W. Patmore and Mr. A. J. Whitmore, for Canada; Mr. Charles E. Jackson and Mr. Edward W. Allen, for the United States.

Meetings of the Commission were held at Seattle on July 7 and December 12, 13 and 14. At the latter meetings, Mr. L. W. Patmore was elected Chairman and Mr. Edward W. Allen was elected Secretary for the ensuing biennium.

In fulfillment of its regulatory duties, the Commission determined the catch limits necessary for each regulatory area, recorded the catch from each area, forecast and announced the date of attainment of each area limit and closed the areas accordingly. In 1939, areas 1 and 2, which include all halibut-fishing grounds south of Cape Spencer, Alaska, were closed to halibut fishing at midnight July 29. The total catches were 1,068,000 and 24,309,000 pounds, respectively, for the two areas. Of the area 2 catch, 373,000 pounds were taken under permits while fishing for other species after the closure of that area. Areas 3 and 4, which include all the halibut-fishing grounds north and west of Cape Spencer, were closed at midnight October 28 with catches of 25,360,000 pounds and zero pounds respectively.

The 1940 fishing season was opened on April 1 under regulations issued on March 25, 1940. Several changes were made in these regulations to facilitate enforcement and to assure limitation of the catch to the prescribed poundage which is as much as is justified by the present condition of the stock. Possession of undersized halibut was prohibited, fishing was restricted to one area on any one trip, and provision was made for the examination of all records dealing with the landing, purchase, and sale of halibut. At the request of the fleet, the method of closure of area 3 was changed to conform to that of area 2.

Investigations necessary for the fulfillment of the purposes of the treaty were continued by the scientific staff of the Commission. These included the collection and analysis of current statistical and biological data which serve as a measure of the changes occurring in the stocks of halibut as a result of regulation and which are a necessary basis for the continued rational control of the fishery. The biological investigations made necessary the operation of two vessels.

Tagging operations were carried on from a chartered halibut vessel during the winter spawning season in area 2. A total of 1,303 halibut were marked in northern British Columbia and southeastern Alaska. From the recovery of these marked fish it is anticipated that valuable information will be obtained concerning the relationship of the spawning populations to the other stocks within area 2 and regarding the rate at which these spawning populations are being removed by the fishery. Materials for the study of age, growth, sex, and state of maturity were also collected during the operations.

Measurements of halibut landed by the fleet were continued to determine the changes occurring in the size composition of the marketable fish as a result of regulation. Material for the age studies was collected at the same time. Preliminary analysis of the measurements of area 2 fish has failed for the second successive year to show any increase in the average size or in the proportion of larger, and therefore mature fish.

The abundance of halibut as shown by the catch per unit of gear fished did not show the improvement that has characterized the catch of the previous eight years. The abundance in area 2, between Cape Spencer in Alaska and Willapa Bay in Washington, was 12 percent lower in 1939 than in 1938, which brought it back to the 1937 level. No change in abundance from that of the previous year was indicated in area 3, where the stocks are in good condition. Although the abundance in area 2 is still 71 percent greater than in 1930, the last year of unrestricted fishing, the marked decrease in abundance in that area must be regarded with concern in view of the unsatisfactory condition of the spawning stocks there.

The effects of regulation upon the production of spawn in area 2 were again observed by means of net hauls taken at sea during the winter spawning season. Analysis of these observations shows that the decline in abundance of eggs from the peak of 1936-37 was continued for the third consecutive year. While some fluctuations may be expected, due to variations in spawning conditions and spawning stocks, the occurrence of such a continuous decline must be regarded as serious. In view of the decreased catch per skate and the un-

favorable trend in the size composition of the marketable sizes of fish in area 2, the decline in production of eggs indicates a decrease in the abundance of spawners in that region that may be expected to have a further unfavorable effect upon the fishery when the young produced by these spawnings enter the fishery 5 or 6 years later.

The most satisfactory explanation, at the present time, of the unfavorable trend in the area 2 stock must be the large amounts of halibut which are known to have been taken recently, both legally and illegally, in excess of the catch limit assigned to the area. It is apparent that a sharp reduction of these excess catches will be necessary to assure the maintenance of past improvements and to make possible further improvements in the condition of the stock.

The investigations of the Commission continued to measure the changes taking place in the stocks of halibut on the banks. They prove that the halibut fishery is still in a critical condition and that more effective enforcement of regulations is needed. They indicate that more intensive investigations than have been possible in recent years are necessary to guide the Commission's future actions.

THE INTERNATIONAL PACIFIC SALMON FISHERIES COMMISSION

The sockeye salmon season of 1939 was the second since proclamation of the Convention between Canada and the United States for rehabilitation of the Fraser River fishery for that species, one of the greatest of modern conservation projects.

The purpose of the Convention is to rebuild the great runs of sockeye to the Fraser River system of British Columbia. The "big" run of every fourth year until 1913 would be worth \$30,000,000 at present prices, but the largest of recent years has been worth about \$4,500,000. To restore these runs, the International Pacific Salmon Fisheries Commission was created, consisting of three members from Canada and three from the United States, in 1939, as follows: A. L. Hager, Chairman, Vancouver, British Columbia; E. W. Allen, Seattle, Wash.; C. E. Jackson, Washington, D. C.; A. J. Whitmore, Ottawa, Ontario; Tom Redi, New Westminster, British Columbia; and B. M. Brennan, Secretary, Seattle, Wash.

The Commission has selected Dr. W. F. Thompson as Director of Investigations.

It is provided in the understandings attached to the Convention that "The Commission shall not promulgate or enforce regulations until the scientific investigations provided for in the Convention have been made, covering 2 cycles of sockeye salmon runs, or 8 years." The first concern of the Commission during these first years has therefore been the scientific investigations, but the study of natural and artificial

obstructions and the use of methods of assisting propagation have received attention.

As required by the understandings attached to the treaty, the Commission has chosen an Advisory Committee from the industry. It has also chosen a scientific council with which the Director of Investigations and staff can consult.

During 1939, the Commission met in Vancouver on July 2, 3, and 4. The midwinter meetings were held in December 1938 in Ottawa and January 1940 in Washington, D. C. The Advisory Committee met with the Commission during the July meetings. The Scientific Council met with the Director in August.

At these meetings the Commission discussed and approved the program necessary. It agreed upon the funds required, since the money appropriated by the respective Governments would decide whether this program could be carried out. Furthermore, since the expenses of the Commission are joint in character, to be discharged in equal shares by the two Governments, the smaller of the two appropriations made must be the limiting one, and it was agreed that a special effort must be made to secure the needed amount from both.

The needs of the Commission are evident from the nature of its duties. Once established, the main features of the research program must be continued from year to year until the necessary information is obtained over at least one cycle. The sockeye of the Fraser River tends to return as a 4-year-old, so that the runs occur in cycles of 4 years. The runs of each year of the four are assumed by current scientific opinion to be more or less independent, very likely composed of different "races" occupying each a home stream to which it returns. Within a 4-year cycle each such race would therefore recur and any program to determine these races, their characteristics and home streams, must cover at least 4 years. Furthermore, the initial investigations must, of course, be exploratory and preliminary, as they have been in 1938 and 1939, and it must be expected that the funds required will increase as the program matures.

During the meetings in 1939, the Commission discussed and approved the extensions of the program it considered vital for the purposes of the Convention. With the "thorough investigation into natural history" already well under way, it was considered that the remaining duties of the Commission, as stated by the Convention, should receive attention by certain extensions of its program. These extensions are those specifically called for by the Convention. They cover the adoption of methods of assisting propagation and the study of obstructions, natural or artificial, in order that recommendations might be made regarding them. The Commission unanimously de-

cided upon, and has requested of the two Governments, the additional funds necessary to inaugurate the required engineering and biological studies. Until such are received, important phases of the duties outlined by the Convention must remain in abeyance, a fact which the formal action of the Commission emphasizes.

The investigations of the Commission were reviewed at the mid-winter meeting in Washington, D. C. With special emphasis upon facts necessary for regulation, they covered the migrations of the races of adult sockeye, their abundance, rate of movement, and time of passage through salt and fresh water to their spawning grounds. The effect of obstructions upon migration, the extent and nature of the spawning grounds, and factors influencing the success and failure of spawning were surveyed.

As in 1938, sockeye were tagged at Sooke, at various places in Puget Sound and the Gulf of Georgia, and at Hell's Gate in the Fraser River canyon, for study of the migration and habits. The returns were extraordinarily high. At Sooke 1,051 fish were tagged, and 51 percent returned, as compared to 44 percent in 1938. As before, those tagged prior to the first week in July were returned from rivers other than the Fraser. Of other tagging in salt water, 6,152 fish were tagged, and 65 percent recaptured, as compared to 2,587 tagged and 47 percent recaptured in 1938. At Hell's Gate 4,344 fish were tagged and 54 percent returned, as compared to 2,128 and 27 percent in 1938. The operations were continued over the full season, instead of about half as in 1938. Analysis of the returns is underway.

At Hell's Gate the time of passage and degree of obstruction to movement were studied. The run past that point was found to be divisible into sections, each bound for a different part of the Fraser River; exceedingly valuable information for regulatory purposes.

Observers were again stationed at the canneries for sampling of the catch, recovery of tags, and gathering of statistics. Others were stationed in the several sections of the Fraser watershed to estimate and take samples of the escapement, recover tags, survey the grounds, and report on obstructions. As before, there was the closest cooperation with the officers of the Canadian Department of Fisheries.

It was obvious that despite the utmost vigilance, enumeration of the escapement by existing methods was neither accurate nor complete. Accordingly the successful experiment on a relatively simple method tried at Cultus Lake and described in last year's report was this year extended to the Harrison-Birkenhead system, tributary to the Fraser. Traps and weirs were constructed and the runs there studied closely as a preliminary to a more extensive experiment in 1940, if funds become available. It is now clear that here, as in the main river, there

is a definite sequence of runs bound for different sections, and that a large proportion of the sockeye which passed were not subsequently observed in the estimation of the spawning population.

During the year a biometric study was made of the races within the Fraser and in other rivers to which sockeye caught with Fraser River fish are bound. A great mass of data was collected and has now been analyzed in part.

The experiments at Cultus Lake with methods of estimating escapement were carried further. At the same time the experiments on the control of predators and the factors influencing the survival of young, as well as their natural history, originated by the Fisheries Research Board of Canada, were continued.

The collection of statistics and materials for a general history of the Fraser River and its sockeye runs was continued on an extensive scale.

COOPERATION WITH FEDERAL, STATE, AND OTHER AGENCIES

The Division of Fish Culture is vitally concerned in placing its product—fish and eggs—in environments where the greatest dividends will be derived from stocking. Because the Bureau's staff of biologists has been entirely inadequate to conduct surveys of all the inland waters of the United States, fish applications from individuals and clubs are submitted to more than 20 State fish and game commissions for approval before stocking the specified waters with the species requested. In some States the authorities stipulate the species, number, and size that will give best results, while in others the stocking programs have been formulated and the combined output of the State and Federal hatcheries has been budgeted to conform to these programs. The exchange of eggs and fish, especially trout (*Salmonidae*) and related species, has been of mutual benefit in a number of States.

In view of the tremendous amount of angling in the waters within the national forests, there has been close cooperation between the Forest Service of the Department of Agriculture and the Bureau in an effort to maintain good fishing in those areas. More than 20,449,000 fish were assigned to the Forest Service for the stocking of suitable waters during the past year. Trout-rearing units were operated in the Chattahoochee, Natahala, Pisgah, Allegheny, Huron, Marquette, Chequamegon, and Superior National Forests, and approximately 1½ million trout were reared to large fingerling, or legal size before liberation.

The Bureau continued to cooperate with the National Park Service in the restocking of waters under its control. It appears that an all-time record will be established with regard to the number of black-

spotted trout eggs collected from waters in Yellowstone Park this season.

In the Tennessee Valley area, 3-way agreements between the Bureau of Fisheries, the Tennessee Valley Authority, and the States of Alabama, Tennessee, and North Carolina have been made effective. The Tennessee Valley Authority has completed a pondfish hatchery having a water acreage of 111 acres on the Elk River in Alabama. The personnel assigned to that hatchery is now collecting brood stock and treating the pond bottoms to reduce the loss of water through seepage. The hatchery operated at Norris, Tenn., was enlarged during the year. The State conservation departments will distribute the fish produced at these units for the stocking of waters in that part of the Tennessee Valley area within their respective State boundaries.

The New Jersey Board of Fish and Game Commissioners donated the services of its staff for the surveying of potential Federal pondfish hatchery sites in New Jersey. Further assistance was received from various State agencies in setting up W. P. A. projects to cover extensive construction programs at Federal hatcheries.

The Bureau of Reclamation has continued its efforts to preserve the runs of salmon in the Columbia and Sacramento Rivers, where the survival of this species is threatened by huge dam-construction projects. In connection with this work, one of the four salmon hatcheries originally contemplated has been partially completed and placed in limited operation.

CONSTRUCTION ACTIVITIES

The major part of fish-hatchery construction during the year was in continuation of projects previously started. The 1940 appropriation carried funds for the establishment of hatcheries in Illinois and New Jersey, a substation in Maine, and/or the enlargement of the East Orland (Maine) Hatchery. Difficulty in selecting a site, and absence of State enabling legislation, prevented any action in Illinois. In New Jersey it was not possible to obtain a suitable site at a price low enough to permit adequate development.

A site near Salem, Maine, was selected for a small trout-rearing and bass-cultural unit, and the title was cleared late in the year. Construction of this unit was not started prior to June 30. At the East Orland station, buildings and ponds were rehabilitated and provision was made for resumption of the propagation of Atlantic salmon.

All of the appropriations for the above projects were continued available and none of the projects were abandoned.

At the start of the year previously approved hatchery projects at Hebron, Ohio; New London, Minn.; and Farlington, Kans., en-

tered a more active phase of construction. At the two former, appropriated funds were supplemented by W. P. A. allotments, with a large work camp assigned to New London. Construction of the Kansas project was retarded by adverse weather conditions, and none of the establishments were developed to the point where fish-cultural work could be undertaken at the close of the year.

Toward the end of the 1939 fiscal year, allotments of P. W. A. funds were made available which provided \$30,000 for the construction of a bass hatchery at Carbon Hill, Ala., and \$60,000 for the development of fish-cultural facilities in Yellowstone Park. Of the latter sum, \$20,000 was reallocated for the construction of the Glacier National Park hatchery at Creston, Mont. With the exception of the Yellowstone Park project, these jobs were nearing completion at the end of the year. The construction of the Glacier Park hatchery was taken over by the Bureau when the project was in an incomplete status. This work was initiated by the National Park Service, and upon the exhaustion of funds available to that agency it was necessary for the Bureau to assume the responsibility for completion.

W. P. A. allotments totaling \$188,047 were allocated to 20 fish-cultural stations for repairs, improvements, and further developmental work. Among the projects undertaken was the construction of four rearing ponds at Moorefield, W. Va., to serve as an auxiliary to the Leetown (W. Va.) Station. This allotment supplemented the regular construction appropriations. Seventeen projects of a similar nature, which had been financed by W. P. A. allotments during the previous year, were continued in operation until these funds were expended. In addition, several W. P. A. projects were approved under State quotas covering similar work. The flexibility permitted under the procedure of transferring W. P. A. funds to the Bureau has been of great value in meeting unforeseen contingencies at the numerous field stations.

JAPANESE ACTIVITIES IN BERING SEA

As was the case during a number of previous seasons, the Japanese training ship *Hakuyo Maru*, of the Tokio Fisheries Institute, made a cruise in North Pacific waters. She visited St. Paul Island on July 11 and 12, thus giving the students a chance to become familiar with fur-seal operations at the Pribilof Islands.

Crab-fishing operations were conducted again in the season of 1939 by the Japanese vessel *Toten Maru*, accompanied by 3 self-navigating tenders and carrying 10 launches. The chief place of operation was in the open sea between 55° and 57° north latitude and between 163°30'

and 168° west longitude. These operations were discontinued by the middle of May and did not interfere with the salmon fishery in that region.

ALASKA FISHERIES SERVICE

ADMINISTRATION OF FISHERY LAWS AND REGULATIONS

Operations in the Alaska fishery industry were observed closely in all areas by field agents of the Bureau, and regulations with respect to commercial fishing were modified during the progress of the season, as circumstances warranted, to permit the fullest possible utilization of the fishery resources consistent with conservation requirements. The Acting Commissioner of Fisheries spent several weeks in the Territory studying problems of fishery management. Following the close of the fishing season he initiated the policy of holding annual hearings in the various fishing centers in order to obtain the views of those engaged in the industry with regard to regulatory measures.

Revised regulations for the protection of the commercial fisheries of Alaska were issued by the Secretary of the Interior on January 4, to be effective in the 1940 season. The new regulations were based upon the evidence presented at the Alaska hearings and in supplemental briefs, as well as upon data gathered by the Bureau's patrol force and biological investigators. Commercial salmon fishing in the Bristol Bay area was restricted to approximately 50 percent of normal operations for the purpose of rebuilding the weak cyclical run of red salmon which occurs in this area in the years divisible by five. The weekly closed period was increased to 60 hours in the Prince William Sound area and in most sections of southeastern Alaska, in order to provide a more continuous escapement of pink salmon throughout the season. In the southeastern Alaska area commercial fishing for herring was prohibited except by gill nets or for bait purposes, and in the Prince William Sound and Kodiak areas herring-catch quotas were established to prevent depletion. Other changes in the regulations included slight modifications of seasons, limitations upon the size of nets, and restrictions upon waters open to commercial fishing. One feature was the closure of 20 salmon fish-trap sites previously open to this type of apparatus.

Separate regulations were issued on May 28, 1940, with regard to the protection of game fish and other fish in the fresh waters of Alaska, as distinct from the regulations pertaining to the commercial fisheries. The publication of separate sport-fishing regulations was found advisable in view of the rapid development of sport fishing in the Territory in recent years. The new regulations define game fish and

establish limitations on the time, means, methods, and extent of sport fishing in the fresh waters of Alaska.

A congressional investigation of the Alaska fisheries was begun during the summer of 1939 by a subcommittee of 7 members of the Committee on Merchant Marine and Fisheries. The subcommittee was assisted by a joint committee of 4 members from the Territorial legislature. This investigation was concerned primarily with the use of traps in catching salmon, the advisability of maintaining or changing the prescribed fishing seasons, the effect of herring fishing operations upon the salmon fishery, offshore fishing by foreign nationals for crabs and salmon, and other matters concerning the conservation of the fisheries of Alaska and a reasonable development of the fishing industry.

The congressional committee held public hearings at nine important fishing centers in Alaska and one hearing in Seattle, Wash., in the course of the investigation. At each hearing supplemental statements and briefs were invited, and these, together with much additional information of a factual nature, were made a part of the record of the hearings. A report of the investigation, together with recommendations of the committee, was published as Report No. 2379 under date of June 5, 1940.

Dr. Carl L. Hubbs, of the University of Michigan, was engaged to make a special investigation of the fisheries of Alaska on behalf of the Secretary of the Interior in the season of 1939. Dr. Hubbs covered the Territory widely, including a visit to the Pribilof Islands, and upon his return in the fall submitted an exhaustive report.

Under the authority granted by the act of August 2, 1937, for the protection of oyster culture in Alaska, a 6-year lease was executed for 100 acres of bottoms in Alaska. This is the third such lease to be executed under the act. An output of 52 gallons, or 455 pounds of oysters was produced in the Ketchikan district in 1939. This is the first reported commercial production of oysters in Alaska waters, although there has been some experimental cultivation since 1931.

A patrol of the fishing grounds was maintained by 14 Bureau vessels, 1 chartered vessel, 5 speedboats of the Bureau, and numerous small craft. As in previous years, chartered airplane service was used to some extent to supplement the vessel patrol, and also for surveys of spawning grounds and transportation of officials to isolated districts. One hundred and seventy-eight persons were identified with fishery law-enforcement work, including stream guards, weir operators, crews of patrol vessels, wardens, and biologists.

In a few isolated regions, funds provided by the Territorial legislature and by local fishery operators were used to continue the payment

of bounties on predatory trout that feed upon salmon eggs and fry. This work is administered by the Bureau in connection with the regular patrol of fishing grounds. Studies of the Dolly Varden trout were continued in the Kodiak area, and considerable numbers of these predators were destroyed by employees in charge of salmon-counting weirs.

PRODUCTS OF THE FISHERIES

The total production of the Alaska fishery industry in 1939 was somewhat less than in the previous year, notwithstanding an increase in the number of plants and persons employed in the industry. The total output was 368,536,000 pounds, valued at \$40,104,000, as compared with 446,664,000 pounds, valued at \$42,870,000, in 1938. The estimated value of the 1939 catch to the fishermen was about \$11,321,000, or approximately \$719,000 less than in the preceding year. There were 30,572 persons employed in the various branches of the industry, as against 28,084 in 1938.

Salmon products represented 73 percent in volume and 91 percent in value of the total fisheries output in Alaska in 1939. Ninety-three percent of the salmon products consisted of canned salmon, the pack amounting to 5,263,000 cases, or 252,631,000 pounds, valued at \$34,-441,082. Red salmon comprised 37 percent and pinks 48 percent of the total pack of canned salmon, as against 37 percent and 47 percent, respectively, in 1938. As compared with the pack in the preceding year, the output of canned salmon in 1939 showed a decrease of about 23 percent in quantity and about 6 percent in value. One hundred and nine canneries were operated in Alaska in 1939, or 11 more than in the previous year, and the number of persons employed in the salmon-canning industry increased from 22,280 in 1938 to 24,921 in 1939.

There were 21 herring plants operated in 1939, as compared with 17 in the previous year. Products of the herring fishery were valued at \$2,090,000, an increase of about 2 percent over 1938. Halibut landings were slightly less in 1939 than in the previous year, and many of the minor fishery products, including clams, shrimp, and crabs, also were less than in 1938.

ALASKA FUR-SEAL SERVICE

General Activities

Sealing and foxing operations were carried on as usual by the native inhabitants of the Pribilof Islands under the supervision of the Bureau's staff. Approximately 80 additional natives from the mainland and Aleutian Islands were employed during the summer to assist with fur-seal activities, and 25 employees of the Fouke Fur Co. also

were detailed to the islands for several months to assist in the curing and packing of the skins.

The byproducts plant on St. Paul Island was in operation again, rendering oil and meal from seal carcasses and blubber. The total production for the season amounted to 32,809 gallons of oil and 502,914 pounds of seal meal. Small quantities of these products were retained at the islands to be used for fox food, but most of the oil and meal was shipped to Seattle for disposition. About 75 tons of seal meal was delivered to the Division of Fish Culture for use in Federal fish hatcheries, and the surplus meal and oil were sold through competitive bidding for the account of the Government.

Four new frame houses were built for natives on St. Paul Island, and a new machine shop was almost completed. Other improvements included an addition to the boatways, the erection of a small pump-house, and the building of a reindeer corral. On St. George Island a new bunkhouse for natives was completed.

Annual supplies for the Pribilof Islands were transported from Seattle aboard the U. S. S. *Capella*, through the cooperation of the Navy Department. The Coast Guard also rendered valuable cooperative service in patrolling waters of the North Pacific and Bering Sea for the protection of fur seals and sea otters, and in giving other assistance in the Bureau's work.

The entire season's take of sealskins was shipped to St. Louis, Mo., to be processed and sold at public auction by the Fouke Fur Co. for the account of the Government, under the terms of the contract of June 9, 1939. In accordance with the terms of the fur-seal treaty of 1911, Japan will receive a 15-percent share in the proceeds of sale, and Canada will receive a like share. The Government of Canada discontinued the previous arrangement for taking delivery of the skins in kind.

The United States received a shipment of 210 Robben Island fur-seal skins, or 10 percent of the number taken by Japan in 1939. This represents the annual share due this country under the terms of the fur-seal treaty. The Department's selling agents at St. Louis, Mo., received the skins for processing and sale.

Seal Herd

The total number of animals in the Pribilof Islands fur-seal herd as of August 10, 1939, was 2,020,774. This is an increase of 148,336 over the computed number in the preceding year.

Take of Sealskins

In the calendar year 1939 a total of 60,473 fur-seal skins were taken on the Pribilof Islands, or 2,109 more than in the preceding

year. Of the total number 47,646 were taken on St. Paul Island and 12,827 on St. George Island. Insofar as possible the killings were confined to 3-year-old males, and a sufficient reserve of this age-class was left for breeding stock.

Sale of Sealskins

In the fiscal year 1940 two public auction sales of fur-seal skins were held at St. Louis. At the sale on October 2, 1939, a total of 21,764 Pribilof Islands sealskins sold for a gross sum of \$463,338.25. The sale included 8,030 skins dyed black, 8,516 dyed Safari brown, 5,100 dyed Matara brown, and 118 raw and partly processed skins. Matara brown is a recently developed color which was offered at this sale for the first time and proved very popular. On April 1, 1940, a total of 28,749 Pribilof Islands sealskins sold for a gross sum of \$585,687. This sale included 9,599 skins dyed black, 9,595 dyed Matara brown, and 9,555 dyed Safari brown. In addition, 210 sealskins from Japan and 2 confiscated skins brought \$3,150.75.

Sealskins disposed of at private sales, under special authorization by the Secretary of the Interior, consisted of 277 dyed black, 170 dyed Safari brown, 265 dyed Matara brown, and 32 raw-salted skins, which brought a total of \$17,224.89. In all, 51,469 fur-seal skins were sold for the account of the Government in the fiscal year 1940 for a total gross sum of \$1,069,400.89.

Foxes

The management of the blue-fox herds on the Pribilof Islands continued to be one of the important activities. During the winter of 1939-40 a total of 1,258 fox pelts were taken, including 377 blue and 8 white pelts from St. Paul Island, and 869 blue and 4 white pelts from St. George Island. Sufficient stocks were reserved for breeding purposes on both islands.

In the fiscal year 1939 there were sold at public auction 1,018 blue- and 11 white-fox skins taken on the Pribilof Islands in the 1938-39 season. The blue pelts brought \$17,001.50, and the white pelts brought \$143, a total of \$17,144.50.

Fur-seal Skins Taken by Natives

The privilege of taking fur seals at sea is granted to aborigines dwelling along the Pacific coast, under provisions of the North Pacific Sealing Convention of July 7, 1911, although such sealing is restricted to primitive methods. In 1939 Indians under the jurisdiction of the United States took 61 fur-seal skins, and Indians under the jurisdiction of Canada took 576 sealskins, all of which were duly authenticated by officials of the respective Governments.

Fur-seal Patrol

Ten vessels of the Coast Guard were instrumental in enforcing the laws and regulations for the protection of fur seals and sea otters in the North Pacific and Bering Sea. One vessel of the Bureau of Fisheries also was assigned to patrol waters off the coast of Washington during the period of sealing operations by the native Indians.

Protection of Sea Otters, Walruses, and Sea Lions

Regulations for the protection of walruses and sea lions were continued in effect without change. The capture of these animals is permitted only under certain limited conditions. Sea otter investigations were made at the Amchitka substation, and for the first time observations were continued throughout the year. The killing of sea otters is prohibited at all times.

PROPAGATION AND DISTRIBUTION OF FOOD AND GAME FISHES

While subsequent revision may alter the totals slightly, it is evident that the output of fish and eggs at the Federal hatcheries during the fiscal year 1940 approximated 7,400,000,000. In comparison with the 8,042,000,000 production of the previous year, there was a reduction of approximately 7.9 percent, or 640,000,000 fish and eggs. This drop is in part attributed to a curtailment in production of cod, haddock, and flounders. Activity with this group is governed by weather conditions, and the intensity of local commercial fishery operations. Both of these factors were adverse during the winter of 1939-40, with a consequent retarding of the hatchery functions.

The principal reason for the apparent slowing down of Federal fish-cultural work was the fact that the production of whitefish and pike-perch, hitherto shown as derived from the Put in Bay (Ohio) Station, was dropped from the records. This work was taken over by the Division of Conservation of the State of Ohio, preparatory to the formal transfer of the hatchery property to the State, as authorized by Congress. This station produced its usual quota of these two species but is listed as a State activity, and its output is omitted from the Federal records. This situation was, therefore, responsible for a reduction of 340,000,000 fish and eggs as reported by the Bureau of Fisheries, although the hatchery continued its service to the fishing industry.

As a matter of fact 24 different species were distributed in increased numbers, among them 6 species of trout and one variety of Pacific salmon. Increases were also registered for shad, striped bass, buffalofish, and lobster. There was a reduction of approximately 1,000,000 in the output of the black basses, which are also

subject to adverse weather conditions during the spawning season. Some 45 different species were handled at the various hatcheries.

Despite the reduction in the total output there was little change in the actual number of the fingerlings and larger sizes of game fish. It is gratifying to note that the production of game and pan species amounted to 151,723,000, an actual as well as proportional increase. These forms comprised 2.5 percent of the total output, but it must be recognized that practically all of the species propagated are sought for recreation at certain times or places.

As maintenance of a continuing stock of food fishes, particularly in coastal waters, contributes to a stable economy, and as maintenance of a well-grounded recreational asset in the form of angling contributes to a sound morale, the Department's fish-cultural functions have made their contribution to the basic elements of national defense.

PROPAGATION OF COMMERCIAL SPECIES

Stormy winter weather prevailing off the New England coast limited the activities of the smaller commercial fishing craft operating in the inshore waters. The spawntakers based at the hatcheries at Gloucester, Mass., and Boothbay Harbor, Maine, were therefore unable to obtain and fertilize the usual quantity of cod and haddock eggs. During the pollock season conditions were more favorable, resulting in an increased rate of salvage for this species. At Woods Hole, Mass., there was difficulty in obtaining an adequate supply of spawning flounders, resulting in approximately 50 percent reduction in the egg collections. Experiments in planting the flounder fry in Narragansett Bay and Long Island Sound were continued, though on a reduced basis.

At Boothbay Harbor, Maine, improved production of fourth-stage lobster fry was attained by heating the water supply for the hatchery. This practice was intensified in handling the lobster hatch during the summer of 1940, and was adopted at the rearing plant maintained by the State Department of Sea and Shore Fisheries.

The aggregate output of fish and eggs from these three stations exceeded six and one-half billion, of which over five and one-half billion comprised fertilized eggs recovered as a salvage measure.

Pacific salmon.—Exhaustive investigation by Bureau biologists, and the report of an independent board of consultants, has indicated that enlarged hatchery operations will constitute one of the most important elements in a plan for maintaining the run of salmon in the Columbia River. There is evidence that the same conclusion may be reached with reference to the Sacramento River in California. The mammoth hatchery developments under construction by the

Bureau of Reclamation in and near Leavenworth, Wash., were not in full operation at the close of the year. It was expected, however, that part of the 1940 run of salmon would be handled at this plant.

The existing salmon hatcheries located on the Rogue River, on Puget Sound, and at Quinault, Wash., as well as on the two rivers mentioned above, produced an aggregate output somewhat less than the previous year. The greatest reduction was with the chinook salmon, the difference being 13,000,000. Fewer chum salmon were propagated. There was a slight increase in the output of silver salmon, with the production of the valuable sockeye species practically unchanged. Nearly one-half million humpback salmon were provided, this being the year for the 2-year cyclic run of this species.

The salmon hatcheries also propagated steelhead trout and were successful in doubling the output of this much-sought game fish. The hatchery at Little White Salmon, Wash., has been in process of reconstruction during the year, and minor improvements, mainly new ponds, were developed at several other points. Hatcheries at Mill Creek and Battle Creek, Calif., were inundated during the floods which visited the Sacramento Valley, but damage to property was negligible and loss of fish was slight.

Anadromous species, Atlantic coast.—For the second successive year the production of shad was increased, totaling 42,000,000 in comparison with 34,000,000 during the previous year. The James and Chickahominy Rivers in Virginia were served by the pondfish station near Roxbury, Va., where previous attempts at shad culture had been largely unsuccessful. Experiments in the rearing of shad fry in ponds were continued, the results indicating that this practice may be a valuable supplement to present methods when suitable ponds are available. Yellow perch and white perch were also propagated at the shad stations on the Potomac River and Albemarle Sound. A production of almost 6,000,000 striped bass fry at the hatchery on the Roanoke River in North Carolina represents the highest level attained with this species in many years.

Of outstanding interest is the resumption of the propagation of Atlantic salmon in Maine. After working out preliminary plans in cooperation with the Maine Department of Inland Fish and Game, the facilities of the East Orland Hatchery were improved. A few thousand salmon eggs were obtained from the Dennys River run in the fall. These were hatched and are being reared to fingerling size before planting. During the spring approximately 100 migrating salmon were taken from the fish ladder at Bangor, Maine, and transferred to a holding pool prepared at the hatchery. Losses of injured fish were slight, and at the close of the year this relatively small stock of brood salmon was in good condition and prospects were favorable

for the collection of several hundred thousand eggs. While the work is of limited magnitude in comparison with the scope of the activity in earlier days, there is every reason to hope that the restoration of the Atlantic salmon is definitely under way.

Commercial species, interior waters.—With the transfer of the Put in Bay (Ohio) Hatchery activities to the control of the State of Ohio, the culture of Great Lakes species is markedly limited. A limited number of lake trout, whitefish, and lake herring eggs were obtained for the Cape Vincent, N. Y., and Duluth, Minn., stations. At the latter point most of the lake trout eggs were supplied by the State of Michigan. The State also supplied lake trout fry which were transferred to the Charlevoix (Mich.) Station, which has been reconditioned as a rearing unit. Losses were heavier than was anticipated, and the fingerlings were released before they had attained the desired growth. However, the effort was repeated during the spring of 1940, and at the close of the fiscal year approximately one-half million lake trout fingerlings were thriving and growing rapidly. It is believed that the planting of lake trout at a larger size will, to a large extent, compensate for smaller numerical output.

The production of pike-perch was only a small fraction of the output of previous years, the reduction being due to the transfer of the hatchery on Lake Erie which has produced the bulk of the eggs of this species. Aside from the Great Lakes species, the commercial fishes of interior waters comprise mainly the carp, buffalofish, and catfish. Since the supply of carp appears to be holding up well, no effort was made by the Bureau to propagate that species during 1940. In the case of buffalofish and catfish there was a significant increase in the planting of eggs and fish. The buffalofish were planted almost entirely in the Upper Mississippi area.

Game species.—Inasmuch as the game and pan species of interior waters are subject to angling exploitation of increasing intensity, special attention was given to the culture of these species. All varieties of trout were distributed in larger numbers, and in many instances in larger sizes. It has been recognized that smaller local waters, farm ponds, and State and county parks, if well stocked with common panfish, present a recreational asset of great importance to a very large part of the population. Consequently the production of the sunfishes, catfishes, and lesser game fishes has been augmented for the purpose of maintaining a supply of fish in waters which may not be frequented by the more ardent angler. Most of the new hatchery developments have been planned with this object in mind. Certain advances and improvements have been effected in hatchery technique, but the actual stocking of the waters them-

selves remains the principal function in which effectiveness can be increased.

At the close of the year the Bureau assumed responsibility for a trout hatchery and rearing unit constructed by the Forest Service on Warm River, Idaho. The site is considered one of the best in the Western United States. A few Dolly Varden trout were propagated, although its low esteem by the anglers discourages any general attempt to increase its abundance. Efforts of several years duration to establish the smallmouth bass in the Southwest appear to have been crowned with success, although additional time will be required for the species to become abundant. The Bureau has continued to experience a shortage of Loch Leven trout, following the virtual elimination of the egg supply previously obtained from the Madison River in Montana. Substitution of a domesticated brown trout stock has been resorted to as a means of overcoming the deficiency. One of the railway distribution cars was retired from service during the year, since the fleet of distribution trucks has been built up to a point where transportation by highway largely supplants movement by rail.

A new demand for warm-water fish has developed as a result of the program of farm pond construction sponsored by the Soil Conservation Service. Although these requirements and the demands for stocking other waters under direct Federal control have been given priority, the percentage of unfilled applications from private individuals and organizations has remained at a low level.

Shipments of rainbow trout eggs were made to Puerto Rico, Hawaii, and to the Republic of Colombia. A successful hatching season during the winter and spring provided an excellent stock of young fish which were being held for rearing and subsequent distribution at most of the stations at the close of the year.

Upper Mississippi Wildlife and Fish Refuge.—The traditional salvage or rescue of stranded fishes in the overflow areas was virtually terminated. The Bureau's policy of constructing propagating ponds at suitable points within the refuge was fully justified by the production achieved at Genoa, Wis., Guttenberg, Iowa, and several other points. The yield of bass was so great during the summer of 1939 that distribution facilities were taxed to the limit. The 1940 hatch was not as heavy, but the production was of great value in maintaining the supply of fish in the great recreational areas in Minnesota and Wisconsin. In addition to this type of fish-cultural work, the headquarters station at LaCrosse, Wis., also provided a large quantity of trout for the same areas.

DIVISION OF FISHERY INDUSTRIES

The Division of Fishery Industries is concerned with the activities and welfare of the commercial fisheries and fishery industries. Its work includes the planning, supervising, and conducting of: (1) The Fishery Market News Service; (2) fishery statistical surveys; (3) investigations in fishery technology; and (4) investigations in fishery economics and marketing, including the administration of the Fishery Cooperative Marketing Act.

Studies and investigations are planned particularly to promote the more orderly marketing of fish and shellfish, to develop commercial uses for little-known or little-used fishery products, and new uses for the better-known species and commodities, and to improve the technology of capture, manufacture, handling, and marketing. This work tends toward the elimination of waste in marketing, and greater utilization of the fishery harvest. Consequently, it accomplishes an important function in conservation. This is imperative, since obviously haphazard and wasteful marketing and technological practices result in a greater drain on the resource for the same volume entering consumption. Thus, the types of activities conducted are of great value in maintaining the important food and industrial resource represented by fish and other aquatic forms, particularly in view of the possibility of a national emergency.

FISHERY MARKET NEWS SERVICE

Essentially, the fishery market news service constitutes the exchange of market information between the fishermen or producers in the fishing areas, and the middlemen in the terminal markets, with the Bureau of Fisheries acting as the exchange agency; that is, the agency for collecting and disseminating market information. The Market News Service now maintains six field offices from which daily reports are issued. These are located at New York, N. Y.; Boston, Mass.; Chicago, Ill.; Seattle, Wash.; Jacksonville, Fla.; and New Orleans, La. The locations of these field offices have been so carefully chosen that the current data collected and disseminated through them cover some phase of the marketing of about one-half of the 3,000,000,000 pounds of fish and shellfish taken annually for food in the United States and Alaska.

New York City was selected for the first Market News office, since it is the center of this country's most important consuming area and the market to which fishery commodities are shipped from all parts of this Nation and from foreign countries. This market exercises considerable influence over production and prices of fishery products throughout the country.

The choice of Boston for a Market News office was due to its importance as the center of New England's valuable fisheries and as a port of landing for large quantities of fish. Thus, Boston is primarily an office for the reporting of production.

Chicago is probably the most important inland market for fishery products. Much of the harvest of fresh-water fish from the Great Lakes and other interior waters is shipped to this city's wholesale market for distribution. Chicago also receives large quantities of Eastern haddock and rosefish, Western halibut and salmon, Gulf coast shrimp and red snapper, and large quantities of Canadian fresh-water varieties.

Seattle is of importance particularly as a landing port for the halibut fisheries of the Pacific Northwest. It also is of importance as a port of landing for salmon in the fresh and frozen fish trade and for other species common to the Pacific coast.

Jacksonville is of importance as an assembling, distribution, and shipping center through which most of Florida's fish pass when destined for northern markets. Consequently, market information emanating from this office is of greatest value to both northern and southern producers, shippers, and dealers.

New Orleans is the largest centrally located city in the Gulf States, which are important in the production and distribution of many fishery commodities; particularly shrimp. Consequently, this city offers unusual facilities for the collection and dissemination of valuable fishery market news data.

In addition to the coverage of market news in these producing, consuming, or distribution centers, the daily releases from each office are augmented by pertinent data telegraphed to it from the other offices, as well as from market news reporters located at important producing points along the coasts.

During the past year the Market News Service has completed arrangements for the daily broadcasting of market news information from radio stations at Boston, Chicago, Jacksonville, and New Orleans, and is making arrangements for similar broadcasts in other cities. Periodic market news reports also are prepared and disseminated from the Washington office. These include summarized data made available through the daily and monthly reports of the field offices as well as articles relating to the commercial fisheries and other related information.

STATISTICAL INVESTIGATIONS

The collection of fishery statistics was one of the earliest activities of the Bureau of Fisheries, and the supplying of these data has continued to be a major function. Fishery statistics are collected to serve

biological and economic purposes. Since the fisheries are usually prosecuted in areas not under private ownership, the problem of their conservation is of national concern. It therefore is important that the Federal Government keep close watch over the condition of the various fisheries in order that depletion may be anticipated in time that remedial measures can be successfully taken. Thus, current statistical data must be obtained on the yield of our fisheries. These figures furnish the biologist with the background from which he estimates future trends and yields. In addition to their value in the conduct of conservation studies, the Bureau's statistical surveys form the basis for information of greatest importance to guide the fishery trade in the conduct of its business activities.

Sectional surveys.—The basic statistical surveys are those for the various geographical sections. These cover complete statistics of the volume of the catch of fish and its value, employment in fishing, quantity of fishing gear used, number and classification of fishing and transporting craft, employment in wholesale and manufacturing establishments, and the volume and value of manufactured fishery products and byproducts. The first comprehensive survey of this type was made for the year 1880. Surveys following 1880 until recent years were periodic, or covered a limited number of States or areas in any single year. Currently, however, complete statistical surveys of the commercial fisheries in all marine and lake sections are being made. Detailed tabular statements based on the sectional surveys are published annually.

Landings at certain important United States ports.—In addition to the basic sectional surveys, the Bureau also conducts various local or special surveys. These include the daily collection of data on the landings of fishery commodities by fishing vessels at the ports of Boston and Gloucester, Mass.; Portland, Maine; and Seattle, Wash. Statistical data for the New England ports are recorded according to the fishing areas from which the catch is taken and gear used in capture. Consequently, this information is most important in following the trend of the yield of the important North Atlantic species. Data on daily landings at Seattle are of equal importance in following the trend of the fisheries for halibut and other North Pacific forms. Data on these landings of fishery products are published monthly.

Shad and alewife fisheries.—Shad once entered the streams of the Atlantic coast, on their spawning migration, in much greater numbers than they now do. Two of the most important streams of present spawning migrations are the Hudson and Potomac Rivers. Consequently, in order that detailed data may be available for the study of these fisheries, annual surveys are made of the production of shad

in these rivers. Annual surveys are also made of the catch of alewives in the Potomac River.

Canned fishery products and byproducts.—Since 1921 annual surveys have been made to collect statistics on the production of canned fishery products and byproducts of the United States and Alaska. These data are of importance to the industry as a guide in their manufacturing activities. This information is published annually.

Cold-storage holdings of fish.—Through the cooperation of the Agricultural Marketing Service, Department of Agriculture, statistics are collected and published monthly on the cold-storage holdings of fishery products and quantities frozen by important species or groups of species. These figures are shown separately for major geographical sections. Since holdings of fishery commodities in cold storage represent a considerable portion of the available supply of fishery commodities on hand at any one time, these data are eagerly sought by the fishery industry. Monthly cold-storage bulletins are published.

Sponge market, Tarpon Springs, Fla.—The domestic sponge fishery is confined to the State of Florida, and a large part of the production is sold through the Sponge Exchange at Tarpon Springs. In view of the importance of this exchange in the total domestic sales transactions of the industry, the Bureau obtains and publishes statistics of the quantity and value of sponges by variety classifications which are handled through the exchange each year.

TECHNOLOGICAL INVESTIGATIONS

The principal objective of fishery technological investigations is to increase the economic value of the aquatic harvest by more complete and efficient utilization. Toward this end studies are conducted of the technical phases of fish production, processing, and marketing. In planning these studies efforts are made to select those which have the broadest fundamental application. The value of technological investigations does not end with their application to the fishing industry, as other American industries also make extended use of the results of this work. For example, the Bureau pioneered in this country in the development of quick-freezing methods as adaptable to the preservation of fishery products. These methods now have widespread application in the preservation of fruits, vegetables, poultry, and meat. In another instance, a search for new sources of vitamins A and D was conducted and it was found that oils from many species of fish are rich in these vitamins. A direct outgrowth of these investigations is the production of oils having a high vitamin content from the livers and viscera of various species of fish such as halibut, tuna, and swordfish. This work has resulted not only in raising the income of the fish-

ery industries through the sale of products heretofore wasted, but it also has been most valuable to the drug industry. Of outstanding importance, however, is the contribution of this work to the health of our people by providing an economical and convenient source of vitamins A and D.

It should be pointed out that technological work, through studies which promote the greater utilization of domestic aquatic forms and through the development of new uses for these commodities, is making the people of the United States less dependent upon foreign sources, which is vitally important in view of present world conditions.

Specifically, the technological work of the Bureau during the past year has dealt with problems in the preservation of fishery products for food, in the manufacture of fishery byproducts, and in the nutritive value of aquatic products in general.

Preservation of fishery products for food.—Studies on the preservation of fishery products for food are conducted in the fields of chemistry, biology, and engineering. Their purpose is the improvement of the quality of fishery food products; the development of scientific tests for judging the quality of fishery products; the development of methods for further improving sanitary conditions in fish-packing plants; and the development of additional fresh, frozen, cured, and canned fish foods. During the past year there were many requests for research on problems of this type. This is indicative of the desire of the fishery industry to place on the market food products which will meet the most exacting requirements as to quality and wholesomeness, and to make the most effective use of the fishery harvest. Not only has the fishery industry been instrumental in having these studies conducted, but it has been quick to adapt to commercial practice many of the recommendations resulting from this work.

Manufacture of fishery byproducts.—Investigations in the manufacture of fishery byproducts have been particularly concentrated on the economic utilization of salmon cannery trimmings and fish livers and visceral organs; the preparation of fish meals of improved nutritive value; the problems of the storage of fish meal; oxidation of fat in fish meal; and the solubility of fish proteins.

Nutritive value of aquatic products.—Studies on the nutritive value of aquatic products have always occupied an important place in the fishery technological investigations because the food value of a product ready for marketing is, in most instances, the true yardstick or measure of the value of a new method of processing or an improvement in existing methods in the industry. For example, assuming that costs of processing are equal in each case, if a new method of manufacturing fish meal or a new method of freezing fish filets pro-

duces a finished product of better quality, measured in terms of food value, than that is a true estimate of its worth or justification for its commercial application.

The problems undertaken in this field during the past year have been concentrated on determination of the nutritive value of the edible portion of fishery products, more particularly the biological value of the protein. Considerable effort has also been expended on evaluation of the feeding value of fish meals and a study of changes resulting from conditions of processing and storage.

Study was also made of the biological value of the protein of salmon taken under different physiological periods such as prior to migration, during migration, and, finally, spawning. Acute and chronic toxicity tests with certain kelp products, Irish moss, and agar, have also been carried out.

ECONOMIC AND MARKETING INVESTIGATIONS

There was a constant demand throughout the year for economic studies of the various phases of the commercial fisheries and the marketing of fishery commodities. The limited facilities of the Bureau make it possible to conduct only a very limited number of large-scale studies of these types. During the past year, however, a rather extensive survey of the retailing of fresh and frozen fish was made. Data thus far reviewed show that the volume of sales for fish was small for most of the stores surveyed. The sales of nearly 40 percent of the 4,000 retail stores handling fish, which were included in the survey, averaged less than \$100 per week during 1938. For about 30 percent of the stores, sales of fish averaged between \$10 and \$29 per week and less than 30 percent reported fish sales in excess of \$29 per week. The 4,000 stores handling fresh fish were located in both commercial and residential sections of about 50 representative cities in the eastern section of the United States. Included among these stores were nearly 1,200 chain stores, over 2,000 independent stores and voluntary chain stores, and about 400 fish markets. Preliminary results of the study indicate that very few stores have extensive facilities devoted to fish sales. Frequently fish are handled on only two or three days of each week, and on these days fish are allocated a small part of the space usually occupied by meats. A large percentage of the stores reported that the fish business is profitable, and some operators indicated that fish was the most profitable item handled. However, many owners and managers of stores evidenced little interest in fish sales and consequently devoted little effort to promote this phase of their business.

It is expected that a great deal of information valuable to retail fish dealers and allied interests will become available upon the completion of the tabulation and analysis of the large volume of data collected in the course of this survey.

Work in connection with the administration of the Fisheries Cooperative Marketing Act was continued during the year. Such work particularly took the form of collecting, analyzing, and disseminating information. This unit of the Bureau offers an advisory service to fishermen who are considering the desirability of forming cooperatives.

Other studies relating to the economics of the fisheries or the marketing of fishery commodities conducted during the year included investigations of the surplus-fish situation; a compilation of the magnitude of the commercial fisheries of the world; the assembling of data on the commercial fisheries as a source of employment; a study of the significance of byproducts to the fishery industries; a review of the rosefish fishery of New England; and studies of such specific fisheries or industries as the Chesapeake Bay soft-crab industry, the shark fishery of the South Atlantic coast, and the Pacific coast oyster industry.

BIOLOGICAL FISHERY INVESTIGATIONS

The primary purpose of all biological fishery investigations is to insure a continuing supply of fish and shellfish for food and industrial purposes. The measurement of the drain on existing resources, the determination of withdrawals that may be made without endangering future supplies, and the development of devices or procedures to protect undersized fish from wasteful and destructive methods of fishing are of fundamental importance from the standpoint of conserving an important food resource. In time of war or threatened war increased exploitation of the fisheries is inevitable. The progress of fishery biology since the first World War will prevent a repetition of many of the serious mistakes made during that period, when certain fishery resources were reduced to dangerous levels by uncontrolled exploitation. It is essential, however, that the programs of investigation that are now in progress, and that are providing information essential to proper fishery management, should be continued without interruption through any period of national emergency if our aquatic resources are to be safeguarded.

North Atlantic fishery investigations.—Biological fishery investigations in North Atlantic waters are concerned primarily with determining the size of available stocks of fish, measuring fluctuations

in abundance of these stocks from year to year, and discovering how large a catch may be made each year without impairing the future productiveness of the stock. For approximately 10 years such a study has been under way for the haddock, which supplies a larger yield than any other New England food fish. It has been demonstrated that in the Georges Bank area, which accounts for the major part of the catch, fluctuations in the abundance of commercial-sized haddock follow regular cycles, which are related to similar cycles in the number of young that survive to commercial size. When years of intensive exploitation of the stock happen to coincide with years of poor survival of the young, a sharp decline in haddock abundance may be expected. Extensive data collected and analyzed by the staff have provided an index of the size of the haddock stocks on Georges Bank for the period from 1914 to 1937. Because of changes in the size and composition of the fleet and the adoption of new gear which in itself increased the effectiveness of fishing operations by at least 29 percent, the catch records alone are no indication of the abundance of haddock, but must be subjected to elaborate statistical analysis before the size of the available stocks may be ascertained.

Mackerel landings on the Atlantic coast in 1939 were considerably smaller than in 1938, although the early months of the 1940 season were marked by a slight upward trend. There has been, moreover, a steady decline in the number of purse-seine vessels engaged in mackerel fishing, with the 1940 fleet the smallest in many years. Investigation of the mackerel fishery has brought to light many significant facts related to the distribution, spawning habits, growth rate, and migrations of the species. While progress has also been made toward determining measures of abundance and predicting changes in the availability and abundance of the mackerel, final solution of these problems awaits offshore investigations from the newly acquired fishery research vessel *Albatross III*.

The various species of groundfish, including the haddock, cod, pollock, rosefish, cusk, hake, and several species of flounders, form the basis of the most important New England fisheries. Fluctuations in the total yield of these fishes have been noticed in past years, but until a biological study of groundfish was begun in 1938 the causes and extent of these fluctuations were unknown. Indices of abundance are now being constructed for each species. When these indices are completed and the requisite knowledge of the life history becomes available for each species, it will be possible to suggest means of maintaining the population at that level which will yield the largest sustained annual catch.

The lobster is of paramount importance to the shore fisheries of the North Atlantic States, since it furnishes a large part of the income of great numbers of small-boat fishermen from Maine to New Jersey. The decline of the lobster catch to approximately one-third of its former level, in spite of vast increases in the amount of gear fished, led to a cooperative investigation by the Bureau of Fisheries and the State of Maine. The primary purposes of this study are to develop improved methods of lobster rearing and to determine the proper legal-size limit. Measurement of lobsters caught commercially along the Maine coast indicates that only about eight percent of the lobster population has an opportunity to spawn, suggesting that present size limits result in both an economic and biological waste. Further research on this problem is in progress.

The past year witnessed increased interest in the restoration of Atlantic salmon. In cooperation with representatives of Maine and other North Atlantic States, a cooperative program designed to restore and maintain salmon runs in favorable New England streams has been prepared. It is hoped that unified support will be accorded this program so that it may be put into effect in the near future.

Middle and South Atlantic fishery investigations.—Additional study of the Atlantic coast shad fishery provided confirmation of the opinion expressed a year ago—that the principal cause of depletion is overfishing rather than pollution or obstruction of runs, and that recovery can best be brought about by providing a spawning escapement in such depleted areas as the Chesapeake Bay and the waters of North Carolina which will be substantially equivalent to that which has proved adequate in the Hudson River. Investigations in 1939 also demonstrated the important fact that the moderate fishing rate in the Hudson eventually takes as many shad from each year-class as the more intensive fishery in the Chesapeake, but by spreading the catch over several years allows six times as much spawning from each year-class. Recommendations have been made to the conservation departments of Maryland, Virginia, and North Carolina to the effect that the fishery should be reduced to 60 percent of its present magnitude by restricting the amount of gear licensed.

As a means of securing greater yields and larger profits from each brood of striped bass, regardless of its relative abundance, the Bureau of Fisheries recommended the establishment of a minimum-size limit of 16 inches, measured from the snout to the fork of the tail. This recommendation was adopted by New York during 1939. A slightly higher size limit is in effect in New Jersey. Recommendations for substantial increases in the size limit have been submitted to the fishermen by the Virginia Commission of Fisheries and similar action

is expected in Maryland and North Carolina. A survey of Chesapeake Bay and the coastal regions from Virginia to southern New England showed that important striped bass spawning grounds are confined to the Maryland waters of the Chesapeake and Delaware Bays, and the lower Hudson River. According to previous surveys the lower Chesapeake Bay and the sounds and coastal rivers of North Carolina are also productive areas. These observations suggest that fishing for striped bass along the coasts of New Jersey, Long Island, and southern New England is maintained chiefly by migration of fish spawned in other areas. Investigations during the year provided further support for the view that production and survival of striped bass are to a large extent independent of the number of spawners; hence regulatory measures to increase the spawning stock are not of primary importance in the conservation of this species.

Long Island cooperative investigation.—Public interest aroused by the cooperative study in which the Bureau of Fisheries participated with the New York Conservation Department, as reported last year, caused the Boards of Supervisors of Suffolk County, and later of Nassau County, Long Island, to contribute funds for a similar cooperative study of local fishery problems. The investigation of the Suffolk County fisheries has been under way throughout the fiscal year 1940; that of Nassau County fisheries since May 20, 1940.

It has been learned that the flounder populations in different regions of Suffolk County are independent, so that measures to improve fishing conditions can be applied directly to individual areas. With the cooperation of pound-net fishermen, methods have been worked out for releasing a large percentage of small sizes of several species of fish taken in nets, thus permitting these young fish to reach a size at which they will be of greater value to commercial fishermen and anglers. The survey has disclosed also that the sport fisheries account for a considerable percentage of the total catch of several important species.

Shrimp investigations.—Because of the constantly increasing drain on the supply of shrimp, which is the most valuable fishery product south of Virginia, it has long been considered important to know whether or not there is a reserve supply available beyond the range of the present commercial fishery. This question has now been answered in the negative through the offshore explorations of the vessel *Pelican* in the Gulf of Mexico and along the South Atlantic coast from Fort Pierce, Fla., to Cape Hatteras, N. C. No concentrations of shrimp were found in either area outside the waters now being exploited, a fact which emphasizes the importance of measures recommended for the protection of the supply in inshore waters.

Tagging of shrimp in the Gulf of Mexico during the past year established the fact that here, as on the South Atlantic coast, the shrimp

move from the waters of one State to those of another, so that effective conservation of the supply must be accomplished by unified action of the States concerned. Clear evidence of interstate migrations was obtained in waters east of the Mississippi.

Surveys on the South Atlantic coast during the spring months of 1940 revealed a critical condition which threatened the production of a crop for next year's fishery. The number of spawners had been reduced to a dangerously low level through the operation of two factors: The excessive winter fishery in Georgia and Florida which draws upon virtually the entire South Atlantic population of large, migratory shrimp, and the unusually cold winter which killed large numbers of the small shrimp which do not migrate but remain in coastal waters as far north as North Carolina. Because of this drastic reduction of the stock, the cessation of all fishing until July 1 was recommended in order that the remaining shrimp might have an opportunity to spawn.

North Pacific and Alaska fishery investigations.—For the second consecutive year the activities of the Columbia River staff have been concentrated upon the problem of salvaging the portion of the salmon run which is barred from its accustomed spawning grounds by the erection of the Grand Coulee Dam. Salmon, steelhead trout, and other fishes bound for the upper Columbia River are being trapped as they pass through the fish ladders at Rock Island Dam, 150 miles downstream, and transferred to tributaries of the Middle Columbia where suitable conditions exist and where it is desired to build up the runs. Because the chinook and blueback salmon have a strong instinct to return to the streams in which they have spent the early months of life, it is expected that such trapping operations will be necessary only throughout one complete cycle of salmon runs. During the period from May 1 to December 9, 1939, 41,722 fish were hauled, of which 36,224 were salmon and steelhead trout. The loss of fish during trapping and hauling was extremely small and observations later in the season revealed successful spawning.

In the Puget Sound area, where the coho salmon are important both from the standpoint of food and recreation, returns of these fish from marking experiments conducted in previous years indicate that releasing fingerlings in the fall produces slightly larger returns and is less expensive than releasing them in midwinter, and is greatly to be preferred to releasing them in the spring of their second year.

Observations on the salmon populations of Bristol Bay, for the purpose of collecting data on which to base a program of management for this valuable resource, were made in 1939 for the second consecutive season. The study of the life histories of the races of salmon populating the lakes and rivers in a watershed of over

35,000 square miles consisted of regular samples of seaward migrant fingerlings taken at five points selected for the purpose. Fingerlings were marked for future identification and released wherever they were available in sufficient numbers, and scale samples, body measurements, weights, and information on sex proportions were obtained from each of the principal rivers during the commercial fishing season. Investigations at sea included experimental fishing and tagging to determine the feeding grounds and migratory routes followed by the adult salmon as they make their way in to the rivers to spawn.

Investigation of the decline in productivity of the Karluk River watershed has revealed that, while the mortality of salmon during the period of life in the sea is remarkably constant, great variations in the percentage of mortality in fresh water are to be expected. These variations are related to changing environmental conditions and to cycles in the fertility of the lake and the abundance of food organisms. A report on the phases of this investigation that are now completed has been prepared for publication.

The existence in the Karluk system of at least two separate populations of the Dolly Varden trout, which prey to some extent on red salmon, has been demonstrated by tagging. Since one of the populations is resident within the lake and the other migrates annually to and from the ocean, control measures, if found necessary, would differ for the two groups.

Improved facilities have now been provided for the study of the pink salmon, which is by far the most abundant species of salmon in Alaska and hence an important source of food. Because of the short life cycle of this species (2 years) it is possible to build up or decimate a population of pink salmon within a short time, hence the need for continued watchfulness. A combination dam and counting weir is now in operation at Little Port Walter, making possible observations that will be used to compute the percentage of mortality in both fresh and salt water. A permanent biological field station has also been established so that biological observations on the survival of the broods may be made throughout the year, permitting more accurate predictions as to the size of the annual runs.

Throughout the year the collection, tabulation, and analysis of the daily catch records of the various types of fishing gear operated by the salmon fishery of Alaska were continued, contributing to an invaluable permanent record of the fishery throughout the Territory. Indices of abundance derived from these data are an important basis for recommendations for changes in the fishing regulations.

The collection of statistical and biological data on the Alaska herring fishery has been continued with a view to safeguarding the supply,

which is now utilized principally in the preparation of oils and meals. Although large catches have been made in certain areas, several facts suggest the need of closer supervision of the fishery. Among these are the lack, in the Kodiak area, of any appreciable increments to the stock as a result of spawning in recent years, added to increased fishing intensity and the observed decline in return per unit of gear. Large catches have been made also in Prince William Sound, but here again the yield is being maintained only by increasing the fishing effort. The catch in southeastern Alaska in 1939 was the lowest since the inception of the intensive reduction fishery 15 years ago. This decline is the result of excessive exploitation combined with the failure of several spawning seasons. In an effort to rebuild the stock, fishing in the Cape Ommaney area was prohibited during the 1939 season, and all fishing for reduction purposes was prohibited in southeastern Alaska during 1940.

Pacific pilchard investigations.—The object of investigating the pilchard fishery of California, Oregon, and Washington is to determine how large a catch may be made annually without jeopardizing future yields. Recognition of an irreversible decline is made difficult by the existence of natural fluctuations in abundance and variations in the availability of the fish to the vessels. For these reasons evidence on many aspects of the fishery and on the biology of the pilchard populations is necessary and is being collected.

Accurate means of determining the age of pilchards has heretofore been lacking, a fact which has hindered the determination of the contributions made by the various spawning seasons to the commercial stock. Intensive experiments conducted by the staff during the past two years have now disclosed a method of defining and interpreting age marks on the scales of juvenile pilchards through the third year of life, and probably of older fish as well, thus providing an indispensable tool of pilchard research.

Surveys to determine what oceanographic conditions control the survival of young pilchards and to discover the extent of spawning areas and the amount of spawning were carried out with the cooperation of the Scripps Institution of Oceanography during the 1939 and 1940 seasons. During the 1940 survey, pilchard eggs were found over the entire area of 1,800 square miles covered by the survey—from San Diego to about Point Conception—although the maximum spawning seemed to have occurred in a zone parallel to the coast and lying 50 to 100 miles offshore. The location of the spawning area appears to correspond to certain hydrographic features. Data collected will permit computation of the total number of eggs in the area explored and an estimate of the size of the spawning stock. Repeated and extensive surveys of this sort are necessary to determine whether the spawn-

ing stock is being maintained at a sufficiently high level to provide adequate replacement for the toll taken by a large and intensive fishery.

While no final conclusions as to the status of the pilchard stock can as yet be drawn, certain facts are evident. During the 1937-38 season, for the first time, the supply failed to equal the demand. During this season also the relatively low catch was accompanied by a decrease in the proportion of large fish in the catch. Without further information these facts do not constitute conclusive evidence of depletion but nevertheless suggest that the pilchard industry has reached the point where further expansion can result only in a rise of production cost.

Great Lakes fishery investigations.—Members of the staff continued their active cooperation with State and Federal officials and with sport and commercial fishermen, participating in meetings and conferences in which Great Lakes fishery problems were under consideration and assisting State conservation officials in the drafting of fishery regulations. One of the significant events of the year was the revision of the commercial fishery regulations for the State of Wisconsin waters of Lake Michigan, which, although at present the subject of litigation instituted by certain fishermen, constitutes another important step toward the attainment of uniform regulations for all waters of that State. An event of even more widespread interest and significance was the appointment, on February 29, 1940, of an International Board of Inquiry for the Great Lakes Fisheries. The Board will undertake a study of the fisheries and will submit recommendations as to means of conserving and developing the fishery resources, possibly by international agreement.

Detailed information on fluctuations in the production and abundance of important commercial species and on the intensity of the fisheries of Lake Michigan has now been compiled for a 10-year period. These data have revealed, among other facts, a pronounced decline in the production and abundance of whitefish in Lake Huron in 1938, in which year the abundance index of this fish was only 29 percent of the 1929-34 average. Although recommendations had been made by the Bureau for the control of the deep trap-net fishery for whitefish, no effective measures were adopted until the fishery had sustained damages that possibly are irreparable.

Much of the attention of the staff was given to analyzing data previously collected and to preparing reports on investigations that are now completed. Among these was a report on the fishery resources of the Red Lakes, which constitute one of the principal sources of livelihood for the Red Lake Indians. No positive evidence of a decline in abundance was found. Recommendations were offered for the proper management of these fisheries, based in part upon studies of

the growth rates of the various species which indicate the minimum size at which it is desirable to subject these fish to commercial exploitation. Another study which has now yielded useful information is an extensive tagging project carried out in cooperation with a commercial fishing firm of Port Washington, Wis. Of the 2,902 Lake Michigan fish that were tagged and released, 38 percent were recaptured, the results disclosing important information on the extent of migration and the intensity of fishing operations. A study of the age and growth of the yellow perch of Saginaw Bay indicates that the present legal length of 8½ inches possibly is too low, inasmuch as yellow perch of both sexes attain this length just as they are entering on the period of most rapid increase in weight.

Shellfish investigations.—Research on oysters was conducted during the year, in accordance with the established policy of the Bureau, (1) to increase technical knowledge of the methods of propagating oysters under various conditions in the coastal waters; (2) to find practical means of improving the quality of marketable oysters; (3) to improve methods of protecting oysters against various pests and parasites; and (4) to determine the effects of pollution and devise means of rendering certain trade wastes harmless to oysters.

Studies of the factors controlling the spawning of oysters have revealed that the old concept of a single critical temperature that induces spawning in oysters is no longer tenable. Depending on the physiological state of ripeness which may be influenced by proper chemical stimulation, the oyster may spawn at various temperatures ranging from 63° to 95° F. These physiological studies have provided a key to a practical method of controlling the spawning of oysters under natural conditions.

In compliance with the request of local oystermen, the Bureau's Milford (Conn.) Station has continued its custom of issuing weekly bulletins on the physiological condition of the oysters in Long Island Sound and the expected time of setting. To this information there have now been added reports on the distribution and abundance of starfish, the principal oyster enemy in this region.

Experiments in North Carolina demonstrated the value and practicability of growing oysters in improved marsh ponds and canals where the depth and velocity of the currents can be controlled. In such areas it is possible to prevent the "smothering" of seed obtained from the early summer spawning by the spat of the September spawning. Even from poor quality seed a growth in volume of over 300 percent was obtained during the first year. By holding seed in special trays it was found possible to cultivate oysters at concentrations equivalent to over 2,000 bushels per acre. These experiments are being continued and developed on a small commercial scale to

determine the maximum size and age obtainable by oysters in these waters and the percentage of mortality to be expected according to age and environmental conditions.

Operation of an experimental oyster farm in South Carolina is providing considerable information on the relative value of the various types of bottom for seed-oyster production. On the Gulf coast, where oyster production has been at a low level for a number of years, the staff is cooperating with oystermen and with State conservation departments in formulating programs for the development and maintenance of natural oyster grounds and for the creation of new grounds by planting shells and seed oysters.

Methods of controlling starfish were tested under a variety of field and laboratory conditions by the staff and are being put into practice by many New England and Long Island oyster growers in a vigorous effort to diminish the losses caused by this abundant animal. Oyster drills, which are a serious menace to oysters in the Middle Atlantic States and are now becoming more numerous in Long Island Sound, have been found capable, when only 1 month old, of destroying approximately five oyster spat a day. Because of the heavy depredations of the boring clam, another oyster enemy found in Gulf coast waters, an investigation of the life history of this little-known mollusk has been undertaken at the Pensacola (Fla.) Station.

The study of the effects of pulp-mill pollution on the oysters of the York River, Va., has been completed and a final report on this investigation will be made early in the fiscal year 1941.

Sponge investigations.—During the summer of 1939 samples of diseased sponges were received from Florida and subjected to microscopical examination. All were found to be infected with the fungus organism that had been discovered and tentatively identified during the preceding year by one of the Bureau's biologists in surveys of the Bahama Island waters and the Florida Keys. From Key West, where the disease first manifested itself in the United States, it spread to Tarpon Springs, and by the end of December mortality of commercial sponges had proceeded to such a point that fishing was discontinued on bars situated below eight fathoms. At the end of the calendar year 1939 the number of sponges brought to the Tarpon Springs Sponge Exchange had noticeably diminished, causing considerable concern for the future of this resource. During the spring of 1940 there was evidence that the disease had abated and that a large crop of small sponges was in evidence. However, two or three years may be required for a substantial restoration of the commercial-sized supply.

Aquicultural investigations.—Studies concerned with the management of fresh-water sport fisheries are conducted along three prin-

cipal lines. The first is related to the artificial propagation and rearing of game fishes; the second to the problem of controlling the parasites and diseases of fish which frequently curtail the output of hatcheries; and the third to field problems relating to fish management, such as the comparative survival and growth of hatchery and wild trout under natural conditions, the ecological requirements of different species of game and food fishes, and the possibility of increasing fish production in natural waters.

In connection with studies of the artificial propagation and rearing of trout, progress has been made toward developing economical diets without sacrifice of growth. Other experiments have demonstrated that overfeeding of trout brood stock is distinctly detrimental in that it reduces the number of eggs that hatch, while experiments in selective breeding have more than doubled both the rate of growth and the production of eggs.

Studies of the pond culture of largemouth black bass were carried on in Florida with a view to determining the role of fertilizers and forage fish as they affect the production of bass fingerlings per acre. Similar work on a somewhat smaller scale has been conducted in West Virginia. Here, also, field studies of the spawning and survival of smallmouth black bass are being made in selected tributaries of the Potomac River.

The most important result of the studies in fish pathology during the year was the development of a safe, practical, and economical method of controlling the external parasites of fish. Other investigations contributed to an understanding of the causes and prevention of the Western type of gill disease and of the importance of several parasites of trout and bass. In addition to the hatchery studies, losses among wild fish in the field were investigated by the staff. The most important problem of this nature that is currently under study concerns the attacks of fungus organisms which inflicted considerable losses on adult chinook salmon and steelhead trout liberated in the Entiat River in connection with the Columbia River salvage operations.

Fish-management studies on trout waters were carried on at the Pittsford (Vt.) and Leetown (W. Va.) Stations, in the Pisgah Game Preserve in North Carolina, and in Utah, Idaho, and California. One of the surprising results of the "test water" studies conducted in Vermont is the finding that fishing is maintained chiefly by natural reproduction of wild fish, and that stocking with hatchery trout has had little effect. Under conditions obtaining in those waters, stocking with legal-sized fish in the fall has been found to be wasteful, and tests are being made to discover whether stocking with smaller fish will yield better results. In the Pisgah Game Preserve, where the

Forest Service has complete control over all streams, management programs worked out by the Bureau of Fisheries have been in operation. Good results were already apparent in 1939, and during this and the 1940 season it was possible to accommodate more anglers and to permit a longer open season than in previous years. Management studies in the intermountain region have been concerned chiefly with the fisheries problems of Fish Lake, Utah, and of Bear Lake, which is situated almost equally in Utah and Idaho. In California, while experiments on the survival of hatchery trout after planting are still under way, the attention of the staff has been given principally to the problem of devising a plan for salvaging salmon whose migration will be blocked by the Shasta Dam. This dam will be approximately 560 feet high and will cut off all salmon spawning areas above it in the Sacramento, Pit, and McCloud Rivers and their tributaries. The value of these salmon runs has been calculated at \$95,000 annually in returns to commercial fishermen. After surveys of potential spawning areas below the dam and of possible sites for trapping the runs for transfer to such areas, a preliminary report embodying recommendations for the salvage operations was issued in June 1940.

Water quality investigations.—One of the major activities of the aquatic physiologists during the past year was a study of the effects of various components of larvacides and herbicides on fresh-water fishes and their associated aquatic food organisms. These studies have now provided evidence that in waters treated with even small quantities of arsenicals and several other materials commonly used as mosquito larvacides, there is impairment of the growth and nutrition of fishes.

Application of physiological, biochemical, and metabolic methods to the study of fishes from irrigation waters has demonstrated that the physiological condition and reproductive capacity of such fish is often below par, a condition traceable to the concentrations of mineral salts discovered in many return irrigation waters. The same methods of study applied to fishes from waters polluted with mine wastes revealed that chronic injuries result from much higher dilutions of the wastes than heretofore have been recognized.

During the summer of 1939 intensive studies of stream pollution were made along the Atlantic seaboard and throughout the greater part of western United States, resulting in the collection of much new information on the nature and effects of polluted waters.

Studies of impounded waters were continued at Elephant Butte Reservoir in cooperation with the Reclamation Service and the National Research Council, and at Lake Mead in cooperation with the same agencies and the National Park Service.

Protection of fish runs from engineering developments.—The establishment, early in the year, of a section on hydraulics within the Division of Scientific Inquiry provided for the application of biological and engineering skill to fishery problems created by the construction of dams, reservoirs, and diversions for the purposes of power, irrigation, navigation, and flood control.

The work of the Hydraulics Section during the first year of its existence has been devoted to three general phases of fish protection: (1) Supervision of the construction of four large fish screens in Federal irrigation canals and the operation of Federal screens already constructed; (2) consultative services in connection with fish-salvage problems at the Shasta Project on the Sacramento River; and (3) the review of Federal water projects from the standpoint of fish protection. Advice in connection with fishway and screen problems has also been furnished the conservation agencies of several States.

APPROPRIATIONS

Appropriations for the Bureau for the fiscal year aggregated \$2,259,400, as follows:

Salaries, Bureau of Fisheries.....	\$183, 000
Propagation of food fishes.....	949, 400
Construction of fish screens.....	10, 000
Maintenance of vessels.....	214, 000
Inquiry respecting food fishes.....	322, 000
Fishery laboratory, Little Port Walter, Alaska.....	7, 500
Fishery industries.....	80, 000
Fishery market news service.....	76, 000
Alaska fisheries service.....	268, 200
Enforcement of Black Bass and Whaling Treaty Acts.....	17, 000
Mississippi Wild Life and Fish Refuge.....	17, 000
Library.....	600
Travel expense.....	114, 700
Total	2, 259, 400

UNITED STATES
DEPARTMENT OF THE INTERIOR
HAROLD L. ICKES, Secretary
BUREAU OF FISHERIES
CHARLES E. JACKSON, Acting Commissioner

Administrative Report No. 39

PROGRESS IN BIOLOGICAL INQUIRIES
1939

By **ELMER HIGGINS**

APPENDIX I TO REPORT OF COMMISSIONER OF FISHERIES
FOR THE FISCAL YEAR 1940



UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1940

ADMINISTRATIVE REPORT SERIES

Since the beginning of the Administrative Report Series, considerable confusion has arisen concerning the system of numbering the separates composing it. Inasmuch as the Reports of the Divisions vary in order from year to year, many have found their designations as "Appendix No. I, II, III, or IV" very confusing. To relieve this, it has been decided to number them as "Administrative Report No. —." Inasmuch as 20 separates had already been printed in this series before starting the numbers, it was deemed advisable to begin the numbering with Administrative Report No. 21. Of course, numbers cannot be printed on those already off the press, but for the information of those who wish to know what the first 25 were, they are numbered for filing purposes as follows:

- No. 1. Report, Commissioner of Fisheries, 1931.
- No. 2. Alaska Fishery and Fur-Seal Industries, 1930.
- No. 3. Fishery Industries of the United States, 1930.
- No. 4. Progress in Biological Inquiries, 1930.
- No. 5. Propagation and Distribution of Food Fisheries, 1931.
- No. 6. Report, Commissioner of Fisheries, 1932.
- No. 7. Alaska Fisheries and Fur-Seal Industries, 1931.
- No. 8. Fishery Industries of the United States, 1931.
- No. 9. Progress in Biological Inquiries, 1931.
- No. 10. Propagation and Distribution of Food Fishes, 1932.
- No. 11. Alaska Fishery and Fur-Seal Industries, 1932.
- No. 12. Progress in Biological Inquiries, 1932.
- No. 13. Fishery Industries of the United States, 1932.
- No. 14. Propagation and Distribution of Food Fishes, 1933.
- No. 15. Fishery Industries of the United States, 1933.
- No. 16. Alaska Fishery and Fur-Seal Industries, 1933.
- No. 17. Progress in Biological Inquiries, 1933.
- No. 18. Propagation and Distribution of Food Fishes, 1934.
- No. 19. Alaska Fishery and Fur-Seal Industries, 1934.
- No. 20. Fishery Industries of the United States, 1934.
- No. 21. Progress in Biological Inquiries, 1934.
- No. 22. Propagation and Distribution of Food Fishes, 1935.
- No. 23. Alaska Fishery and Fur-Seal Industries, 1935.
- No. 24. Fishery Industries of the United States, 1935.
- No. 25. Propagation and Distribution of Food Fishes, 1936.

Note that the last Commissioner's Report was for 1932. Since then its place has been taken by a reprint from the Report of the Secretary of Commerce under the title "Bureau of Fisheries." Inasmuch as it is no longer a Bureau publication, it is not numbered; but it will be supplied to any who request the Report of the Commissioner for any year since 1932.

PROGRESS IN BIOLOGICAL INQUIRIES, 1939¹

By **ELMER HIGGINS**, *Chief, Division of Scientific Inquiry*

[With the collaboration of investigators]

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¹ Administrative Report No. 39, Appendix I to Report of the U. S. Commissioner of Fisheries for 1940. Approved for publication May 13, 1940.

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INTRODUCTION

Progress in biological inquiries during 1939 recounts numerous advances and extensions of scientific knowledge of the Nation's aquatic resources. From the research of the Division of Scientific Inquiry there is emerging a philosophy of fishery management that is finding direct application in State laws for the protection and development of the commercial fisheries and in the more active measures adopted for the rehabilitation and maintenance of the recreational fisheries.

The growth and expansion of fishery research throughout the almost 70 years that have elapsed since the establishment of the old U. S. Fish Commission is an interesting study. The early scientific investigations were either casual surveys or attempts to discover and to catalogue the aquatic resources. The strictly scientific surveys of the *Albatross*, the *Fish Hawk*, and the *Grampus* that bridged the end of the last and the beginning of the present century were paralleled by or followed by special investigations of specific phases of our inland water resources. From those studies there resulted a basic fund of oceanographic, ichthyological, and general zoological information. That basic research program has never ceased, for the spirit of discovery still persists throughout all of the Bureau's scientific endeavors.

The purely systematic and distributional studies of fishes and invertebrates of commercial importance did not long remain ends in themselves. It was not only necessary to know what we had but also how each item behaved in relation to its environment. Thus life-history and ecological studies of the most important fishes, molluscs and crustaceans were conducted with the object of obtaining information that would suggest means of insuring a continuation of the supply at a safe level of abundance. Statistical methods of analysis were adopted to interpret the large quantities of data that were accumulated. Fundamental concepts of fishery management were developed and applied and biological investigation thus become an indispensable tool of conservation.

The specific aim of the research concerned with both marine and fresh-water fisheries is an analysis of the fluctuations in natural abundance and production in an attempt to discover methods of balancing commercial yields against reproductive activities. In other words, the continuation of any fishery resource demands that an adequate breeding population always remain and that commercial production should remove only the surplus, or "annual crop."

Unfortunately, the depletion of many commercial fishery resources has been allowed to progress to a critical point before the financial support of investigation to discover means of protection was provided. Any attempts at rehabilitation based on scientific findings, necessarily are slow, especially since the fishing industry must be maintained at as high a level of production as is consistent with the preservation and recovery of the stocks. The research programs

concerned with the major commercial fisheries have been in progress for a sufficient time to enable recommendations for revised regulations and methods of management to be formulated.

Because the Bureau serves only as an investigative and advisory agency in most of the commercial-fishing areas, the practical application of recommendations is difficult and often tardy. More often than not, the general public has not been informed of the condition of the resources and the need for regulations. The lack of public appreciation permits the industry to oppose, unchallenged, constructive recommendations for legislation which they do not favor. The differences in the laws of States that border on the same waters are often a deterrent to the adoption of adequate conservation measures, for when the question of uniform laws arises the fishermen often clamor for the adoption of the regulations of that State which has the least stringent code. The problem of divided control seems much nearer a permanent solution at the present time than ever before. The success of international commissions, vested with full regulatory powers, in bringing about the recovery of depleted marine resources that are exploited in international waters is becoming well known. The recent authorization of interstate compacts by Congress for the purposes of formulating and enforcing conservation measures promises to provide a suitable vehicle for adequate control of fishery resources within the United States.

The invasion by recreational fishermen of marine and fresh-water areas formerly exploited principally by commercial fishermen has created additional problems for the fishery biologist. Angling has been conducted in commercial-fishing areas for a long time and the increase in intensity has perhaps been more gradual than the publicizing of the enterprise during the last several years would imply. Reliable estimates of the angling for certain commercially exploited species in areas of the Atlantic coast, the Great Lakes, and the Pacific coast indicate that the total annual catch of recreational fishermen may equal, at times, the catch of commercial fishermen. The magnitude of sport fishing conducted in some areas in competition with commercial fishing will necessitate the development of statistical procedure more complete than exists at present to measure the annual catches of both methods of fishing. An extension of the scope of research activities to consider the effect of angling on the natural abundance of heavily exploited species also will be imperative.

The cooperation of many States in the collection of reliable commercial fishery statistics is becoming greater each year. Records that enable the fishery biologist to study fluctuations in abundance in the major fishing areas are essential to the development of management procedures. Periods of unusual availability or of low levels of abundance can be anticipated if continuous and uniform statistical records that lend themselves to abundance analyses are available. A nation-wide and uniform State system for the collection of daily records of individual fishing enterprise for all commercial-fishing areas cannot be urged too strongly.

One of the important functions of the Division of Scientific Inquiry during recent years has consisted of cooperation with the Division of Fish Culture in projects related to artificial propagation of food and game fishes. From the "veterinary service" originally pro-

vided for hatcheries there has developed, in different parts of the country, a diversified cooperative program of assistance. Studies of hatchery disinfectants, methods of disease control, methods of fertilization, selective breeding, hatching, rearing, and planting, as well as feeding experiments and nutrition studies have been undertaken. The popularity of the processed publication, *The Progressive Fish-Culturist*, sponsored and edited by the Division, has continued to grow and it has become the principal means of disseminating practical and scientific information related to fish culture and fish management in fresh waters.

The studies of interior waters in relation to their value as angling resources constitute yet another phase of the Division's work. Unlike the commercial fishery investigations which were faced with critical conditions at the outset, the opportunity is afforded to assess many of the angling resources while they are in a healthy state. The accumulation of information related to the management of angling resources, stream improvement, and the formulation of stocking policies has progressed as rapidly as the limited funds and investigative personnel will permit. The related studies of the effects of pollution of all kinds have been advanced significantly both through controlled laboratory experimentation and ever-widening field investigations. A comprehensive study of the effects of larvicides and insecticides on fish populations has yielded important conclusions.

COOPERATION

The scope of the investigational activities of the Bureau has become so broad and diversified, as indicated by the preceding general discussion and the detailed reports which follow, that neither the appropriations nor the staff are adequate to carry on the work unaided. The cordial relations with many colleges and universities and their generous provision of laboratory space, equipment, and other facilities have enhanced the work of the Division for many years.

The material cooperation of a number of States, various State agencies, and of many establishments of the Federal Government has continued in greater measure than ever before. The U. S. Forest Service, the Bureau of Reclamation, the War Department, the Coast Guard, and the Tennessee Valley Authority have been concerned in cooperative undertakings during the past year. The Council of State Governments has continued to provide active assistance to the Bureau and to various States in the promotion of interstate and international cooperation in the development of means and measures for the preservation of the Atlantic coast and Great Lakes fisheries. The North American Council on Fishery Investigations, composed of representatives of the United States, Canada, Newfoundland, and France, held no meetings during the year because of the war in Europe. The organization remains active, however, and regular meetings will be resumed as soon as conditions permit.

PUBLICATIONS

Although substantial progress has been made in all of the Division's many fields of investigation, and a number of manuscripts were completed during the year, the available funds for printing

were so limited that the actual dissemination of printed information was extremely meagre. There are on file a large number of manuscripts which represent an investment in time and materials many times as great as the cost of publication. The reports of the investigations that have been completed are sorely needed as scientific references and as sources of information for management and legislation. The practical value of many of these unpublished reports will diminish gradually through the protracted delay in publication, but, fortunately, their scientific worth will suffer little. The very scanty number of scientific publications by the Bureau during recent years does not reflect the constantly expanding responsibilities and the continuous improvement in the calibre of the investigative personnel.

The following publications appeared in the Bureau's series during 1939:

BELL, FRANK T., and ELMER HIGGINS.

A plan for the development of the Hawaiian fisheries. Investigational Report No. 42, 25 pp., 3 figs.

GALTSOFF, PAUL S., and VICTOR L. LOOSANOFF.

Natural history and method of controlling the starfish (*Asterias forbesi*, Desor). Bulletin, U. S. Bureau of Fisheries, vol. XLIX, No. 31, pp. 75-132, 32 figs.

HIGGINS, ELMER.

Progress in biological inquiries, 1938. Administrative Report No. 35, 81 pp.

PEARSON, JOHN C.

The early life histories of some American Penaeidae, chiefly the commercial shrimp, *Penaeus setiferus* (Linn.). Bulletin, U. S. Bureau of Fisheries, vol. XLIX, No. 30, pp. 1-73, 67 figs.

The following papers were published by members of the staff of the Division of Scientific Inquiry, during the year 1939, in journals of other organizations:

CRAIG, J. A.

Critique on Fisheries. The Pacific Northwest: A selected bibliography. The Northwest Regional Planning Council. 1939. Portland, Ore.

DAVIDSON, FREDERICK A.

The conservation of the Alaska salmon fisheries. The Military Engineer, vol. 31, No. 176, 1939, pp. 109-111, 3 figs.

Why it's important to protect our salmon. Alaska Life, vol. 2, No. 1, February 1939, pp. 8-9, 18; 1 fig., map.

DAVIDSON, FREDERICK A., and A. E. VAUGHAN.

Cyclic changes in the time of the southeast Alaska pink salmon runs. Pacific Fisherman, Feb. 1939, pp. 22-24 (pt. 1); Mar. 1939, pp. 40-42 (pt. 2); Apr. 1939, p. 39 (pt. 3).

DEASON, HILARY J.

Report of the Division of Commercial Fishing. Transactions, American Fisheries Society, vol. 68, 1938 (1939), pp. 27-30.

The distribution of cottid fishes in Lake Michigan. Papers, Michigan Academy of Science, Arts and Letters, vol. XXIV, pt. II, 1938 (1939), pp. 105-115.

FIRTH, FRANK E.

A record size (480 mm.) John dory (*Zenopsis ocellatus*) with notes on its distribution in our North and Middle Atlantic waters. Zoologica, vol. XXIV (pt. II), Oct. 1939, pp. 383-384, 1 fig.

FISH, FREDERICO F.

Notes on *Myxobolus inornatus* n. sp., a myxosporidian, parasitic in the black bass (*Huro floidana* Le Sueur). Transactions, American Fisheries Society, vol. 68, 1938 (1939), pp. 173-177.

Simplified methods for the prolonged treatment of fish diseases. Transactions, American Fisheries Society, vol. 68, 1938 (1939), pp. 178-187.

GALTSOFF, PAUL S.

The new Milford laboratory of the Bureau of Fisheries. *Science*, vol. 90, No. 2338, 1939, p. 365.

GALTSOFF, PAUL S., H. H. BROWN, C. L. SMITH, and F. G. SMITH.

Sponge mortality in the Bahamas. *Nature*, vol. 143, 1939, pp. 807-808.

GINSBURG, ISAAC.

The measure of population divergence and multiplicity of characters. *Journal, Washington Academy of Sciences*, vol. 29, 1939, pp. 317-330.

Two new gobioid fishes collected on the Presidential cruise of 1938. *Smithsonian Miscellaneous Collections*, vol. 98, No. 14, 5 pp., 2 figs.

HILDEBRAND, SAMUEL F.

An annotated list of the fishes collected on the several expeditions to Greenland, the Fox Bay region, and the coast of Labrador by Captain R. A. Bartlett, from 1925 to 1935. *Meddelelser om Grønland*, Bd. 125, Nr. 1, 1939, 12 S.

The Panama Canal as a passageway for fishes, with lists and remarks on the fishes and invertebrates observed. *Zoologica*, vol. XXIV, pt. I, art. 3, 1939, pp. 15-45, 2 pls.

LOBEYLL, MILTON J.

Report on certain fishes: winter flounder (*Pseudopleuronectes americanus*).

In: *A Biological Survey of the Salt Waters of Long Island, 1938. Pt. I. Supplement to Twenty-eighth Annual Report*, New York Conservation Department, 1939, pp. 63-96.

NEEDHAM, PAUL R.

Migratory fishes and dam construction in West coast waters. *Transactions, Fourth North American Wildlife Conference*, 1939, pp. 300-304.

Natural propagation versus artificial propagation in relation to angling. *Transactions, Fourth North American Wildlife Conference*, 1939, pp. 326-331.

NEEDHAM, PAUL R., and H. J. RAYNER.

The experimental stream, a method for study of trout planting problems. *Copeia*, 1939, No. 1, March, pp. 31-38.

NESSIT, ROBERT A.

Report on certain fishes: weakfish (*Cynoscion regalis*). In: *A Biological Survey of the Salt Waters of Long Island, 1938. Pt. I. Supplement to Twenty-eighth Annual Report*, New York Conservation Department, 1939, pp. 97-106.

NEVILLE, WILLIAM C.

Description of Long Island. In: *A Biological Survey of the Salt Waters of Long Island, 1938. Pt. I. Supplement to Twenty-eighth Annual Report*, New York Conservation Department, 1939, pp. 11-14.

NEVILLE, WILLIAM C., CHARLES L. DICKINSON, and JAMES R. WESTMAN.

Miscellaneous species. In: *A Biological Survey of the Salt Waters of Long Island, 1938. Pt. I. Supplement to Twenty-eighth Annual Report*, New York Conservation Department, 1939, pp. 107-152.

NICHOLS, J. T., and FRANK E. FIRTH.

Rare fishes off the Atlantic coast including a new gramicolepid. *Proceedings, Biological Society of Washington*, vol. 52, June 5, 1939, pp. 85-88.

NIGRELL, ROSS F., and FRANK E. FIRTH.

On *Sphyrion lumpi* (Krøyer), a copepod parasite on the redfish, *Sciaea marinus* (Linnaeus), with special reference to the host-parasite relationships. *Zoologica*, vol. XXIV, pt. I, Apr. 1939, pp. 1-10, 4 pls.

PEELMUTTER, ALFRED.

An ecological survey of young fish and eggs identified from tow-net collections. In: *A Biological Survey of the Salt Waters of Long Island, 1938. Pt. II. Supplement to Twenty-eighth Annual Report*, New York Conservation Department, 1939, pp. 11-71, 8 figs.

SUMNER, FRANCIS H., and OSGOOD R. SMITH.

A biological study of the effect of mining debris dams and hydraulic mining on fish life in the Yuba and American Rivers in California. Report submitted to U. S. District Engineer's Office, Sacramento, Calif., May 1, 1939, 51 pp., 14 figs., 3 maps. [Mimeographed.]

SURBER, EUGENE W.

A comparison of four eastern smallmouth bass streams. *Transactions, American Fisheries Society*, vol. 68, 1938 (1939), pp. 322-333.

VAN OOSTEN, JOHN.

A common concern—Great Lakes fisheries for anglers and fishers. Michigan Game Trails, vol. 1, No. 5, 1939, p. 1.

Battle rages over closing Potagannissing Bay to commercial fishermen. Michigan Game Trails, vol. 1, No. 3, 1939, pp. 19-20.

Can the Great Lakes fisheries be saved? American Wildlife, vol. 28, No. 3, 1939, pp. 129-135.

Migratory fish, a problem of interstate cooperation? Transactions, Fourth North American Wildlife Conference, 1939, pp. 25-30.

Save the Great Lakes fisheries! Outdoor America, January, 1939, 2 pp. [Also appears in: Congressional Record Appendix, March 24, 1939, pp. 4588-4589.]

The age, growth, sexual maturity, and sex ratio of the common whitefish, *Coregonus clupeaformis* (Mitchill), of Lake Huron. Papers, Michigan Academy of Science, Arts, and Letters, vol. XXIV, pt. II, 1938 (1939), pp. 195-221.

VAN OOSTEN, JOHN, and HILARY J. DEASON.

The age, growth, and feeding habits of the whitefish, *Coregonus clupeaformis* (Mitchill), of Lake Champlain. Transactions, American Fisheries Society, vol. 68, 1938 (1939), pp. 152-162.

WESTERMAN, FRED A., and JOHN VAN OOSTEN.

Report to the Michigan State Senate on the fisheries of Potagannissing Bay, Mich. Michigan Department of Conservation, Lansing. 82 pp.

MULTILITHED PUBLICATIONS

HERRINGTON, WILLIAM C., H. M. BEARSE, and FRANK E. FIETH.

Observations on the life history, occurrence, and distribution of the redfish parasite *Sphyrion lumpi*. Special Scientific Report No. 5, 12 pp., 6 figs.

U. S. BUREAU OF FISHERIES.

The Progressive Fish-Culturist. Memorandum I-131. 5 issues.

Progress reports of the investigations conducted by the various sections, prepared in the main by the section heads, are presented in the following pages:

NORTH ATLANTIC FISHERY INVESTIGATIONS

WILLIAM C. HERRINGTON, *in charge*

The situation of the offshore fisheries in the North Atlantic region was somewhat better in 1939, on the whole, than during 1938. The total catch, as shown by landings at Boston, Gloucester, and Portland, was nearly as great as in the previous year in spite of labor difficulties which caused temporary tie-ups. The catch reached 389,000,000 pounds, about 3 percent less than in 1938, but, due to higher average prices, it brought the fisherman more than \$9,300,000, an increase of nearly 7 percent over the 1938 value. This offshore catch landed at the three principal New England ports represents more than half of the total New England poundage of fish and shellfish. In 1937 it amounted to about 60 percent of the total weight and 50 percent of the total value of the New England catch.

The shipbuilding boom of the past few years, which included the construction of a large number of new otter trawlers of the "super trawler" class, did not continue in 1939. In contrast, there was a shrinkage in the fleet of large otter trawlers, since many of the old steamers were disposed of. By the end of the year only 6 steamers remained in operation out of a one-time total of around 40 boats. The decommissioning of old boats balanced the new construction approximately, so that total fishing intensity due to the large boats was about the same in 1939 as in the previous year.

The great fisheries of the North Atlantic have been subject to tremendous fluctuations in yield since the early days of the fishing industry, yet neither the extent of these changes nor their causes and probable duration have been known. An understanding of these factors, based on a comprehensive study of the biology and catch records of the important species, is necessary to maintain the fisheries at a high productive level or to suggest corrective measures in instances of overexploitation. Studies of the mackerel and haddock offshore fisheries have been under way for several years, and recently have been started on flounders. A much needed general study of the fluctuations in abundance of other groundfish was begun in 1938. No biological work has been possible recently on the important fisheries for cod, redfish, pollock, and swordfish.

The biggest handicap to the understanding of present trends in the extensive inshore fisheries of the North Atlantic coast is the lack of adequate catch statistics to provide a measure of changes in abundance. The most important problems involve the improvement or maintenance of the fisheries for flounders, lobster, haddock, cod, and salmon, which form the chief means of support for the coastal communities on long sections of the New England coast.

Cooperation with various State organizations has increased and has proved very satisfactory and productive. In addition to assisting in the inauguration of a general State system for collecting current catch records, the staff cooperated in various other projects. The most significant undertaking was the lobster investigation. The lobster fishery is an extremely important resource from Maine to New Jersey, and is second in value only to the haddock fishery in the region as a whole. In spite of the fact that it has been generally admitted for some time that the lobster fishery was in a serious condition, and has been subjected to regulation for many years, little biological work has been done recently to develop a sound basis for intelligent management. In order to obtain much needed information concerning improved rearing technique and the value of various regulations, the Maine Department of Sea and Shore Fisheries turned over to the Bureau a fund to cover the salary of a biologist to work in this field. The Bureau has provided the other expenses of the investigation.

Working in cooperation with several State officials, an annual lobster conference has been organized to bring together representatives of the industry and conservation departments of the interested States for a discussion of mutual problems and development of progressive and uniform conservation regulations. Meetings were held in February and July, 1939.

The past year witnessed increased interest in the restoration of Atlantic salmon. At the request of the National Wildlife Federation, W. C. Herrington and Dr. G. A. Rounsefell, in cooperation with Mr. George H. Stobie, Maine Commissioner of Inland Fisheries, and representatives of other North Atlantic States, prepared a long-period, cooperative program designed to restore and maintain salmon runs in the most favorable New England streams. It is hoped that the concentration of support behind one sound basic program will make it possible to get something definite started by the States and the Bureau in the near future.

During the past year an extra effort was made by the North Atlantic staff to develop a more widespread knowledge of and interest in the marine fisheries problems of the region. Working in cooperation with Dr. Daniel Merriman, of Yale University, a marine section was added to the annual meeting of the New England Game Conference.

After 8 years with no sea-going equipment, the Division finally obtained a 41-foot hull by transfer at Boothbay Harbor from the Division of Fish Culture. With the assistance of Supt. Thomas Dorr and his crew, the boat has been renovated, a cabin and engine room added, and an engine installed. She was christened *Skimmer*, and will be used in inshore waters principally for flounder work. However, the major contribution to our fleet came through a gift of the 152-foot steam trawler *Harvard* from the General Seafoods Corporation. This boat was built in 1926, and although the hull was in good condition, had been tied up for several months due to the relatively high cost of operating steam-powered trawlers, compared to Diesel-powered. A grant of \$125,000 has been obtained from the P. W. A. and this boat, which has been named *Albatross III*, will be renovated during 1940.

Commissioning of the *Albatross III* will make it possible to undertake annual surveys of the fishing grounds from Cape Cod to the Newfoundland Banks. These surveys will provide information on the abundance and distribution of the various species of marketable fish and will enable us to assess the strength of year classes 1 and 2 years before they enter the commercial fishery. Numerous problems connected with the mackerel investigation, tagging, and gear experiments also can be attacked.

Although good progress is being made in the various investigations, in many cases the work has been seriously limited by the lack of sufficient technical and clerical assistance to collect and analyze the data required for certain phases of the work. W. P. A. projects Nos. 365-14-3-4 and 702-3-2, which expired in the spring of 1939, and No. 765-14-3-20, which was begun on July 5, 1939, have made possible the continuation of the compilation and charting of statistics bearing on the development of the New England fisheries and the analysis of the records of the haddock fishery for early years, as well as a study of the early groundfish fishery.

The headquarters of the North Atlantic Fishery Investigations has remained in Cambridge and Boston, Mass. Harvard University has generously provided the staff with space and facilities in its biological laboratories. The cooperation of the Woods Hole Oceanographic Institution is gratefully acknowledged, as is the personal advice and interest of Prof. Henry B. Bigelow. The assistance and cooperation of fishermen and dealers in providing the use of their records, and in other ways, is also acknowledged with pleasure.

MACKEREL

Catch records indicate that mackerel landings on the Atlantic coast in 1939 were considerably less than in 1938. This decrease is shown by receipts of mackerel at the three principal New England ports, Boston, Gloucester, and Portland; 20,887,000 pounds in 1938 compared to 12,319,000 pounds in 1939. In 1935, the last year of high mackerel landings, 45 percent of the total Atlantic coast mackerel catch was landed at these ports. To the fishermen, this drop in land-

ings was accompanied not by a price increase, but by a slight decrease; the average being 2.8 cents per pound in 1938 and 2.6 cents per pound in 1939.

Conditions in the mackerel fishery have not been encouraging to owners of New England vessels which annually account for more than one-half of the total mackerel production. The last 5 years have witnessed a steady decline in the number of purse seiners entering the mackerel fleet; in 1935, there were 99, but only 49 in 1939. Most of the 50 vessels lost to the mackerel fishery have taken up groundfish dragging. Dependable profits to fishermen in a well-established rosefish fishery, especially, have offered relief from the uncertainties of the mackerel supply and discouraging financial returns. Such uncertainties are not new to the mackerel fishery. Violent fluctuations in the catch from one year to the next have bothered the trade and the fishermen for more than a century.

The mackerel investigation begun in 1926 had for its purpose the discovery of causes for the great differences in annual yield, with a view toward turning its findings to economic advantage. Several lines of investigation were inaugurated for solution of the problems. These were: (1) The collection of catch records, to provide a means of comparing past with present production of mackerel. (2) The determination of a measure of abundance not affected by changes in the size of the fleet or the amount of gear fished. (3) The study of such salient features of mackerel biology as might have a bearing upon the problem; geographical distribution, spawning habits, rate of growth, life span, migrations, etc. (4) A study of conditions in the sea to determine what environmental factors influenced appreciably the biological features mentioned above.

Catch records assembled from many sources revealed an 80 to 100 million-pound production level, roughly speaking, from 1804 to 1885. This was the "hey-dey" of the fishery, when annual production occasionally exceeded 100,000,000 pounds. The last such peak, in 1884, was followed by a drop to about 25,000,000 pounds in 1886. Since that time mackerel production has averaged approximately 30,000,000 pounds a year. The last good year was 1935, when total Atlantic coast landings approximated 80,000,000 pounds. In 1937, the total production was about 25,000,000 pounds.

Mackerel first appear off Virginia in the spring, and are found progressively northward to the Gulf of St. Lawrence as summer advances. The offshore fishery rarely extends more than 100 miles from shore, while the activity of the fleet is confined largely to a strip of water averaging less than 50 miles from the coast. With the approach of cold weather, mackerel apparently leave the Gulf of St. Lawrence and head southward. Until 3 years ago the fishery had ceased off southern New England by the end of December. During the past 3 years, however, a few purse seiners have continued operations into January.

Observations have demonstrated that spawning in the southern part of the range takes place between April and August. Due to rapid summer growth, mackerel attain minimum marketable size their first fall; about 8 or 9 inches in length. As a rule, the maximum size attained is about 22 inches in length and about 4 pounds in weight, during a life span of approximately 12 years.

Although no direct measure of mackerel abundance has been found, their availability to the purse-seine fishery has been taken as roughly indicative of abundance under actual conditions. Of course, this fails to measure adequately the availability except where the fleet is fishing. The strictly shoreward dispersal of the species, and its distribution on distant banks, has not been measured.

During the course of the investigation it was found that the make-up of the commercial fishery in any year was predominantly mackerel of one or two year classes. Sometimes a single year class has been important to the catch for as long as 5 years. In other seasons the year class of most importance has been of a transitory nature, appearing for but one year and then dropping out of the catch quite rapidly.

Observations indicated two principal factors that control mackerel abundance—the recruitment of new year classes to the fishery, and the losses due to mortality. Having obtained a measure of these factors, a series of fairly successful catch forecasts was begun in 1931. In 1937, however, the catch by the vessel fishery fell about 40 percent below the prediction. Since this circumstance indicated the operation of unknown factors, forecasts have been discontinued pending further research to discover them.

Progress during 1939.—The mackerel investigation in 1939 was under the direction of John R. Webster, who was assisted by Frank E. Firth. Analysis of the commercial landings showed three size groups in the mackerel populations during 1938—the year class of 1937, the year class of 1936, and a mixed group of year classes from 1934 to 1930. No one group dominated the catch for an entire year. All groups exhibited marked increases in availability compared to the previous year which averaged about 500 percent for the 1937 and 1936 year classes, and more than 100 percent for the mixed group of older fish.

The causes of such an increase in availability must be found in environmental conditions. To be caught by purse seiners, mackerel must be sighted while they school at the surface. Records of surface-water temperatures at lightships along the New England coast during the summer of 1937 were above normal, sometimes by as much as 7° F. It was at this time that the mackerel catch fell off the most. Temperatures during the summer of 1938 were near or slightly below normal.

The spring purse-seine fishery shifts its activity from the Middle Atlantic area to the Gulf of Maine as rapidly as mackerel become commercially available there. The question arises as to whether abundance of the shore run of mackerel keeps pace with that of off-shore populations. Progress in solving this problem has been made through the assembling of trap-catch records for 1937 and 1938 covering the coast from Virginia to Massachusetts. The records indicate that considerable numbers of mackerel persisted in the Middle Atlantic region for at least 2 months after seiners in the spring fishery quit the region.

Field work in 1939, conducted principally by Mr. Firth, was confined largely to securing measurements, scale samples, and interviews with boat captains who landed catches. Data were secured in New Jersey and New York in April and May, and at the Boston Fish Pier

during the remainder of the year. Sufficient data concerning 675 mackerel trips were secured by interview to provide representative information concerning fleet activity. A total of 49,000 mackerel measurements will form a basis for population studies, and 450 scale samples will enable age determinations to be made.

Considerable difficulty has been experienced in developing a suitable tag and tagging technique, for mackerel in order to study the migration problem. Several kinds of tags have been tried, but they have yielded discouragingly low percentages of returns. Experiments conducted by Mr. Webster at Woods Hole in August indicated, beyond reasonable doubt, that the chief problem of tagging is one of handling mackerel properly.

HADDOCK

The North Atlantic haddock fishery of the United States extends from the coast of southern New England to the western portion of the Grand Banks, and in the past 13 years has produced between 150 and 250 million pounds annually. The peak years came between 1928 and 1930, but they were followed by a rapid decline to approximately 150 million pounds in 1932. Since 1932 the catch never has approached the 1928-30 level. The fishery in 1939 was comparatively successful from the point of view of the industry. The total catch of 135 million pounds landed at Boston, Gloucester, and Portland (which accounts for 80 to 90 percent of the United States total) was slightly higher than in 1938 in spite of labor troubles which tied up many of the large trawlers for several weeks. Prices averaged about 11 percent above 1938, so that the total value of the above catch reached \$3,693,000. The increase in the price of scrod was particularly noticeable, for after a poor start during the period January-March the price rose above that of the previous year and maintained the advantage for the balance of the season. The average increase for the year was 35 percent.

Two-thirds of the 1939 catch came from area XXII So. (Georges Bank and South Channel) and present experience indicates that on the average this area will continue to supply the bulk of the New England haddock catch in the predictable future. Prior to 1935, between 70 and 90 percent of the catch ordinarily came from this area. However, the appearance of the tremendously abundant 1929 year class on the Nova Scotian Banks caused a shift of fishing activities which reduced the Georges catch in 1934 to 30 percent, and in 1935 to 40 percent of the total. With the exhaustion of this great year class, there has been a progressive shift of fishing activity back to Georges Bank. As no year class comparable to that of 1929 has been observed on the Nova Scotian Banks in subsequent years, while several have appeared on Georges Bank, it would appear that the latter bank is more regularly productive than the former, and, except for limited intervals, will continue to be our principal source of supply. The trend back to Georges Bank in 1939 was stimulated by the campaign for an improvement in the quality of fish and has emphasized the importance of short trips. This makes fishing on Georges Bank particularly advantageous, since most of the bank is less than 1 day's run from Boston.

The Grand Bank fishery still seems to be beyond the practical range of our fleet. Several scouting trips were made to this area during 1939, but the distance is so great that the catches ordinarily do not justify the extra time and fuel consumption.

The unfortunate trend toward concentration of the fishery on small haddock has continued, and in recent years the fleet has taken an increasing quantity of scrod haddock. This size category made up 25 percent of the total catch in 1937, 32 percent in 1938, and 38 percent in 1939. On Georges Bank alone, the proportion ran even higher—43 percent in 1939. The increased capture of scrod is definitely prejudicial to the future of the haddock fishery, since haddock of the small sizes affected are growing rapidly, and another year on the bank would increase materially the poundage in the sea available to the fisherman. The increased concentration on scrod will reduce even further the supply of haddock available.

It was demonstrated early in the present investigation that although the great decline in catch immediately following 1930 was partly due to economic factors, the principal cause was the scarcity of haddock as compared to earlier years. The major problems to be solved are the detection of the causes of the scarcity, whether due to natural conditions or to the commercial fishery, and the determination of how these causes could be controlled so that the fishery might be restored and maintained at the most productive level.

In attacking these problems, a consistent program of investigation has been pursued which stresses the following points: (1) The collection and compilation of present and past records to show the total quantity of haddock taken by the commercial fishery from each of the principal fishing grounds. (2) The development and application of an index of abundance to show accurately the changes in the stocks of fish, rather than changes in gear or fishing methods. (3) A determination of the relative success of reproduction from year to year and its relationship to measurable features of the natural environment. (4) A determination of the interdependence of haddock stocks through study of the passive movements of eggs and larvae and the migration of bottom stages. (5) A study of features of the biology of the species, such as growth rates, mortality rates, and distribution, that are needed to interpret the various population data. (6) An analysis of modifications in fishing procedure to determine the most practical and effective methods for obtaining an optimum yield. This involves experiments with savings gear, the charting of nursery grounds, and related projects.

Extensive records of fishing activities of the otter-trawl fleet from 1914 to the present, were accumulated from various public and private sources. After considerable analysis, a method of calculating the relative abundance from year to year was developed which gave consistent results in spite of changes in fishing intensity from month to month and from year to year. By use of this method an index of abundance, or availability, was nearly completed for 1914-37. This index demonstrates that in the Georges Bank region regular cycles in abundance of commercial-sized haddock occurred in the early years of the fishery before the fishing intensity had become severe. These cycles of 7 to 9 years in length were caused by similar cycles in the success or failure of the survival of young to commercial size. The cycles in the survival of young tentatively

appear to be correlated with the magnitude of the adult stock, with poor survival in years of extremely high as well as of low abundance of adults, and good survival in years of intermediate abundance. There are other apparently noncyclic variations from year to year which appear to be due to features of the physical environment.

The precipitous drop in haddock abundance during the years 1929 to 1931 was due to the coincidence of a period of greatly increased fishing intensity and that portion of the natural cycle having a minimum replacement of young. Consequently, with a heavy drain from the commercial fishery and negligible replacements of young fish, the abundance of marketable haddock declined at a rapid rate. Following the low level reached in 1931 the abundance has recovered to some extent, but has failed to build up to levels comparable to the 1926-28 period since the commercial fishery has been so intensive that no considerable accumulation of market-sized haddock was possible.

Information concerning the haddock populations off the Nova Scotian coast is much less complete, for our fleet fished this area only sporadically until 1933-34, and practically no fishing was done in the area during the years of high abundance on Georges Bank. Therefore, the continuous measure of abundance available for Georges Bank is not available for the Nova Scotian coast.

A large amount of subsidiary biological information, discussed in previous annual reports, has been obtained to assist in the explanation and understanding of the abundance cycles.

Progress during 1939.—The investigation was continued under the direction of Mr. Herrington with the part-time assistance of H. M. Bearse and M. S. Moses. Dr. Rounsefell continued the Maine tagging experiment begun in 1938. Field work was limited mainly to the collection of the basic data required for determining the age, number, and size composition of the 1939 catch, since analysis of abundance now is included in the groundfish studies. During the course of the year Mr. Bearse obtained length measurements of nearly 50,000 haddock and collected 3,500 haddock scale samples.

Laboratory work was concentrated on the completion of the haddock abundance index from 1914 to 1937 and the compilation of a record of the total monthly haddock catch from the Georges Bank and Nova Scotian areas for the same period. Records of total monthly haddock catches were obtained from Bureau records for Boston, Gloucester, and Portland, and from records of fishing companies for New York and Groton. These records account for nearly the entire offshore haddock catch. The compilations are required to show the total fishing strain and for use in evaluating the effect of increased gear competition.

Completion of the primary stage of computing the abundance index required special analysis to compensate for certain gaps in our data for 1914 to 1916. Portland landings, shown only as total haddock, were divided into large and scrod on the basis of hauled weights. Statistical analysis showed that this method was consistently accurate. The running time between port and fishing grounds, which is required for our calculation of fishing effort, was obtained from the length of trip since data for 1917 to 1920 showed that there was a high degree of correlation between these two components of a trip.

In the more complete records and refined analysis for late years, a number of minor difficulties were solved. The validity of variations in our records of "lost time," the most subjective of the factors used in our computation of "catch per unit of fishing effort," was established through comparing the percentage lost time with percentage wind force of 7 or more, as reported by lightships. A correlation of 0.91 between these variables indicated that the variations in lost time were due to weather and not to personal factors. Shifts within the season between Georges Bank and the more distant grounds were found to be closely correlated with water temperatures, apparently due to the difficulty in keeping fish on long trips during the summer, when water temperatures are high. This work completed the primary analysis of our data to show catch per day by months.

The next major step in the abundance analysis was to summarize the data by seasons and years. Preliminary attempts, using the usual arithmetic averages and direct combination, proved unsatisfactory due to monthly differences in level of availability, combined with great variations in the amount of fishing carried on in the several areas and from month to month. The availability through the season was found to follow a consistent pattern throughout the 24 years studied. However, it was found that in years of scarcity the winter fishery suffered much more than the summer, since at such times the winter catch declined 40 percent more than the summer. It was determined that the best seasonal grouping was by 3-month periods, beginning in February. Using this grouping and a weighted-ratio method of combining monthly data which takes care of variations from month to month in the amount of fishing, the seasonal and yearly summarization was completed for the Georges Bank area.

The final step in the preparation of the index curve is an adjustment for the various changes in fishing methods and apparatus that were introduced from 1914 to 1937 in order to make the data on catch per day comparable over the entire period. The adjustment for these changes is of prime importance, since some of the most vital conclusions concerning the productivity of the stock at different levels of abundance depend on a correct determination and comparison of the levels of abundance in early and in recent years.

Most of the work on evaluation of the above changes was completed during 1939. The increased size and power of the trawlers was taken into account by using specific groups of boats over a protracted period, and when forced through obsolescence of boats to change from one group to another the activities of the two groups were overlapped to obtain a measure of relative effectiveness. There also was a change from steam to Diesel power involving a decrease in both gross tonnage and horsepower, but no appreciable change in effectiveness. The effect of Vigneron-Dahl gear, adopted by most of the boats between 1927 and 1931, was evaluated by comparing the productivity of groups of boats before and after installation of this gear. Results showed that the new gear increased performance by at least 29 percent during the winter, and probably more in summer. Evaluations of the influence of the radio, fathometer, and gear competition were partly completed. A study of the effect of changes in the proportion of other species in the catch was partially completed.

Tagging.—The tagging experiments commenced in 1938 by Dr. Rousefell were continued. In June 1938, 628 haddock were tagged and released off Mt. Desert Island, Maine, and in June 1939, 538 additional fish were marked in the same locality. Recoveries from both experiments indicate that haddock taken by hook and line from a small boat—insuring careful individual handling—can be tagged successfully when fishing in depths up to at least 30 fathoms. Tagging of fish caught at greater depths has not been attempted. When the new research vessel is completed, the same technique may be applied to the haddock on the shoaler parts of the offshore banks.

Of the number of fish tagged in 1938 experiment, 10 percent were recaptured. Three types of tags were employed and the recoveries consisted of 11.4 percent of the celluloid-disk type, 9.5 percent of the "bachelor button" type, and 8 percent of the internal-anchor type, but the differences in the percentages of recaptures of fish marked by the three methods are not statistically significant. In the 1939 experiment, from which recoveries are still coming in, 10.2 percent of the disk type and 7.3 percent of the button type have been taken to date. The disk type thus seems to be proving slightly superior to the button. In the 1938 experiment, 49 percent were recaptured more than 90 days after their release, 38 percent more than 200 days, and 10 percent more than a year later.

In the 1938 experiment, the locality of recapture was available for 60 of the 63 recoveries. Of these, 52 percent were recaptured within 10 miles of the point of liberation and 65 percent within 20 miles. However, several long migrations were performed, so that although the median distance traveled was only 7 miles, the average distance was 36.7 miles. Since the 1939 experiment has run for only 8 months, the dispersion will not be discussed.

During the summer months the haddock showed a tendency to migrate southwestward along the Maine coast. From the time of their release in June to the end of October there were 37 recaptures at known localities, of which 30 were taken within 20 miles of the point of release, and 7 from 30 to 85 miles to the southwest. From Feb. 28 to May 10, 1939, 6 were taken on Browns and Little La Have Banks, from 137 to 182 miles southeastward of the point of release. This indication of a southeastward spring migration is confirmed largely by the fact that Browns Bank, fished throughout the year, yielded recoveries at only the one season. The recovery of two tags on Georges Bank raises the question of whether the haddock crossed the deep Fundian Channel, separating Browns and Georges Banks, or whether they followed a long, roundabout course by way of Cape Cod and Nantucket Shoals (one fish was taken 130 miles southwestward, on Jeffrey's Ledge), or crossed directly over the Gulf of Maine.

FLUNDER

The flounder fishery of the North Atlantic States is based chiefly on 5 species: (1) The lemon sole, *Pseudopleuronectes dignabilis*; (2), the winter flounder or blackback, *P. americanus*; (3), the grey sole or witch, *Glyptocephalus cynoglossus*; (4) the yellowtail, *Limanda ferruginea*; and (5), the dab, *Hippoglossoides platessoides*. In 1937, the most recent year for which complete figures are available, the total catch of flounders reached 59,000,000 pounds, worth nearly

\$2,500,000 to the fishermen. Yellowtail contributed the largest poundage (15,000,000 pounds), closely followed by the winter flounder (13,500,000 pounds). The winter-flounder catch was the most valuable (\$522,380) followed by the grey sole catch (\$510,046).

The greater part of the flounder catch comes from the inshore fishery. In 1937 less than one-third of the total catch was landed at Boston, Gloucester, and Portland by the offshore fleet fishing out of those ports. Consequently, the species of flounder are of great importance to the small-boat and shore fisheries, and during recent years have become of increasing interest to a growing army of sport fishermen, particularly from Cape Cod to Long Island waters.

In 1938 the New York State Conservation Department undertook a survey of the marine fisheries in New York waters. Although the State survey ended in Dec. 1938, Suffolk County, which includes the major part of Long Island waters, provided funds to continue the work on their fisheries until June 1940. A report of the cooperative investigation appears on pp. 27-29 of this publication.

In view of the importance of commercial and sport fishing for winter flounders south of Cape Cod, and the financial cooperation of New York State, it has been decided for the time being to concentrate the work on the winter flounders in that area. It is hoped that facilities will be available in the future to extend the work to other areas and species.

Numerous reports indicate a serious decline in abundance of the winter flounder. To obtain some measure of this decline, determinations of the total catch and catch per unit of effort over a long period of time must be made in order to determine the condition of the stock and fluctuations in the fishery. To discover the factors that influence fluctuations, such biological phases as racial composition of stocks, age and growth, migrations, success of spawning, etc., must be studied.

Progress during 1939.—Better records of flounder landings are available for 1939 than ever before, through the action of Maine and Connecticut in installing a system for the collection and publication of monthly records of their fish catches. The coverage of several important flounder ports in Massachusetts also was improved through the collection of records of landings by the Bureau's Market News agents. These developments are of great importance to the flounder work, since the greatest part of the catch of these species is landed at minor ports and is not covered by the Bureau's records for Boston, Gloucester, and Portland.

The excellent reports of landings at the three principal New England ports do not show the fish landed at "T" Wharf, Boston, which include large quantities of flounders. A temporary assistant was detailed to cover "T" Wharf for the month of February to determine the magnitude of the landings. The 4-week total reached 248,000 pounds. According to information obtained from dealers, landings during the summer are considerably higher. Thus, it appears that more than 3 million pounds of fish per year are not included in the Boston reports.

Returns continued to come in from fish tagged in Great South Bay, Great Peconic Bay, Gardiners Bay, and Long Island Sound, in New York waters, as well as from fish tagged in Connecticut and Rhode

Island waters. During 1939 a series of fish also was tagged in John's Bay, Maine. In general, tagging experiments indicate offshore migrations of the winter flounder in the spring, and inshore spawning migrations in the fall. Although there was some slight dispersion of fish from local areas, the majority never ventured far from home waters.

Racial studies of the flounders in the Long Island area, during the summer of 1939, confirmed the existence of local populations in the Peconic Bay, Great South Bay, and Long Island Sound regions, as indicated by the tagging experiments.

ANALYSIS OF GROUND FISH ABUNDANCE

The groundfish abundance analysis was continued under the direction of Dr. Rounsefell, who was assisted by Mr. Bearse. During 1939 the fishing vessels landed 376,000,000 pounds of groundfish at Boston, Gloucester, and Portland. Compared with 1938, when 379,000,000 pounds were landed, this represents a decrease of less than 1 percent. However, the value to the fishermen rose from \$8,352,000 in 1938 to \$9,017,000 in 1939; an increase of 8 percent.

An outstanding feature of the 1939 fishery was the continuing expansion of the rosefish catch. In 1933 the catch was less than 300,000 pounds, and in 1934 it was just under 2,000,000 pounds. In 1935 the filleting of rosefish gave the product access to the markets of the Midwest—where they are sold as "ocean perch"—and the catch rose to 17,000,000 pounds. In 1936 it jumped to over 66,000,000 pounds, which was almost too large for the market to absorb. In 1937 the catch fell off to 58,000,000; in 1938 it was 65,000,000 pounds; and in 1939 was 77,600,000 pounds.

During 1939 the large otter trawlers, which have a long cruising radius, commenced taking large quantities of rosefish off eastern Nova Scotia, especially in The Gully, just south of Banquereau. From July to December 1939, this area accounted for over 8,400,000 pounds, or 58 percent, of the rosefish catch of the large trawlers, whereas it accounted for only about 1 percent of their catch during like periods in 1937 and 1938.

The various species of groundfish form the basis of the most important New England fisheries. Although it has been known that the total yield has fluctuated, our knowledge has been too limited to know the causes, or which species are most affected. The shift in the fishery within the past few years toward rosefish and grey sole, for instance, presents the problem of discovering what effect these changes are having on the species that were already being intensively exploited. Indices of abundance are being determined for each species, which are so constructed that they may be added to from month to month to show any sudden changes. Under a system which made only irregular summaries of abundance those changes might be unnoticed for a long period. When the indices are completed, however, it will be possible, as soon as the requisite knowledge of the life history becomes available for each species, to suggest means of maintaining the population at that level which will yield the largest sustained annual catch.

The study of the three variables—total catch, fishing effort, and abundance—is difficult in a fishery that covers such a wide geographical area. At times the fleet operates in comparatively shallow water, and at other times in deep water, and the species taken vary accordingly. Also, some species are more available to the fishermen at certain seasons than in others, so that only comparable seasons yield valid comparisons. Since the welfare of thousands of New England fishermen, shore workers, and fillet cutters depends on the maintenance of this tremendous fishery, it is essential that we understand the factors responsible for changes in yield. Not only can that knowledge help to prevent a decline similar to that suffered by the North Sea fisheries, but it can also deter the enactment of irresponsible legislation which is sometimes a “stop-gap” not based on complete knowledge of the facts.

Statistics.—The first step in assessing the condition of this fishery is to obtain information on the yield. Since even the same species may have independent stocks on different banks, it is necessary to know the quantities caught in each area. This information is obtained for all boats of over 5 net tons landing at Boston, Gloucester, or Portland, and is published monthly by the Division of Fishery Industries. It also gives an excellent summary showing the type of gear used and the bank where caught. The landings at these three principal ports comprise about 65 percent of the New England landings, and all but a small fraction of the offshore catch. The information on fishing banks was brought up to date in 1939 by making several slight changes in the boundaries of statistical subareas based on the grounds fished by large otter trawlers in 39,632 days of fishing from 1928 to 1937, inclusive. A 1-year trial of the new boundaries has shown that they conform more closely with the natural fishing areas than those previously adopted.

Until 1939 the only available records of the total New England catch have been those of the Bureau's annual canvass. However, due to limited personnel and funds, this canvass cannot achieve the desired degree of accuracy, since it is made only once a year at the end of the season and many of the fishermen from whom records are obtained do not keep accurate accounts. Furthermore, such annual statistics do not show the season or the locality of the catch.

In cooperation with the Division of Fishery Industries, the North Atlantic staff has encouraged the installation of adequate statistical systems by the New England States. The State of Maine installed a system on Jan. 1, 1939, whereby the dealers use triplicate receipt books, furnished by the State, for each purchase of fish. The State collects one copy of each transaction at the end of each month. The State of Connecticut commenced a similar system during the year. The Market News Service of the Bureau now obtains information on all landings at Provincetown and New Bedford, Mass. Although there is still much work to be done, the progress made during 1939 will assure the most complete statistics so far obtained on the New England fisheries.

Fishing effort.—The amount of fishing effort expended in relation to the volume of the annual catch is of great importance in studying the trend of a fishery. The changes in type of gear and in the size and style of fishing boats should also be known. Such information

provides a perspective for analyzing the state of a fishery. The catch, tabulated according to vessel and size and type of gear, is being compiled from the reports of landings at the three principal New England ports. Data have been assembled for all except 2 years of the 1927-39 period.

A comparison has been made between the catches of 1927 and 1938. During 1927 the average number of vessels that landed each month was 218 (including a total of 364 boats). The average was computed on a 12-month basis so that in the purse-seine fishery, for example, if 60 boats fished 6 months the average for the entire year would be 30 boats. If a boat used two types of gear during the same month, each gear has been credited with half a month. The average number of boats that landed catches each month during 1938 was exactly the same, 218 (332 different boats landed). Not only was the same number of landings made in 1927 and 1938, but the average gross tonnage per individual boat was 96 in each year.

However, there was a 50 percent increase in the landings of all species, from 268,000,000 pounds in 1927 to 401,000,000 pounds in 1938. This appears to have been due largely to a radical change in the proportions of each type of gear used. All forms of gear except otter trawls and sink gill nets decreased in numbers. Hand-lining accounted for an average of 10 boats fishing throughout 1927, but that method of fishing had practically disappeared in 1938. The average number of purse seiners decreased from 35 to 20. The line trawlers decreased 34 percent in number and 52 percent in gross tonnage. This apparent discrepancy is accounted for by a decrease from 49 to 23 in the line trawlers of over 50 gross tons, but an increase from 8 to 15 in the average number of smaller line trawlers. The number of otter trawlers increased 60 percent, from 76 to 121, due largely to the building of new boats, although, to a lesser extent, it was also due to the present practice of operating a boat throughout the year. In addition, several line trawlers were converted for otter trawling. The medium-sized otter trawlers in operation, 51 to 150 gross tons, increased from 22 to 34, or 55 percent; the large, from 24 to 40, or 67 percent; and the small otter trawlers from 30 to 47, or 57 percent. Thus, the large trawlers showed the greatest increase in numbers. In 1927, with an average of 24 large trawlers in operation, 88 percent were propelled by steam. In 1938 steam accounted for only 24 percent of an average of 40 large trawlers, the balance being Diesel-powered.

Other factors in addition to the shifts in type of gear contributed to the 50 percent increase in landings. One was the adoption by the otter trawlers of the Vigneron-Dahl trawl, which increased their catches considerably. A second factor is the newly developed fishery for rosefish, which produces a greater poundage per unit of effort than any other species.

Population estimates.—Having laid the ground work for the determination of total catch by season and area, and of total fishing effort, there remains the third variable—abundance.

Very fortunately the haddock investigations, as one phase of their activity, commenced collecting data at the Boston Fish Pier in 1932 that are of great value to the groundfish analysis. The phase of the haddock work dealing with abundance will henceforth be carried on

as a part of the determination of abundance of all species of ground-fish.

At the Boston Fish Pier the captains of all vessels of over 50 gross tons are interviewed at the end of each trip. The data listed includes the day and hour of departure and arrival at the pier; the fishing locations by rectangles covering 10 minutes of latitude and of longitude; the depth fished; the number of hours of fishing time lost through bad weather, engine trouble, or other causes; the proportion of time spent on each bank; and the proportion of the trip (and of most of the species caught) on each bank. For line-trawl vessels the number of tubs of gear set on each bank and in each depth also is obtained. These interviews are now being made by Mr. Bearse. During 1939 the catches were allocated to their appropriate subarea and depth zone, and the fishing time for selected groups of otter-trawl vessels was calculated. The calculated number of fishing days and catch allocations were added to the punch cards used by the Division of Fishery Industries in tabulating the material for its monthly bulletin on the landings at the three principal New England ports according to fishing bank and type of gear. As soon as the indices of abundance by species for the 1932-38 period are completed it will be possible to follow the changes in abundance from month to month.

For the two selected groups of large otter trawlers, the catch and number of days of fishing in each statistical subarea during each month has been tabulated, according to depths fished, for the period 1932-38, inclusive. One group of trawlers is slightly over 90 percent as efficient in fishing ability as the other group. By making an allowance in the number of fishing days, it is possible to place the two groups on an equal basis and to combine the data for final analysis.

The determination of abundance is further complicated, however, by the necessity of analyzing the data according to the depths fished, inasmuch as different species vary in their choice of habitat. Accordingly, all catches have been allocated to 3 depth zones, namely: Shallow, 0 to 30 fathoms; medium, 31 to 60 fathoms; and deep, over 60 fathoms.

The analysis of trips for area XXII—the banks of the Gulf of Maine, Georges Bank, and Nantucket Shoals—in which the otter trawlers fished wholly within 1 depth zone and 1 statistical subarea, show that although most species vary considerably in abundance in the different depth zones, this is not true for haddock. Giving each depth zone an equal weight, the relative abundance of large haddock on the basis of 100 percent was 35 for shallow water and 32 for both medium and deep water. Scrod haddock had a relative abundance of 37 for shallow, 40 for medium, and 23 for deep water. This may be an artifact, because, since haddock represent over 60 percent of the catch, the fishermen are seeking locations where they are most abundant and fish each depth most intensively at the time when haddock are most abundant there.

The flounder group—blackbacks, lemon sole, and yellowtail—definitely prefer shallow water, and yielded percentages of 88, 72, and 76, respectively, as compared to 11, 23, and 20 for medium depths, and only 1, 5, and 3 percent for deep water. Grey sole and dabs, on the other hand, are deep-water species; 84 and 69 percent coming from over 60 fathoms. Cusk, pollock, and hake are all taken in much

greater quantities in deep than in shallow water. Almost 100 percent of the rosefish are likewise from the deep zone.

As soon as the data can be analyzed for seasonal abundance, and for varying degrees of abundance according to geographical location, the final curves of annual changes in abundance will be determined. For a few species, such as cusk and hake, which are taken only in small quantities by the otter trawlers but in large quantities by hook and line, we may have to depend largely on the analysis of the catches of line-trawl vessels. Data showing the number of tubs of gear fished by selected line trawlers and their catch for each depth and subarea have already been assembled for 6 of the 7 years under consideration, and will be analyzed in a like manner.

LOBSTER

The lobster fishery is of paramount importance to the shore fisheries of the North Atlantic States, since it furnishes all or part of the income of great numbers of small-boat fishermen from Maine to New Jersey. In 1937 this fishery produced a catch of over 11,500,000 pounds, worth nearly \$2,500,000. Fifty years ago the catch was nearly three times as great, but it has declined in spite of protective regulations in all States, and artificial rearing in some.

The research program began in March 1939, with the employment of Leslie W. Scattergood to carry on the investigations. The program has been divided into two main parts—the first dealing with hatchery and rearing methods and the second with the study of the Maine lobster population to obtain biological data necessary for the most effective management of the fishery.

More than one-half of the total catch is accounted for by the Maine fishery. The records collected by the Maine Department of Sea and Shore Fisheries showed the catch in 1939 to be 6,625,000 pounds, compared to about 23,000,000 pounds 50 years previously when the fishery was much less intensive. Because of the importance of this species to the fishermen, and the need for the adoption of measures to attempt to maintain the yield, the State of Maine constructed a large rearing station at Boothbay Harbor in 1938 and 1939, and in the latter year joined in a cooperative lobster-research program with the Bureau of Fisheries. The object of the investigations undertaken was to develop improved methods of rearing lobsters and to obtain data that would assist in the determination and establishment of an adequate minimum-size limit.

Experimental rearing to the fourth stage was conducted at the hatchery under different conditions of temperature, light, and food, but, due to unnatural water conditions present in the rearing station, the work was beset with difficulties which were only partially overcome at the end of the rearing season. Further experimental rearing, under more suitable conditions, will be attempted during the spring and summer of 1940.

The commercial catch of lobsters was sampled along the entire coast of Maine from Cape Porpoise to Cutler. The sex and carapace length, as defined by State laws, were recorded for over 15,000 lobsters. From these samples it was found that 12 percent of the number had a carapace length of less than $3\frac{1}{8}$ inches, 34 percent under $3\frac{1}{4}$ inches, and but 8 percent above $3\frac{3}{4}$ inches. Measurements

of seed lobsters taken along the Maine coast indicate that they do not mature before they reach a length of $3\frac{3}{4}$ inches; in many regions we have reason to believe that sexual maturity must be first reached at a length greater than $3\frac{3}{4}$ inches. It appears that only about 8 percent of the population has an opportunity to spawn. Further research must be carried on concerning this problem.

As a result of a request from the North Atlantic Lobster Committee to "assemble information concerning size limits and begin the research work required to obtain additional biological information necessary for sound recommendations concerning size limits," certain data were gathered during the summer and fall fishing season. These observations consisted of a determination of the size composition and sex ratio of the commercial catch, length-weight relationships, the relationship between the length measurements from eye socket to end of the carapace and total length measured from the tip of the rostrum to the end of the tail, and size measurements of seed lobsters. As seed lobsters proved to be difficult to find in any numbers during the summer and fall, an indirect method of determining the sexual maturity was employed which was based on the fact that the width of the female's abdomen increases at a higher rate than body length with the approach of sexual maturity.

The present size regulation of $3\frac{1}{8}$ inches, carapace measurement, allows the capture of small, immature lobsters which results in an economic as well as a biological waste. A $3\frac{1}{4}$ -inch lobster weighs 1 pound, on the average. The important summer and fall fishery depends upon lobsters under 1 pound for 34 percent of its numbers. These small "chicken" lobsters are not in demand on the markets and a general lowering of the prices occurs with the overabundance of undesired sizes.

Tagging experiments were carried on to determine the interdependence of local populations and to measure the intensity of the fishery. A total of 413 lobsters were liberated in three groups in Boothbay Harbor; one lot in July, another in August, and a third in November. The recoveries were 27, 55, and 31 percent, respectively. The first percentage recovery is not comparable to the second and third, as the lobsters of that group were near the shedding stage, at which time they would lose the tags. One hundred lobsters were released in the Sheepscot River, a long tidal estuary, during October and a 7-percent recovery resulted by the end of December. On the offshore fishing grounds of Sheepscot Bay, 186 lobsters were liberated in July and 100 in December. Recoveries of 12 and 3 percent, respectively, were made by the end of the year.

It is too early for the final results of the tagging to be known, as more tagged lobsters are expected to be caught during the summer and spring of 1940. At the present time, the longest migration has been $3\frac{1}{2}$ miles, and two facts are evident from the tag returns: First, there is very little migration during the summer and fall months; and, second, the intensity of the fishery may vary in different regions, depending upon the season and the number of traps fished in an area.

Although records of daily catches and the number of lobster traps fished by the entire industry are not available for the year, certain lobster dealers have kept daily records of the catches of their fish-

ermen, thus providing a means of sampling the poundage yield per trap unit.

MIDDLE AND SOUTH ATLANTIC FISHERY INVESTIGATIONS

ROBERT A. NESBIT, *in charge*

A few years ago it would have been correct to state that the principal objectives of conservation administration in the Middle and South Atlantic region are: To protect the interests of the consuming public in an abundant production of food fish and to promote the welfare of the commercial fishermen. Today, however, it is necessary to add a third objective—to protect the interests of salt-water anglers. The number of anglers has increased greatly in recent years and many active organizations which are very influential in matters of conservation legislation and administration have been formed.

It has often been pointed out that the interests of the consuming public, the commercial fishermen, and the anglers are identical in that they are best served by the maintenance of high levels of abundance. Also it has frequently been indicated that the only controllable influence on abundance is the fishery itself, and that the only effective means of exercising control is by management of the intensity of the fishery.

That it makes a great deal of difference how the intensity of an excessive fishery is reduced is a point that is repeatedly overlooked. Complete elimination of commercial fishing would protect the interests of anglers, but obviously would be contrary to the interests of the consuming public and the commercial fishermen. Measures designed to reduce excessive fishing by requiring commercial fishermen to use inefficient methods, that is, by making it unprofitable to fish excessively, protect the interests of the public and the anglers but are unsatisfactory to commercial fishermen.

It is apparent, therefore, that if effective cooperation of all interested groups is to be obtained it will be necessary not merely to eliminate overfishing but also to eliminate it by some means which will not only protect the fish but will also protect the profits of commercial fishermen.

Since the cost of fishing is almost directly proportional to the amount of gear operated, the most economical method of decreasing fishing intensity is to reduce the amount of gear employed to a minimum. Recent recommendations by the Middle Atlantic staff, based on this principle, have been received favorably by commercial fishermen in Chesapeake Bay. It is possible, therefore, that such proposals will provide a basis for better cooperation between anglers and commercial fishermen.

As in previous years, office and laboratory space was provided by the University of Maryland. In the conduct of these studies much voluntary cooperation has been received from the conservation departments of several States and from organizations of commercial fishermen, sports fishermen, and dealers. Special thanks are extended to the conservation departments of Rhode Island, Connecticut, New York, New Jersey, Maryland, Virginia, North Carolina, and South Carolina. The staff also profited greatly by the cooperation of the

Narragansett Biological Laboratory and its director, Dr. Charles J. Fish, and the Chesapeake Biological Laboratory and its director, Dr. R. V. Truitt.

SHORE FISHES

Investigation of the shore fishes of the Middle Atlantic region during 1939 was continued by William C. Neville. The work included a study of fishery problems in Long Island, N. Y., conducted in cooperation with Suffolk County (reported on pp. 27-29 of this publication), and observations on the winter trawl fishery off the Virginia Capes.

Winter trawl fishery.—The year 1939 marked the eighth anniversary of the winter trawl fishery off the Virginia Capes. The establishment of this activity as a permanent part of the industry is indicated by continued large annual production. Approximately 18,000,000 pounds of fish were landed at the principal ports in Virginia, New Jersey, and New York during the 1939 season. This high level of catch has been maintained during the past several years. The most pressing need in the study of the probable effect of the winter fishery on the general supply of sea bass, scup, fluke, and croakers, which species comprise the major part of the catch, is to devise saving methods to release undesirable market sizes of fish, in good condition, at sea. It is hoped that such savings work can be started in the near future through the use of the trawler recently acquired by the Bureau and now being remodeled and equipped at Boston.

ANADROMOUS FISHES

Striped bass.—The principal objectives of the striped bass study conducted by William C. Neville in 1939 were: (1) Continuation of the studies which led to the Bureau's recommendation of a minimum size limit of 16 inches, measured from the snout to the fork of the tail (approximately 17½ inches overall), as the best means of securing greater yields and larger profits from each brood of striped bass, regardless of its relative abundance. (2) To determine the extent to which the available supply in the various States depends on local reproduction, or on migrations of fish from other parts of the coast, and whether, on the basis of the source of the supply and the extent of withdrawal by the fishery, more restrictive or protective legislation is necessary for the proper utilization of the supply.

Mainly as a result of the Bureau's recommendation, the legal limit of striped bass was raised to 16 inches, fork length, in New York State during 1939. A slightly higher size limit is in effect in New Jersey. Recommendations for substantial increases in the legal size limit for striped bass have been submitted to the fishermen by the Virginia Commission of Fisheries, and similar action is expected in Maryland and North Carolina. These three States comprise the most important striped bass production area along the entire Atlantic coast. Analysis of biological data obtained through tagging experiments reveals that the fishery is so intensive in certain parts of Chesapeake Bay as to remove a considerable quantity of the small sizes of bass. Hence, it is particularly important that Virginia and

Maryland increase their size limit to the Bureau's recommendation of 16 inches to insure more efficient utilization of the supply. The increased size limit will result in a greater total catch and value, provided by an equal number of fish of the same year class.

A survey of the coastal regions of Chesapeake Bay to southern New England during 1939 confirmed conclusions resulting from previous study that not all important areas for striped bass furnish their quota of young to replace the larger-sized fish removed by the fishery. Spawning grounds of significant importance were located in the Maryland waters of Chesapeake Bay, Delaware Bay, and the lower Hudson River in New York. According to studies made in previous years, the lower Chesapeake Bay and the sounds and coastal rivers of North Carolina are also productive areas. Results of the survey in 1939 indicated a notable lack of successful reproduction of striped bass along the ocean coasts of New Jersey, Long Island, and southern New England. These observations suggest that the adult stock in these latter regions originates mainly from the migration of young fish from the more productive spawning and nursery areas of Chesapeake Bay, and possibly Delaware Bay and the Hudson River.

The survey also revealed that spawning in 1938 and 1939 in the important Chesapeake Bay region was relatively unsuccessful, despite the fact that the spawning stock was one of the largest on record. This was in marked contrast to the unusually successful reproduction that occurred in 1934, when the stock of adult fish was relatively low. This disclosure supports the results of previous studies in that the production and survival of young striped bass are, to a large extent, independent of the number of spawners, and hence regulatory measures to increase the spawning stock are not of primary importance in the proper conservation of the species. The Bureau's recommendation of a 16-inch size limit will, however, increase the number of spawners, but it is intended more specifically to insure better utilization of each brood. Results of the study of spawning and nursery areas for striped bass, and of tagging experiments to determine the extent of the withdrawal on the stock and additional information on the seasonal migratory habits of the species, have been considered in connection with the question of whether more restrictive legislation intended to improve or maintain the abundance of striped bass is necessary in some of our Atlantic Coast States.

Shad.—Further study in 1939 confirmed the opinions expressed in the report for 1938 to the effect that the principal cause of depletion is overfishing, rather than pollution or obstruction of runs, and that recovery can best be brought about by providing a spawning escapement substantially equivalent to that which has proved adequate in the Hudson River.

Study in 1939 also brought out the important point that the moderate fishing rate in the Hudson eventually takes as much shad from each year class as the more intensive fishery in Chesapeake Bay, but spreading the catch over several years allows six times as much spawning from each year class.

In December 1939, a memorandum was submitted to the conservation departments of Maryland, Virginia, and North Carolina, sum-

marizing the results of the shad studies in 1938 and 1939 and making recommendations as follows:

For the restoration of the shad fishery of Maryland, Virginia, and North Carolina, then, the Bureau recognizes the following fundamental facts and principles: (1) The decline in shad production in Maryland, Virginia, and North Carolina is the result of overfishing. (2) To correct overfishing of shad the annual toll taken by the fishery should be reduced to 60 percent of the present rate. (3) This should be accomplished by restricting the amount of gear operated so that the fishermen will be spared the uneconomic practice of purchasing and operating more gear than is required to take the annual harvest.

In accordance with these principles it is specifically recommended: (1) That appropriate steps be taken by the States to secure necessary additional detailed information as to the amount, the location, the period of operation, and the catch of existing gear in order to accomplish equitably this reduction in fishing gear; (2) that when sufficient detailed information is available appropriate legislation be enacted to accomplish the reduction in gear on a trial basis and to modify such regulations as experience accumulates; and (3) that no expenditures be made for enlarging permanent hatchery facilities and that existing hatcheries be operated strictly on a salvage basis until natural reproduction has been restored.

Investigations of the early life history of the shad were made at the Charleston (S. C.) Office by Louella E. Cable. Because the survival of eggs and young of shad will determine the number of spawning fish required to maintain or build up any given population, studies were designed to determine the survival rates. A survey of the Edisto River, and preliminary plankton collections in 1938, revealed the best spawning areas of the river and provided material from which it was learned that large numbers of eggs are not fertilized and that the survival rate may be as low as 1 percent.

Two stations, one at the upper limit of the spawning area and the other near its center, were sampled intensively during the 1939 shad season for evidence of a possible differential in survival rate, but none was noted. With slight variations, findings of the previous year were substantiated. In 1940 the same central station will be sampled as in 1939 and two lower stations will be added, one to be located in brackish water.

The shad population of the Hudson River, N. Y., has shown, within the past few years, a phenomenal increase as reflected in the commercial catch. Does this indicate a higher survival rate of the eggs and young in the Hudson than has been found in the Edisto River, or is the increase entirely due to a larger escapement of spawners? To better understand the change, it is planned to work on the Hudson in the near future.

Racial studies based on meristic characters, made by Miss Cable, indicate the existence of several populations of shad along the Atlantic coast. These studies will go far in corroborating evidence obtained from tagging experiments and scale readings.

FISHERIES OF SOUTH CAROLINA

Fishery research at the Charleston office, which is in charge of John C. Pearson, concentrated upon fundamental studies of the distribution and abundance of the eggs and young of the shad in Southern coastal rivers, particularly the Edisto River. Several secondary fields of research also present themselves to the trained fishery observer as worthy of investigation. Such research may properly be conducted with the present facilities at Charleston.

It is a matter of general knowledge that the largest hydroelectric development in the Southeastern States, the Santee-Cooper project, is now under way. It is proposed to divert at least one-half of the normal flow of the Santee River over a series of dams into the headwaters of the Cooper River, a tributary of Charleston Harbor. Although the Santee River system is not important from a fishery standpoint, important and perhaps far-reaching ecological changes will take place not only in the lower regions of the Santee but also in the Cooper River. So far, little has been said of the effects of the diversion with respect to the Cooper River, although the U. S. Bureau of Biological Survey realizes the effects of the project on the wildlife, particularly ducks, of the lower Santee River.

The Cooper River, a relatively new and large coastal river created by man, now largely of estuarine character and possessing salt or brackish water, will become fresher with the incursion of fresh water from the Santee River. Aside from becoming a problem of immense interest from a strictly ecological standpoint, probably the most striking change effected by man on an estuarine environment, certain features of practical consideration come to mind. The most valuable aquatic resource in South Carolina is the marine shrimp, *Penaeus*, and nearly 2 million pounds of this crustacean are taken annually in coastal waters of that State. Research has indicated that estuarine areas along the coast are essential nursery grounds for young shrimp after they have been spawned at sea and are carried into shallow in-shore estuaries. The young shrimp require salt or brackish water in a shallow, muddy environment for adequate survival and growth. The estuarine area of the Cooper River provides one of the important shrimp nurseries along the South Atlantic coast. Its contribution to the supply of shrimp in this region may be considerable because millions of shrimp utilize this area for growth, shelter, and development.

The investigative problem is to determine the effect of the constant influx of fresh water upon the environment, especially the nursery areas. Obviously, the salinity of the brackish areas will be reduced, and it is important to know whether this will cause any decrease in the annual catch of shrimp along the coast.

Another secondary problem which could be pursued within the field of fishery biology at Charleston concerns the fishery for sea bass or blackfish. The latter are taken locally on coral reefs off the coast and are probably independent populations from those of more northern areas. The fish are captured solely by hook and line and comprise the third most valuable fishery within the State.

A study of the size and age composition of the catch, correlated with the location of the catch, might throw light on one basic point in modern fishery biology, e. g., does overfishing occur on some reefs, as might be indicated by a lower size and age composition of the fish population, when accompanied by a decrease in catch per unit of effort? Studies of the sea bass stocks to determine such fundamental facts might prove profitable.

SUFFOLK COUNTY COOPERATIVE INVESTIGATION

WILLIAM C. NEVILLE, *in charge*

During the year 1938 a survey of the marine fisheries of Long Island waters was conducted by the New York Conservation Depart-

ment, assisted by the Bureau. Public interest aroused by that survey led to an appropriation of \$6,750 by the Board of Supervisors of Suffolk County, N. Y., for a study in cooperation with the Bureau, of the local fishery problems of that county. The investigation, planned to continue until June 1940, was under the joint supervision of William C. Herrington and Robert A. Nesbit and directed by William C. Neville, of the Middle Atlantic staff. He was assisted by Milton J. Lobell, of the North Atlantic staff, who continued the flounder studies until September 1939, when he was transferred to the U. S. Department of the Interior Antarctic Expedition. Alfred Perlmutter, who was appointed to the North Atlantic staff in December 1939, resumed the flounder investigation.

The studies undertaken will be of value not only to the county but elsewhere in the middle Atlantic region where similar problems occur. The main objectives of the study are as follows:

1. To determine whether any serious decline in the abundance of winter flounders is occurring, and what remedial measures are desirable to maintain a high level of abundance or to insure the best use of the local supply. In this study attempts are being made to determine the effectiveness of planting hatchery-reared fry in an effort to increase or maintain good catches; the desirability of increasing the legal size limit from 6 to 10 inches, and whether current fishing practices result in any great mortality of illegal or unmarketable sizes of fish that are discarded at sea.

2. To determine whether an increase in the size limit on weakfish from 9 to 12 inches would improve the catches of larger-sized fish of greater market and recreational value.

3. To seek practical saving methods to curtail the destruction and waste of illegal and undesirable market sizes of fish.

Favorable progress has been made on all three main objectives. In the winter-flounder study, information collected during 1937 and 1938, supplemented by data in 1939, indicates that different regions of Suffolk County have independent population units, so that efforts to improve fishing conditions can be applied directly to individual areas. Marked differences in the rate of growth of flounders occur in these separated regions, thus permitting determination of the probable benefits to each region through increases in the legal size limit. Frequent contacts during the past 2 years with commercial and sport fishermen of Suffolk County have resulted in much personal interest in the study, and through individual cooperation accurate catch-record data are expected to be available for determining the extent of fluctuations in amount of catch.

The question of whether benefits can be derived by increasing the size limit of weakfish from 9 to 12 inches can be answered in part on the basis of results of the Bureau's study of this species since 1928, and of the biological survey of Long Island made in cooperation with the New York Conservation Department in 1938. Releasing weakfish less than 12 inches in length in New York waters would result in at least some of these fish returning to New York waters as larger-sized weakfish. It is still uncertain, however, whether the gains would fully compensate for the losses. Weakfish are delicate and many would not survive sorting by hand. Progress has been made in adapting the "sifter" method long used by Rhode Island trap oper-

ators, not only to small weakfish but to butterfish as well. As much as 80 percent of the smaller sizes can be released by sifters of appropriate mesh more quickly than by hand sorting, and with less mortality. Unfortunately, this method is not applicable at all seasons, for at times the runs are made up of several species so that sifters of appropriate mesh for one species will permit the escape of marketable sizes of other species or will cause objectionable gilling. Results of these studies will be included in a report to be submitted to the Board of Supervisors of Suffolk County by July 1, 1940.

SHRIMP INVESTIGATIONS

MILTON J. LINDNER, *in charge*

During the past several years the shrimp fishery has been characterized by the rapid expansion of the market for the "fresh-headless" product. This industry first came into prominence along the Atlantic coast in the early thirties. With the initiation, in the winter of 1937-38, of an offshore fishery in Louisiana for the large-sized shrimp, generally known as "jumbo," this phase of the shrimp industry has now become of considerable importance in the Gulf of Mexico. The rapid rise in the fresh-headless shrimp business, together with a growing demand for canned shrimp, has led to considerable increase in fishing effort. The augmentation of fishing, due to the increase in the number of boats, size of craft, and the efficiency of their operation, has placed a strain on the supply of shrimp along the Atlantic coast. The greatly increased fishing intensity has not resulted in an appreciable increase in the catch, but, on the contrary, it has resulted in a decrease in the catch of the individual fisherman with respect to the amount of effort expended. In Florida the increased intensity has resulted in a lesser total catch during the winter fishery, which is composed of migrants from North Carolina, South Carolina, Georgia, and northern Florida. Apparently the fishery on the Atlantic coast is so heavily prosecuted that a great proportion of the migrant shrimp are captured by the fishermen before they reach their wintering ground between St. Augustine and Cape Canaveral, Fla.

Extreme competition, together with the discovery of jumbo shrimp off the Louisiana coast, has led a number of Atlantic coast shrimp boats to migrate to Louisiana to enter the offshore fishery. The Atlantic coast shrimp vessel is much better suited for the offshore work than is the Gulf-style shrimp boat which has been developed for use in the shallow inland bays and bayous.

During 1939, as in previous years, the shrimp investigators were furnished office quarters by the Louisiana Department of Conservation, at New Orleans. The city of Gulfport, Miss., supplied dockage and storage space for the *Pelican* and its gear. Due to the curtailment of funds it was necessary, in February, to temporarily suspend the Texas investigations which were being conducted in cooperation with the Texas Game, Fish, and Oyster Commission. For the same reason the tagging operations with *Launch 58* and the exploratory work with the *Pelican* were interrupted during February and March, respectively. Both boats were again placed in commission after

July; the *Pelican* for a brief period during August and *Launch 58* continuously, for tagging purposes.

Through the cooperation of Dr. R. Dana Russell, School of Geology, Louisiana State University, the bottom-core and mud samples collected with the *Pelican* are being examined. In addition to an analysis of the chemical and physical characteristics of the bottom deposits by Dr. Russell, the Foraminifera, Bryozoa, and Ostracoda will be identified by Drs. Howe and McGuirt of the School of Geology. Through Dr. H. N. Fisk, Louisiana State University, the mollusc collections are being identified. The salinity samples are being analyzed by Professor Albert E. Parr, of the Bingham Oceanographic Institute.

With the interruption of the Texas work, field operations have been restricted to exploratory work with the *Pelican* in the offshore waters of the Gulf and tagging experiments with *Launch 58*. M. J. Lindner and W. W. Anderson conducted the studies made with the *Pelican* and Albert Collier of the Texas Game, Fish, and Oyster Commission assisted during the Texas cruise. C. H. Baltzo has been conducting the Gulf tagging experiments. From June 17 to December 9 Mr. Lindner was detailed to Mexico to assist the Mexican Government in some of their fishery problems.

Messrs. Lindner and Anderson examined and identified the entire collection of penaeid shrimps collected with the *Pelican* in the Gulf of Mexico. This collection contained 16 species of Penaeidae, only 4 of which ever enter the commercial fishery. One, the common shrimp (*Penaeus setiferus*), comprises at least 95 percent of the commercial catch, and all discussion in this report refers to that species.

Information of considerable value was made available during 1939 by the publication entitled, "The early life histories of some American Penaeidae, chiefly the commercial shrimp *Penaeus setiferus* (Linn.)", by John C. Pearson.

OFFSHORE OPERATIONS

Because of the constantly increasing drain on the shrimp population it is particularly important to know whether or not there is a reserve supply of shrimp available beyond the range of the present commercial fishery. The recently developed fishery off the Louisiana coast is a direct result of the studies carried on by these investigations. The possible discovery of additional and similar concentration areas will prove of immediate economic importance to the industry. If such additional areas do not exist it is of both biological and economic significance to know this fact. Future expansion of this fishery will depend appreciably on the presence or absence of additional virgin fishing grounds, and no well-founded management can be attempted without complete knowledge pertaining to the distribution of the shrimp and the limits of its range. The possibility of an offshore spawning reserve can be determined only by fishing in depths greater than those now exploited by the fishing boats.

In an attempt to solve these problems the *Pelican* was used between January 14 and March 15, 1939, to explore the area between the beach

and the 100-fathom contour from the Mexican border to Carrabelle, Fla. Throughout this stretch of bottom 380 hauls, of one-half hour duration each, were made with a 9-foot otter trawl. The trawl actually was dragged over 1,200 miles of ocean floor. In addition to trawling, the *Pelican* occupied 70 hydrographic stations at which 158 salinity samples, 51 Petersen dredge samples, 51 mud samples, and 20 bottom-core samples were taken, together with temperature observations at each station.

Again, as in 1938, concentrations of large shrimp were found off the central Louisiana coast near the 10-fathom line between Ship and Trinity Shoals. No comparable aggregations were found along the entire length of the Texas coast. East of the Mississippi River, between Mobile, Ala., and Carrabelle, Fla., the catch was even less than along the Texas coast. At no time were common shrimp taken in depths greater than 15 fathoms.

These results indicate that the common shrimp does not go to any great depths; that the shrimp boats working in the offshore Louisiana area extend their fishing operations to the outer limit of the range of the common shrimp; that there appears to be little likelihood of other offshore fishing areas being developed in the Gulf with a magnitude comparable to that now present between Ship and Trinity Shoals; and that bottoms composed primarily of sand, shell, or coral do not provide a suitable habitat for the shrimp.

Since it has been determined that the common shrimp does not inhabit areas in the Gulf of Mexico that are outside of the range of operations of *Launch 58*, it was decided that further work with the *Pelican* would be unnecessary in the Gulf. However, similar offshore studies on the distribution of shrimp along the Atlantic coast also are needed, for the same reasons that they were required in the Gulf. The *Pelican* will be transferred to the East coast in January 1940, for the purpose of performing exploratory trawling out to the 100-fathom contour between Fort Pierce, Fla., and Cape Hatteras, N. C. When this exploratory work has been accomplished we will be in a position to recommend what, in our judgment, appears to be the best method for the management of the Atlantic coast shrimp fishery.

MIGRATION STUDIES

As shown by tagging experiments, the Florida winter fishery is comprised of migrants from as far north as North Carolina. Before the migrating shrimp can reach their Florida winter ground they first must run the gamut of the fishery along the entire stretch of coast from their nursery ground to their winter ground. The fishing intensity has been so severe during the past few years that only a small portion of the shrimp that start out on this migration ever reach their objective.

Since the shrimp definitely is migratory, the solution of the Atlantic coast problem lies not within the individual responsibility of any one State but must be the accomplishment of unified action on the part of all four of the States involved. Until the current year, although suspected, it was not known whether similar united action would be advisable in the Gulf of Mexico in case the need arose. However, tagging experiments conducted in Louisiana, Mississippi,

and Alabama, during 1939, have shown that the shrimp populations in these three States move from one State to another. Here, again, we have the necessity for two or more States to unite in their efforts to properly regulate a migratory fishery.

Inasmuch as the common shrimp does not possess any of those structures common to many fishes and molluscs by means of which the age of an individual specimen can be determined; and inasmuch as the shrimp apparently has a relatively short life span, an extended spawning season, a complex migratory nature, and the habitat changes markedly during its life span, many problems concerning its life and habits can be solved only by means of tagging. The problem of growth is complicated at certain periods of the year by local movements, migrations, an extended spawning season, and the lack of dominant size classes. The problem of fishing intensity has presented innumerable difficulties due to the lack of adequate catch statistics in all of the shrimp-producing States. This problem has been complicated further by the migratory nature of the shrimp and the fishing boats. Tagging experiments are the most feasible approach, so far devised, to the problems of growth, migration, longevity, and fishing intensity. Tagging constitutes a technique that has proven successful in tracing migrations of the South Atlantic shrimp and in providing information on the other questions. All of these problems require solution before a well-founded management of the fishery can be proposed.

Because of extensive offshore fishing and the migratory nature of the shrimp, tagging experiments were first conducted along the Atlantic coast. Now, however, with the establishment of an offshore fishery in the Ship and Trinity Shoals area off central Louisiana, a means is provided for securing the return of tags throughout the year. During the last few weeks of 1938 the ground work was laid for a series of shrimp-tagging experiments in Louisiana waters. Fishermen and dealers throughout the experimental area first were made acquainted with the nature of the investigations to be performed, by means of newspaper articles, talks, and posters. The willing assistance and genuine interest of the industry have contributed to the success of the entire program. The fishermen cooperated by returning captured, tagged shrimp and reporting where and when they were taken, and the dealers preserved and retained the specimens and data on their premises until the Bureau's agent could collect them.

The tagging program commenced during mid-December of 1938, when 2,300 shrimp were released in 3 localities between the Mississippi and the Atchafalaya Rivers. During the following month 1,750 additional tagged shrimp were released in the Ship Shoal area. Although these initial plants of approximately 4,000 shrimp were to have been succeeded by regular monthly releases, an unforeseen shortage of funds forced the temporary cessation of the work until the following summer. Tagging was resumed in late August 1939 and continued uninterruptedly for the remainder of the year, and 12,200 shrimp were released during the period. At the same time the area of operations was extended to include inland bays and lakes, as well as offshore waters, and releases were made in Alabama and Mississippi in addition to Louisiana.

Field work has been so extensive that very little time has been available for analysis of the data gathered. Preliminary observa-

tions indicate, however, that east of the Mississippi River the shrimp do not confine their movements within State boundary lines. Shrimp tagged in Louisiana were recaptured in Mississippi; Mississippi releases were taken both in Alabama and Louisiana; and Alabama shrimp were returned from both Mississippi and Louisiana waters.

The shrimp tagged and released to date must be regarded as only a beginning of an extensive program. The highly variable characteristics of almost all aspects of shrimp life and behavior make an unusually large amount of data necessary in order to approximate more closely the average. To obtain a complete picture of the movements in the Gulf populations the tagging should be extended to the eastern limit of the fishery, near Carrabelle, Fla., and westward along the Texas coast. The young shrimp inhabiting the inland marsh areas should be marked to follow their growth rate and to determine the factors influencing their egress to the fishing grounds. A considerable number of large spawning shrimp should be permanently branded to determine the possibility of their living more than 1 year, and to follow their spawning movements. The accomplishment of these objectives will require a period of several years and will necessitate the tagging of many thousands of shrimp.

NORTH PACIFIC AND ALASKA FISHERY INVESTIGATIONS

DR. FREDERICK A. DAVIDSON, *in charge*

The North Pacific and Alaska fishery investigations, with headquarters in the Fisheries Biological Laboratory at Seattle, Wash., are concerned with the solution of problems that arise in the maintenance and rehabilitation of the salmon populations of the Columbia River and Puget Sound and the salmon and herring populations of Alaska. All of the major investigations that were in progress in 1938 were continued in 1939.

COLUMBIA RIVER

The investigation of the biological and physical factors influencing the populations of fish inhabiting the Columbia River and its tributaries was continued during 1939 by J. A. Craig, A. J. Suomela, M. G. Hanavan, Z. E. Parkhurst, R. L. Rucker, and J. R. Coleman.

Since it was necessary to detail practically the entire personnel of this investigation to the fish-salvaging work, it was not possible to conduct any stream surveys during 1939.

Migratory fish salvage.—The Grand Coulee irrigation project, now being carried out by the Bureau of Reclamation, U. S. Department of the Interior, makes necessary the erection of Grand Coulee Dam across the Columbia River at a point some 128 miles up-river from Wenatchee, Wash. This structure will be about 330 feet high, from river level to crest, when completed. Because of the great height of the dam, it was decided that it would not be feasible to pass adult migratory fish over the dam on their upstream journey, nor their offspring over the structure in their downstream migration.

Since this situation prevailed, and since significantly important runs of chinook and blueback salmon and steelhead trout normally proceed upstream beyond Grand Coulee Dam, it was necessary to devise and carry out plans for the protection or salvaging of these

runs of fish. The method decided upon provided for the trapping of all upstream migrant salmon and steelhead trout at Rock Island Dam near Wenatchee, Wash., and the construction of holding ponds and a large hatchery on the Icicle River, a tributary of the Wenatchee River, near Leavenworth, where the adult fish would be held until the sex products were ripe and the fish were stripped. Subhatcheries, or rearing stations, located on the Methow, Entiat, and Okanogan Rivers are also part of this plan. These stations are to be used for the hatching of the eggs taken from the adults at Leavenworth, after which the young fish will be reared and liberated in the river system where the subhatcheries are to be located. All of these streams enter the Columbia River below Grand Coulee Dam and above Rock Island Dam. Because of the fact that chinook and blueback salmon have an extremely strong and uniform habit or tendency to return to the stream in which they were reared and liberated, it is believed that the fish resulting from the hatchery operations will return to these streams below Grand Coulee Dam, thus making trapping operations unnecessary at some future date.

By the spring of 1939 the construction of Grand Coulee Dam had proceeded to such a point that fish could no longer pass beyond the dam site. Unfortunately, construction of the hatcheries was unavoidably delayed. Therefore, emergency measures had to be taken to accomplish the salvaging of the runs.

It was decided to trap the fish in the fish ladders at Rock Island Dam and to transport them to 3 of the streams entering the Columbia between that place and Grand Coulee Dam, where they were liberated and allowed to spawn naturally. In this way the transfer to the streams below Grand Coulee Dam was begun, but with natural spawning taking the place of the hatcheries.

The permanent trapping equipment at Rock Island Dam was completed last spring and was used to catch the fish in the salvage program. Also, 8 specially built tank trucks, which will be used to transport fish from Rock Island Dam to the Leavenworth hatchery, were used to haul the salmon and steelhead trout to the desired locations. These trucks each have a capacity of 1,000 gallons and are equipped with auxiliary motors, pumps, and compressors which aerate and circulate the water in the tanks. The water is cooled by circulation through ice compartments.

Because of information previously collected by the stream-survey crews, it was possible to select areas in the Wenatchee, Entiat, and Okanogan River systems which were suitable for the spawning activities of the salmon and steelhead trout. Chinook salmon and steelhead trout were placed in Nason Creek, an upper tributary of the Wenatchee River, the main Wenatchee just below Wenatchee Lake, and in the "stillwater section" of the Entiat River. The young of the blueback salmon require a lake for their fresh-water habitat; so that species was planted in Wenatchee and Osoyoos Lakes. Fish weirs, or racks, were constructed at the lower end of each stream section or lake in which the spawners were placed, so that the fish would not stray downstream and perhaps back into the main Columbia where they might be unable to find or reach suitable spawning areas.

The actual hauling of fish began on May 1, and the last load was transported on December 9. All of the salmon in the 1939 run were

trapped at Rock Island before hauling ceased, and few, if any, steelhead trout ascend the upper Columbia in the winter. During the May-December period 41,722 fish were hauled. The totals by species are as follows: Chinook salmon, 11,206; blueback salmon, 19,591; silver salmon, 13; steelhead trout, 5,427; squawfish, 1,771; suckers, 3,389; chubs, 133; whitefish, 163; Dolly Varden trout, 1; carp, 2; tench, 1; and lamprey, 25. Every effort was made to sort out the scrap fish, such as suckers, squawfish, etc., so that they would not be hauled along with the salmon. This practice was in general successful, but all of the undesirable species could not be eliminated from the loads.

Careful and complete observations and records were made of the entire salvage operations. The records included the number and species of all fish trapped and hauled each day in each truck, and to each location. The number and species of all fish that died during the hauling or trapping operations were also recorded. Temperature readings of the water in the Columbia River, the tank trucks, and the streams or lakes where plants were made, were obtained. Also, determinations were made of the free carbon dioxide, dissolved oxygen, pH and alkalinity of the Columbia River, the water in the trucks and in the streams where the fish were planted. After the fish were liberated, continuous limnological observations were carried on in the areas where the fish were confined. All dead fish were examined to determine whether or not they had spawned, and aquatic-food samples were taken from the streams. The success of the spawning was recorded and some of the nests were examined to discover the degree of development and the mortality of the eggs. Samples were taken of young steelhead trout from the early spring spawning so that growth could be studied.

The loss of fish during trapping and hauling was extremely small and the mortality in the streams and lakes after the fish were liberated and before they spawned was not excessive, except in the Entiat River where a bacterial fungus infection caused a significant percentage of the spawners to die before they had matured and deposited their eggs.

It is felt that the analysis of these data will contribute significantly to our knowledge of the habits of chinook and blueback salmon and steelhead trout, as well as present a valuable account of a practical fish-salvage operation.

Tagging.—Five tagging experiments were conducted near the east end of Sand Island, at the mouth of the Columbia River, on blueback salmon from June 11 to July 9, inclusive. The purpose of these experiments was to obtain data on: (1) The rate of migration of the salmon upstream; (2) their distribution in the river system; and (3) some estimates of fishing mortality.

During the operations 238 blueback salmon were tagged and liberated, of which 61, or 25.6 percent, were recovered from the commercial fishery.

Additional catch records of the commercial fishery were tabulated and summarized to be used in studying the movements and abundance of the salmon populations.

Construction of fish protective works.—The program of fish-screen construction in eastern Washington, Idaho, and Oregon was con-

tinued under the supervision of J. A. Craig and O. W. Lindgren, and was accomplished with the aid of W. P. A. and P. W. A. funds. During 1939 the construction of the screen in the Wapato Canal, near Yakima, Wash., the work on the Sunnyside screen, and the construction of the screen in the Echo Feed Canal in Oregon, were completed. Both of the canals are property of the U. S. Bureau of Reclamation. Contract work on the screen at the Black Canyon Dam canal of the Bureau of Reclamation, on the Payette River in Idaho, was begun in December and all contract and other work on the screen in the Prosser Power Canal of the same agency, near Prosser, Wash., was almost completed at the end of the year.

COHO SALMON

The coho salmon of Puget Sound are not only of importance to the commercial fishery of the region, but likewise to the sport fishery which forms one of the Pacific Northwest's most valuable recreational assets. The study of the life history of these salmon, and the causal factors responsible for fluctuations in their abundance, was conducted by George B. Kelez until May 1939. Owing to Mr. Kelez' assignment to the study of the Bristol Bay salmon, Dr. J. L. Wilding, formerly with the Columbia River investigation, took over the study of the coho salmon.

Marking experiments.—Final returns from the 1937 marking experiments at the Bureau's Quilcene (Wash.) Hatchery were collected at the hatchery rack in the fall of 1939. During this period the rack was covered twice by flood waters and some of the fish escaped to the upper river. Of 148 adult fish taken at the rack, 67 were marked. Thirty-eight of the recoveries were from the lot of 24,600 fingerlings marked and released in August and September 1937, 25 were from the lot of 20,039 fingerlings marked and released in December 1937, and 4 were from the lot of 17,094 fish marked and released in May 1938. Two additional recoveries from the December 1937 release were made in salt water near the hatchery.

The results of these experiments show that the fall release of fingerlings produced slightly better returns than the midwinter release, with less expense for handling and feeding, and the spring release of fingerlings in their second year produced much smaller returns than did the preceding releases.

Returns from the belly-tagged fingerlings released at the State of Washington's Samish River Hatchery in 1937² also were recovered in the fall of 1939. One adult fish was returned from the October release, 15 were recovered from the December release, and 3 recoveries were made of fish which had not retained the tags. Although these returns were sufficiently large to warrant further experiments, mortality appeared to be considerably higher than that of fish marked by fin incision only. The survival of winter-tagged fingerlings was much greater than that of fall-tagged fish.

Young fish, and fish-food studies.—A study of the seasonal fluctuations in numbers of young fish and abundance of the fish-food organisms in the various streams of the region frequented by the coho salmon was begun. This study was also planned to include a corre-

² See "Progress in Biological Inquiries, 1937," p. 30.

lation of the fish food present with the food organisms consumed by the coho young from the time of hatching until their seaward migration. This procedure, together with a study of the influence of varying environmental conditions on the growth and time of seaward migration of the young, was aimed to give insight into the fresh-water mortality of the species.

In order to locate suitable key streams for these studies a general survey was made of the important streams in the region. Five tributaries were selected, each of which differed from the other in its source, distance from salt water, size, shaded areas, type of bottom, mean temperature, and, to some extent, in chemical composition. The selection of streams with varying environmental conditions was made in order to include the important fresh-water habitats frequented by coho salmon.

A new type of sampler for streams, designed by Dr. Davidson and Mr. Kelez, is being used to determine qualitatively and quantitatively the bottom fauna and its variations. The new sampler is more efficient than net types, since it can be used in a variety of locations such as in sand, mud, vegetation, and gravel, and it takes an exact quantitative sample. An example of its efficiency is shown by the numbers of Chironomidae larvae that are consistently taken in the sampler, whereas these forms are usually, if not entirely, missed by other samplers due to the small size of the larvae and their depth in the gravel. Collections of chemical and physical data on the streams, bottom samples, and coho fry or fingerlings are taken each month.

Hatchery experiments.—In cooperation with the Division of Fish Culture, a series of experiments are being conducted to test the reactions of coho fry and fingerlings to various concentrations of sea water. The relative tolerance to salt water, and rapidity of adaptation to higher concentrations exhibited by fish of varying age, would have a definite bearing on the time of release of hatchery-reared fish. The experiments were begun at the Quilcene Hatchery in November.

SURVEY OF ALASKAN LAKES

Dr. Wilding was detailed to southeastern Alaska from July to October to study certain lakes and streams in cooperation with the U. S. Forest Service. The purpose of the survey was to determine the physical, chemical, and biological characteristics of the waters in order to formulate a trout-stocking and conservation program. Ten lakes in Southeastern Alaska, and Wonder Lake in McKinley Park, were surveyed. The analysis of the lakes included: Temperature series, dissolved oxygen and free carbon dioxide, pH, carbonates, bottom fauna, fish, and plankton samples. The amount and suitability of spawning area was determined and fish- and egg-planting sites were located. In certain general characteristics the lakes were quite similar, especially in regard to their oligotrophic nature, high oxygen content, low bacterial decomposition and carbon-dioxide content, slightly acid reaction, absence of vegetation, and scarcity of bottom organisms. The plankton population was extremely variable from lake to lake, and in general there were numerous organisms of a few species. A detailed report of the investigation has been prepared and a stocking policy recommended.

BRISTOL BAY SALMON FISHERIES

The Bristol Bay area, which produces more than 60 percent of the pack of red salmon in Alaska, is one of the greatest salmon-producing districts in the world. During 1939 this area produced 54½ million pounds of canned salmon. This pack was 5 million pounds below the average for the preceding 10 years, the curtailment being due, in part, to a shortening of the fishing season by the Bureau in order to insure the escapement of an adequate number of spawning fish to the tributaries in the various watersheds.

The determination of the causal factors affecting the fluctuation in abundance of the salmon runs in this region is the fundamental purpose of the investigation being conducted by Mr. Kelez and Joseph T. Barnaby, assisted by Walter Sands, Albert Collier, and Robert Hacker. The problems entailed in the investigation are manifold, including a complete study of the life history of all the races of salmon populating the lakes and rivers in a watershed of over 35,000 square miles. In addition to the studies on the fresh-water phase of the life history of the red salmon, studies must be made of the factors that influence the growth, mortality, and migrations of these fish during their sojourn in the ocean.

Fresh-water studies.—Investigations of the fresh-water phase of the life history of the red salmon of the Bristol Bay region were carried on during the season of 1939 at field camps established on 5 of the main rivers during the summer, and on the watersheds of these streams during the fall. A camp at the foot of the Naknek River rapids was established on May 19; 1 at the head of the Ugashik River lagoon on May 24; 1 on the Kvichak River, at the foot of Kaskonak flats, on May 25; 1 below the Egegik River rapids on May 27; and 1 on the Wood River at the foot of Marsh Mountain on May 31.

Regular samples of seaward migrant fingerlings were taken at each camp, collections of other fishes were made, and fingerlings were marked for future identification in the rivers where they were available in sufficient numbers. Daily records of weather conditions, stream levels, and air and water temperatures were kept throughout the season until the parties moved to the upper watersheds for spawning observations. The stream observations will be correlated with annual meteorological data collected by the U. S. Weather Bureau at 3 stations in the Bristol Bay region.

The spring break-up was very late in 1939, particularly in the Wood River watershed, where ice, carried down from the Wood River lakes, seriously interfered with seining activities as late as June 13. Fingerlings were available in sufficient quantities to warrant marking only in the Naknek and Wood Rivers, although small numbers of migrants were taken in the other streams.

Migrants were taken in the Naknek River from May 31 to August 15, but less than 100 per day were caught prior to June 14. Marking, by excision of the dorsal and right ventral fins, was begun on June 16 and terminated on August 14. All marked fish were retained in holding pens for 24 hours after marking in order that the losses due to handling might be determined. The total release of marked fish in this area was 26,419. The Naknek fingerlings were large, averaging about 113 mm. in length, and were in good condition; losses due

to handling were small. The recovery of these marked fish as adults will afford data on life history, points of capture in the commercial fishery, and mortality in the ocean.

Fingerlings were taken in the Wood River from June 4 to August 22, and marking was carried on between July 3 and August 14. Abnormal water levels in the river during the month of June followed the late break-up of ice on the Wood River lakes. A peak rise of more than 45 inches during this period reduced the number of locations suitable for fishing activities appreciably. The water level dropped gradually thereafter throughout the season, a condition exactly opposite to the normal occurrence in the Bristol Bay streams. The total release in this area was 11,338 fingerlings, marked by the excision of the adipose and left ventral fins. The Wood River fingerlings were much smaller than those of the Naknek area, their general condition was poor, and they were further weakened by a high degree of infestation by cestodes. Losses due to handling aggregated nearly 20 percent of the fish taken; an exceptionally high mortality for wild fish.

During the commercial-fishing season 1 man was stationed at each of the main rivers to obtain regular scale samples, body measurements, weights, and sex proportions from the catches of the commercial drift-net fishery. Additional samples were taken from the fish caught by set nets within the rivers. These data will provide information concerning the age of the mature fish, material for racial comparisons, and a basis for the determination of gear selectivity.

The field parties were moved to the tributaries of the respective rivers during August for the purpose of making surveys of spawning grounds. In the course of the surveys, actual numbers of spawners were counted in various streams and their tributaries. The rate of water flow, temperatures, stream-bed characteristics, and the extent of the spawning areas were determined. Body measurements, scale samples, and data on various morphological characters were obtained from spawners in these areas for racial comparisons. Of the spawning tributaries thus investigated, 3 were rivers, 7 were major streams, and 19 were creeks. The field parties returned to Seattle via the Iliamna Lake portage on September 6.

In addition to the above-mentioned activities, several lakes were surveyed by Mr. Kelez as possible sites for survival studies on eggs and young fish. All major spawning areas were covered at least twice during the season by aerial survey, and spawning-ground estimates thus made were correlated with the work of the field parties. A new method of making a population census by means of aerial photographs was begun. While still in the experimental stage, this method holds much promise in that it makes possible a determination of the distribution of spawners in inaccessible areas, or in those areas where the cost of ground surveys is prohibitive.

For Bristol Bay in general, the escapement of 1939 was considerably less than that of 1938, the Kvichak area showing the greatest proportional decrease. The Naknek and Egegik areas indicated uneven distributions and decreased total numbers of spawners, while the Wood River and Nushagak escapements were more nearly equal to those of 1938. The Ugashik area had a somewhat better escapement than that of 1938, although the spawning ground in this district was still not adequately seeded.

Marine studies.—Investigation of the marine phase of the life history of the Bristol Bay populations is not only important in order to determine the factors influencing the salmon growth and survival, but is also of importance in ascertaining the magnitude of the commercial catch, since part of the run of fish is captured 400 to 500 miles from the home streams of the salmon.

Tagging experiments were carried on in the Shumagin Island area and in the Ikatan-Morzhovoi Bay area to determine the migration routes and destinations of the salmon frequenting those areas. In these experiments, mature salmon on their spawning migration were tagged by means of an aluminum strap-tag which was attached to the dorsal part of the caudal fin. The experiments were similar in nature to those carried on in 1923 by Charles H. Gilbert and Willis H. Rich.³

A greater return was obtained from the 1939 Shumagin Island tagging than was obtained in 1923, the recovery being 34.5 percent as against 28.7 percent in 1923. A much higher percentage of the fish was caught locally, 22.6 percent in 1939, compared with 2.6 percent in 1923. A greater percentage of returns was taken to the eastward, 4.3 percent in 1939, and 0.5 percent in 1923. Most of the returns came from Chignik, which experienced a good run during the past season. Lower percentages were recovered from Ikatan and Bristol Bays in 1939, 3.0, and 1.2 percent, compared to 11.1, and 9.2 percent, respectively, in 1923.

The 1939 study of the migration of fish around the Shumagin Islands supports the conclusion that as many fish traveled up Popoff Straits as migrated down the Straits. The results, therefore, do not confirm the conclusion made by Gilbert and Rich on the basis of the 1923 study that "the majority of the salmon that escape the traps in the region of Kelly Rock skirt the south shore of Unga Island * * *."

The return from the Ikatan tagging experiments was 37.0 percent in 1939 as against 44.6 percent in 1923. Fewer fish were recaptured locally in 1939; 19.7 instead of 34.0 percent. A slightly higher percentage migrated eastward; 1.0 compared to 0.3 percent in 1923. A smaller number was taken in Bristol Bay; 4.0 percent in 1939 and 6.2 percent in 1923. The lower percentage of recovery in the Bristol Bay area was due in part to the fishery on the south side of Unimak Island, which recaptured 10.8 percent of the fish tagged, whereas in 1923, this fishery was not in existence and consequently once the fish left Ikatan Bay they were not intercepted until they reached Bristol Bay. Of special interest is the evidence indicating that at least a fair proportion, if not a majority, of the Bristol Bay fish which pass the Shumagin Islands and Ikatan Bay proceed to Bristol Bay along the south shore of Unimak Island, and thence probably through Unimak Pass. Gilbert and Rich (*loc. cit.*) concluded that most, if not all, of the Bristol Bay fish found in the Shumagin Island and Ikatan Bay area proceeded through False Pass on the way to their home streams. Although those authors pointed out that fish may enter Bering Sea through other passes, they also stated that "no such migration through western channels has ever been reported."

³ Second experiment in tagging salmon in the Alaskan Peninsula Fisheries Reservation, summer of 1923, by Charles H. Gilbert and Willis H. Rich, Bulletin, U. S. Bureau of Fisheries, vol. 42, 1926, pp. 27-75.

In the 1939 experiments a smaller return was made locally from the tagging at East Anchor Cove than was made from the tagging close to False Pass, indicating that in general the fish were moving away from the Pass. The relatively high percentage of marked fish recovered south of Unimak Island, and the abundance of migrating red salmon along this entire shore, shows that a fairly large number of fish travel by this route after leaving Ikatan Bay. These fish would enter Bristol Bay via Unimak Pass or other passes to the westward.

Local fishermen who have tried to catch fish in False Pass report that there are no red salmon to be found in the northern half of the Pass, and that while red salmon enter False Pass they do not go through but return to Ikatan Bay. While it is possible that some red salmon do go through False Pass, it is certain that a fairly large number proceed from Ikatan Bay to Bristol Bay via Unimak Pass and other passes to the westward.

A study of the migration routes of the Bristol Bay red salmon populations was also made in the off-shore waters, both north and south of the Alaska Peninsula, by operating various types of fishing gear at varying distances from shore. The data obtained from this research are of considerable value in determining the areas traversed by the salmon on their return to their home streams, and also the types of organisms taken by them for food.

The U. S. Coast Guard again cooperated with the Bureau of Fisheries by furnishing the cutter *Redwing* for the purpose of conducting the oceanographic survey of Bristol Bay and contiguous waters. New anchor gear and a sonic depthfinder were installed on the *Redwing* early in the spring to facilitate the carrying on of the oceanographic studies, which require numerous stops for samples and for frequent and accurate soundings.

Samples were obtained at all stations in Bristol Bay proper prior to the time of the fish run, during the run, and again after the run has passed by. In addition, some samples were taken between Unalaska Island and the Pribilof Islands. Temperature data and plankton samples were collected, and chemical analyses were made of the water taken at various depths from each station, to determine the oxygen, chloride, silicate, phosphate, and nitrite content of the water. The purpose of the oceanographic surveys is to determine the environmental conditions in the areas in which the fish spend a part or all of their sojourn in the ocean.

KARLUK RIVER RED SALMON

Further studies to determine the extent and causes of the fluctuations in the size of the red-salmon runs to the Karluk River, Alaska, were conducted in 1939 by Allan C. DeLacy and William M. Morton. The period of field work extended from May 1 to October 5, and the tabulation and analysis of data occupied the balance of the year.

The runs of red salmon to the Karluk River have shown great fluctuations in abundance during the 19-year period in which they have been under observation by the Bureau of Fisheries. From 1887 to 1908 the commercial catch of red salmon in the Karluk area averaged 2,500,000 fish per year. Following this period, the commercial catch has exceeded 2,000,000 fish in only 1916, 1917, and

1926. With the establishment of a counting weir in the river in 1921, and the passing of the White Law in 1924 (43 Stat. 464), a 50 percent escapement of fish to the river has been required. This limited escapement has curtailed the commercial catch in the area, and since 1924 the total run of red salmon to Karluk has exceeded 2,000,000 fish in only 8 years; in only 2 of these 8 years did the total run exceed 3,000,000 fish.

In view of the decline in the productivity of the Karluk River every effort is being made to determine its cause, with special emphasis on the factors responsible for the mortality of red salmon during their fresh-water and marine existence. Because of the greatly varying environmental conditions in the river system, it has been found that the number of mature salmon necessary to adequately seed the spawning grounds may fluctuate considerably from year to year. The mortality of the salmon during their fresh-water existence has been traced to the influence of environmental conditions on the spawning grounds and to seasonal fluctuations and periodic trends in the fertility of the lake, which are responsible for corresponding variations in the abundance of the food available to the young fish and the influence of fresh-water predators.

An intensive study has been made of the mortality of the red salmon during their marine existence by means of consecutive yearly marking experiments from 1926 to 1936, inclusive. The results of this study indicate that there is a fairly constant mortality of the salmon in the ocean which averaged 79 percent during the 8-year period of study.

A complete report of the activities and results of this investigation of the Karluk red salmon, from 1926 to 1936, has been prepared by J. T. Barnaby and submitted for publication. Mr. Barnaby conducted this investigation from 1929 to 1938 and then was transferred to the Bristol Bay investigation.

Migration studies.—Red-salmon fingerlings migrating to the ocean were first seen in abundance at the Karluk weir on June 1. The migration continued for about 2 weeks and appeared to be normal in size. Samples of the fingerlings were taken to determine the age composition of the migrant run, and the average length of the individuals in each age group. The 1939 migrants were of average size and were considerably larger than the 1937 and 1938 migrants.

Between May 21 and September 23, 666,004 adult red salmon were counted as they passed through the weir, and it was estimated that after the removal of the weir on September 23, 40,000 additional red salmon ascended the river. Only twice before, over a period of 19 years, has the escapement been less than in 1939. However, conditions on the spawning grounds appeared to be favorable, and a fair to good return is anticipated, despite the relatively small size of the escapement.

The number of pink salmon passing through the Karluk weir was 31,944. This is the largest odd-year escapement of pink salmon since 1933, and it is evident that the 2-week cessation of commercial fishing in the Karluk area, between July 24 and August 5, was beneficial.

Racial study.—It has long been recognized that the run of adult red salmon to the Karluk River is characteristically divided into 2 parts. The first peak of abundance occurs in June, and the second

in August or September. If the fish that constitute these 2 runs are hereditarily distinct, then it is apparent that conservation measures must be designed and carried out in such a manner that each group will receive adequate protection. To ascertain whether or not the two runs are racially distinct, morphometric data were collected from 448 red salmon during the 1939 season between June 7 and September 16. Twenty-one measurements were made on each fish examined, and in addition the gillrakers were counted. A statistical treatment of the data will reveal any dissimilarities between the two runs of Karluk fish. A large sample of pink salmon also was measured for racial characteristics to be included in the racial studies of the pink salmon in Alaska.

Egg counts.—Counts were made of eggs collected in 1938 from 60 red salmon that ranged from 51 to 65 centimeters in length. The left ovary was found to contain a higher average number of eggs than the right ovary, although in similar counts made in 1926 the reverse of this condition usually was found. The 1926 sample of fish averaged 3,728 eggs per individual. The 1938 average for a comparable group of fish was 3,218. In general, the larger the fish the greater was the discrepancy between the results of the 2 years' tabulations. One hundred and twenty additional egg samples were collected during the 1939 season and will be used to supplement the 1938 data, and to determine whether or not the number of eggs per female varies from year to year.

DOLLY VARDEN TROUT

Life-history studies were continued at Karluk in 1939 on the salmon predator *Salvelinus malma*, commonly known as the Dolly Varden trout, or char. From tagging experiments started in 1937 and 1938 a total of 875 tags were recovered. Two tagging and three marking experiments were initiated in 1939. During the upstream migration of Dolly Varden trout in July, 2,695 fish were tagged at the Karluk weir, and at a weir built in Thumb River—the largest tributary of Karluk Lake—1,463 additional chars were tagged in late summer. One marking experiment was made at the Karluk weir in which the adipose and both ventral fins were amputated from 2,038 Dolly Varden trout between 21 and 25 cm. in length. At the Thumb River weir the adipose and left ventral fin were clipped from 543 fish between 16 and 20 cm. long, and the adipose and right ventral from 178 chars between 11 and 15 cm. in length. Returns from these marking experiments will supply data concerning the growth rate and migration of a group of small fish which it is difficult to tag successfully.

The conclusion that there are at least 2 populations of char in the Karluk system was reached after the tag recoveries made in 1937 and 1938 had been analyzed. The presence of a nonmigratory lake population and a population which annually migrates to and from the ocean was shown. In 1939 additional tag returns and a study of the morphological characters of the Karluk chars confirmed the foregoing conclusion. The total number of gillrakers proved to be a useful diagnostic character. The stationary, or lake-type char was found to have an average of 23.4 (21 to 26) gillrakers, while in the

migratory, or ocean-type char the average number of gillrakers was 18.4 (17 to 21). Some of the other characters which differ in the 2 types are the coloration, average number of vertebrae, length of head, diameter of eye, and depth of caudal peduncle.

Returns in 1939 from 2 tagging experiments in progress at Karluk Lake again pointed to the lack of homogeneity in the lake's char population. Fish tagged in 1937 were still most commonly found in 1939 at the mouths of the same streams at which they had been tagged 2 years earlier. Further study will be required to determine the presence or absence of races of chars within the lake itself.

PINK SALMON

The study of the causal factors responsible for the fluctuations in the abundance and seasonal time of the spawning migration of the pink salmon in Alaska was continued during 1939 by Dr. Davidson and S. J. Hutchinson.

The pink salmon are by far the most abundant species of Pacific salmon in Alaska. During the past 10 years an annual average of 3,150,748 cases of pink salmon have been packed, whereas the red salmon, which are second in abundance, have yielded an average of only 1,908,072 cases yearly. The pink salmon have a lower market value than the red salmon. The 1930-39 annual average catch of pink salmon was valued at \$13,346.874, while the corresponding average value of red salmon was \$15,798,340.

Because of the complete 2-year life cycle of the pink salmon it is possible to build up or break down a population of the species within a few years. The record packs of pink salmon from 1934 to 1938 have been due in part to the successful reproduction of the species, and in part to the increase in the intensity of the fishery. The size of the spawning populations in 1937 and 1938, in some areas, was far from comparable to the total catches of the fishery, and a marked reduction in the ensuing populations was predicted. The unusually small packs of pink salmon in 1939 in Central Alaska, with the exception of the Kodiak and Cook Inlet areas, and in Southeastern Alaska, were to be expected. In Southeastern Alaska the intensity of the fishery has been mounting in spite of warnings from the Bureau of poor escapements and unfavorable spawning conditions. A number of needed restrictive regulations were recommended for the pink-salmon fishery in the Central and Southeastern sections for 1940. In view of the almost complete lack of escapement in some areas in the Southeastern section in 1939, an extensive curtailment of the fishery will be imperative in 1941 if the populations in these areas are to be kept above the critical point of depletion.

One of the most important factors in the reproduction of the pink salmon is the mortality that occurs during their fresh-water existence. The stream at Little Port Walter, on Baranof Island in Southeastern Alaska, was selected as a site where fluctuations in the fresh-water survival of the pink salmon could be determined and the causes thereof studied. In March and April, 1939, a combination stop-log dam and counting weir was constructed in the stream at Little Port Walter which will permit the counting of both the upstream and downstream pink salmon migrants. The counts will make possible the determina-

tion of the number of fry resulting from the spawning of a known number of eggs each season. The adults returning from the liberation of a known number of fry each season will be determined from the subsequent spawning populations, and in this way the percentage of mortality during both the fresh-water and salt-water existence may be calculated.

In order to carry on the necessary weekly observations of the influence of environmental conditions on the brood in the stream, and conduct laboratory experiments on the salmon leading to a better understanding of their reactions to certain environmental factors, a laboratory-residence building was constructed at Little Port Walter during the past summer. A permanent biological station foreman will be appointed for the purpose of maintaining the equipment at the station and making the necessary biological observations regarding the survival of the salmon in the stream. It is expected that the results from the continuous operation of this field station will give insight into the survival of the pink-salmon brood in this region of Alaska each year, and permit more accurate predictions as to the size of the annual runs of pink salmon.

Spawning escapement.—The first count of adult salmon through the weir at Little Port Walter in 1939 was made on August 17, and by August 22 the run was well under way. A total of 16,830 pink, 122 coho, 117 chum, and 7 red salmon was counted through the weir. Of the 16,830 pink salmon, 51.56 percent were males, and 48.44 percent were females. The pink-salmon escapements through the weir at Little Port Walter prior to 1939 were: 1934, 6,952; 1935, 6,073; 1936, 5,164; 1937, 7,085; and 1938, 6,467. The adults in 1939 came from the spawning population of 1937, and, since the commercial fishery at Little Port Walter has been negligible, this is the first year when the returns were greater than $1\frac{1}{4}$ to 1. Unfortunately, it cannot be determined whether this survival occurred in the salt-water or fresh-water period, but such fluctuations in the future, it is hoped, may be traced to the influence of certain environmental factors.

Tagging program.—With the opening of the commercial fishing season in Eastern District on July 5, a pink-salmon tagging program was instigated. Pink salmon were tagged and released each week end throughout the fishing season. All the tagging was conducted from the 2 traps in Tebenkof Bay, which are the first traps encountered by the migrating salmon as they enter Chatham Straits from the south and travel the inside waters to their spawning grounds in Frederick Sound and contiguous waters. A total of 2,100 pink salmon were tagged during the season. The general trend of the migration, as indicated by tag recoveries, is northeast into the inside waters of Frederick Sound, Stephens Passage, and the Stikine River region. There were 684 tags recovered, yielding a 32.57 percent return from the experiment. Of this number of recaptures, the majority traveled a distance of 40 miles or more and were taken within 5 days after the tagging date. The greatest distance that a tagged salmon traveled before being recaptured was 162 miles. One specimen, taken the day after tagging, had traveled over 100 miles. Thus it becomes evident that the pink salmon entering Lower Chatham

Straits are not destined to any one particular locality, but are quite diversified in their routes of migration. Tagged pink salmon were recaptured in 26 different salmon traps in Western District, in 36 salmon traps in Eastern District, in 16 traps in Sumner Strait District, and in 1 trap in Clarence Strait District. Seine boats reported captures in 19 localities, and gill nets in one location. Of the total of 684 recaptures, 551 were made by traps, 128 by seine boats, 2 by gill nets, 2 from streams, and 1 unknown. The traps caught 80 percent of the tagged salmon that were recaptured, the seine boats 19 percent, and 1 percent was taken by miscellaneous gear.

Racial study.—A racial analysis of the pink salmon in Southeastern Alaska is being made. The first step in the analysis is to determine from body measurements suitable indices for comparing the populations, i. e., ratios of measurements that are characteristic of each population. At present, 15 ratios have been devised and are being tested to determine their reliability as racial indices. After these racial indices are determined, the experiment will reduce to the comparison of populations from various localities using these indices and thus determine the races of pink salmon existing in Southeastern Alaska.

ALASKA SALMON STATISTICS

The collection, tabulation, and analysis of the daily catch records from the various types of fishing gear operated by the salmon fishery in Alaska was continued in 1939 by Elizabeth Vaughan. The purpose of this investigation is to provide a permanent source of information from the daily catch records of the various forms of gear from each of the geographical divisions of the territory. These records provide an invaluable part of any investigation of the fisheries, and will make possible a complete survey of the industry year by year. The single comprehensive compilation will avoid duplication of effort which would inevitably result from the individual collection of statistical data by several investigators, and will insure the collection of much valuable data which would almost certainly be lost with the passage of time and changes in the companies operating, were the collection delayed until further investigation was undertaken. To eliminate duplications and losses, the statistical investigation was originated with the following specific aims: (1) To collect all available records of the daily catch of salmon in Alaska from each form of gear; (2) to add to those early records the current data as it becomes available each year; (3) to index carefully and segregate the data by area, species, and type of gear; and (4), to tabulate the data into usable form, and to analyze these tabulations as may be required in the study of specific problems.

During the past years, all available records have been collected. The analysis of the trap-catch records for the Southeastern Alaska and Prince William Sound fishing districts have been made for the pink and chum salmon.

During 1939 the data on the 1938 fishing season were collected, and the analysis of the trap-catch records of the pink and chum salmon for the Southeastern Alaska and Prince William Sound districts was added to the analyses for previous years. The analysis consists of determining the average daily catch per trap for each fishing

season, by district. Indices of abundance and seasonal time of appearance of the salmon runs are determined from these daily averages. This information is used as a basis for recommending changes in the fishing regulations in Alaska in order to provide for the conservation of the salmon resources.

During 1939 the records from the Alaska Peninsula, Chignik, Kodiak Island, and Cook Inlet trap fisheries were sorted and indexed. The tabulation of these data will be begun in the near future.

HERRING

Three major areas of the Territory of Alaska at present support extensive commercial herring-fishery operations; these being Kodiak, Prince William Sound, and Southeastern Alaska. The investigation of the herring fisheries, which was continued throughout the year by E. H. Dahlgren and L. Kolloen, was primarily concerned with the following problems: The delimiting of the areas frequented by the various races or populations comprising the stocks of herring; an evaluation of the abundance of the populations supporting each of these fisheries; the measuring of changes in fishing intensity; and the determination of fluctuations in annual increments to the population, and the factors governing these fluctuations.

Kodiak area.—In the Kodiak area the largest catch ever recorded was made in 1939, with a total take of 309,000 barrels. However, the total catch of itself has no significance as a measure of abundance unless correlated with the fishing effort required to make it. Since the inception of reduction operations in this area in 1935, the herring fishery has undergone a tremendous expansion. Reduction capacity has increased from 15 tons of raw fish per hour in 1935, to 45 tons per hour in 1939; the number of vessels engaged has increased from 11 to 21; and, with a tendency toward the use of larger vessels, the fishing capacity of the fleet has increased threefold. In order to establish a trend of abundance, the number of vessels, weighted by their net tonnage in order to account for the greater efficiency of larger vessels, multiplied by the number of days each vessel operated in the area, was divided into the total catch for the year to give the average catch per ton-day of fishing effort. These data were compiled for each year since the inception of the reduction industry in 1935. The catch in barrels per ton-day fished rose from 6.4 in 1936 to a high of 7.5 in 1937 and has declined to a low of 4.5 in 1939.

The great abundance of herring in the Kodiak region during the past 5 years has been in part the result of the accumulations of the stocks during the less intensive operations previous to 1935. A further factor that contributed to the high abundance level has been the presence in the catch of the offspring of the dominant 1931 year-class. The phenomenon of dominance of certain year-classes, with the attendant great natural fluctuations in abundance, results from an occasional remarkably successful spawning, in consequence of which large numbers of larvae survive to enter the adult populations 3 years later. In contrast, spawnings in immediately previous or subsequent years are not so successful—some may even be virtual failures and contribute no appreciable increments to the stocks. Daily samples of the catch were taken throughout the season and ages were read

from the annuli on the scales, in order to establish the relative abundance of the various age groups represented in the catch in relation to comparable data obtained in previous years.

In 1937, the first year for which adequate data are available for the Kodiak region, the 1931 year-class constituted 70 percent of the total number of fish taken. In 1938, with the entrance of the 1935 year-class into the catch, the year-class of 1931 declined to 49 percent of the total yield. Age readings of approximately 2,500 individuals during the 1939 season revealed that the catch was still composed of 20 percent of the 1931 year-class even after 5 years of fishing had decimated its numbers, and also confirmed the previous findings that the spawnings of 1932, 1933, and 1934 failed to contribute any appreciable increment to the stocks. Since the spawnings of these years added so little to the populations, and since the 1931 year-class will have been nearly exhausted by 1940, the catch during that season will become dependent almost entirely on fish spawned in 1935 and 1936. This condition does not bode well for the continuance of a high abundance level. In view of the increased fishing intensity, the declining return per unit of gear, and the decreased spread of the age composition of the stock, the need for close supervision of the herring fishery cannot be disregarded.

Prince William Sound area.—The catch in the Prince William Sound area during the 1939 season was 423,000 barrels. This total compares favorably with the average catch of 317,000 barrels during the preceding 5 years, and taken alone would indicate a healthy condition for this fishery. Considered, however, in relation to the amount of fishing effort required, and the declining return per unit of gear, together with the change in age composition, it is apparent that this area, too, will require careful supervision to avoid over-exploitation.

Reduction capacity in this area has increased from 7 tons of raw fish per hour in 1934, to 66 tons per hour in 1939 and this increase in plant capacity has been followed by an increase in fishing effort. The number of vessels employed in 1934 was 7, compared to 30 in 1939. Because of the larger vessels employed, the increase in actual capacity was in the ratio of 6 to 1. In the face of this increase in the fishing effort the catch per unit of gear, based on the catch per ton-day of fishing effort, as in the Kodiak area, has shown a progressive decline from 8.1 barrels in 1934 to 3.1 barrels in 1939.

Reduction operations in the Prince William Sound area were not intensive until after 1934, providing an opportunity for the herring stocks to build to a high abundance level. This abundance also was bolstered by the presence of a dominant 1931 year-class, as occurred in the Kodiak area. The 1937 and 1938 samples of the catch in this area were taken in the fall months only—August 25 through September. In 1939, for the first time, age-composition data are available throughout the season, and age determinations from scales of approximately 4,600 fish were made. However, since there is a change in the age composition of the catch during the season in this area, with the older fish appearing in greater relative abundance during the fall months, comparisons of the age composition of the catch with that of previous seasons has been made for the fall portion of the season only. This analysis shows that the

1931 year-class represented 54 percent of the catch in 1937, 48 percent in 1938, and 32 percent for the corresponding period in 1939. Here, again, the spawnings of 1932, 1933, and 1934 were almost total failures, their combined contribution to the catch during the fall of 1939 being less than 5 percent. With the disappearance of this dominant 1931 year-class, and because the succeeding 3 brood-years failed to contribute any measurable portion to the catch, a further decline in the population level may be anticipated in this area for the 1940 season.

Southeastern Alaska.—The season's catch for Southeastern Alaska in 1939 was 160,000 barrels, compared to a 10-year average of 434,000 barrels in the area, and was the lowest catch recorded since the inception of the intensive reduction fishery 15 years ago. The success or failure of this fishery has been dependent almost wholly on the abundance and availability of the stock of herring frequenting the Cape Ommaney area. The continuing decline in the abundance of this population, as reflected in a declining catch per unit of gear, led to a closure of the Cape Ommaney area during the 1939 season, although nearly 72,000 barrels of the total catch were taken from this same population outside of the closed area.

Samples of the size and age composition of the catch in this area were again collected. In the Cape Ommaney region, as in Kodiak and Prince William Sound, the 1931 year-class dominated the catch for several years, but by 1938, due to the more intensive fishing in this area, had practically disappeared. Here, too, the spawnings of 1932, 1933, and 1934 were virtual failures. The decline in this fishery to a dangerously low level must be attributed, in no small measure, to this failure of the young to survive.

A survey of the spawning grounds at Sitka, which is the source of the Cape Ommaney stock of herring, was made during the spring of 1939. For the second consecutive year the run in this important area was exceedingly light, giving further proof that the decline in abundance as measured by the catch per unit of gear is valid. Incidental to this survey, an effort was made to determine the effect of temperature and dessication on the survival of eggs spawned in the intertidal zone. The clusters of eggs could not be separated for microscopic examination without hardening them in a fixative. When the eggs were hardened they became opaque which precluded a determination of viability. Thus the attempt resulted only in the development of a technique for hardening, separating, and clearing eggs which will make possible future accurate estimates of mortality due to temperature and dessication.

PACIFIC PILCHARD INVESTIGATIONS

O. E. SETTE, *in charge*

The problem of the pilchard investigation is to determine the amount that can be safely harvested annually without jeopardizing future yields.⁴ This determination is complicated by the existence of natural fluctuations in abundance, which are caused by differences from year to year in the numbers of fish surviving the early stages of life. There are also variations in availability, so that the com-

⁴ Progress in Biological Inquiries, 1938, pp. 43-47.

mercial fishery probably reflects fluctuations in abundance more or less imperfectly, depending on whether fishing conditions are favorable or unfavorable. For these reasons the recognition of an irreversible decline in abundance is not easy, but requires evidence on many aspects of the fish and the fishery.

During the season of 1938-39 the exploitation of the fishery was modified by withdrawal, in midseason, of floating reduction plants from high-seas operation. This action was the result of economic difficulties during the early part of the season and of the previous year, and coincided with the passage, by referendum, of an amendment to the State Constitution giving the California State Fish and Game Commission authority to prevent deliveries by California fishing boats to establishments outside of the jurisdiction of that State.

The season's catch was as follows: California, 574,676 tons; Oregon, 17,018 tons; Washington, 26,483 tons; British Columbia, 52,049 tons; a grand total of 670,226 tons. Of this quantity, 44,000 tons were caught for floating reduction plants operating on the high seas off San Francisco.

The total was more than 37.3 percent higher than that of the previous season. This increase probably may be ascribed to a natural fluctuation in abundance brought about by the entrance into the fishery of unusually successful year-classes produced some years previously; probably in 1934 to 1936. This probability is suggested by the higher percentage of young fish in the catch. It is difficult to determine, however, from present evidence, whether the increase is due altogether to these incoming year-classes, or partly to a better availability than obtained the previous season. An apparent dearth of older fish also raises the question as to the possible existence of a fundamental decline obscured by the accession of so many young.

The program of work discussed herein was carried out by a staff consisting of O. E. Sette, who was in charge of the investigation, Dr. L. A. Walford, Kenneth Mosher, Ralph Silliman, Earle Palmer, and Robert Luckhardt. The broad scope of the investigation and its accomplishments were possible only because of the cooperation and assistance of several organizations and persons. Clerical and technical assistance were furnished by W. P. A. Projects 702-3-1 and 10917; thus, 10,000 scales and a like number of otoliths were mounted, 550 bottles of plankton were sorted, and extensive statistical processes were carried on which would not otherwise have been possible. The extensive plankton research was made possible by the cooperation and collaboration of the Scripps Institution of Oceanography and its director, Dr. H. U. Sverdrup. Subsequent studies on hydrographic data carried on by Mr. Richard Tibby, of that institution, were made available immediately to the Bureau for its biological studies of the young pilchard. The California State Fisheries Laboratory, the Fish Commission of Oregon, the Department of Fisheries of Washington, and the Fishery Research Board of Canada all contributed records essential to various phases of the Bureau work of 1938-39. Stanford University contributed laboratories for the central office, and also provided facilities in Hopkins Marine Station for the Bureau field man stationed at Monterey. Members of the faculty of Stanford University, notably Drs. Frank W. Weymouth and Willis H. Rich, contributed advice on matters pertaining to the Bureau program.

STUDIES OF ABUNDANCE

According to a study of the catches of a fleet of purse seiners which were delivered primarily to reduction ships on the high seas off the coast of central California, the abundance of pilchards in that area has undergone a fluctuation; increasing slightly less than twofold from the season of 1932-33 to that of 1934-35. During the succeeding 3 seasons it decreased by about 70 percent, and in the last year, 1938-39, it increased again by about 15 percent.

An essentially similar course has been demonstrated by the study conducted by the California State Fisheries Laboratory on the shore landings at the ports of Monterey and San Pedro. Therefore, it was evidently a condition effective generally in the waters off California. Obviously, the initial rise during this period was due to the entrance of a successful year-class, or group of year-classes, probably 2 in number, produced in the spawning seasons of 1930 and 1931. The subsequent downward trend in the curve, a matter of 30 percent per annum, represents the decline of a population dominated by these 2 year-classes, to which there were no important new accessions. By itself, 30 percent per annum has little significance, but must be compared either with a previous or a future cycle of the passage of a successful year-class or group of year-classes through the fishery. Unfortunately, the manner of regulating the fishery in previous years, enforced in part by the State and in part by the industry, makes it difficult to obtain a parallel statistic for previous comparable cycles. However, judging from the high percentage of the young, coupled with the large catch of the current season, it appears that a new cycle has now begun and will soon afford the desired comparison.

In Washington and Oregon the fishery for pilchards has a history too short to cover the same period as that studied for California. The available records, as analyzed by Vernon E. Brock, of the Oregon Fish Commission, in collaboration with O. E. Sette, pertaining to the summers of 1935 to 1938, inclusive, did not show a decline similar to that noted from the California records, but rather an oscillation about the horizontal trend; the years 1935 and 1937 being high, and the years 1936 and 1938 being low. This is a somewhat surprising result in view of the finding by both British Columbia and California investigators that pilchard migrate between California and British Columbia waters. Hence, fluctuations should be similar, even at these extremes of the range, provided the entire population migrates. The only inference to be drawn from the lack of similarity in the results from the north and south is either that a varying proportion of pilchard migrates to northern waters each summer, or that availability in the north fluctuates so strongly that the commercial fishery cannot reflect changes in general abundance. A longer series of observations must be awaited before conclusions on these points can be reached.

AGE AND GROWTH

The identification of year-classes, and the measurement of their relative strength, involves a knowledge of past survival rates of young fish, which can become known by determining the age of fish

surviving to commercial size. Though an approximate knowledge of age and growth has been attained through a study of the size composition of the commercial catch, a greater precision is necessary for determining the relative numbers of each year-class surviving from year to year; and, also, the relative mortality rates, once the fish attain commercial size. Such precision is possible by determining the age composition of the commercial catch. Age determination is a technically difficult task, having been first attempted some 14 years ago, and, up to the time of this investigation, not yet accomplished. By intensive experiments during the past 2 years it has been found that the age of juvenile pilchards, i. e., those up through the third year of life, can be determined by rings formed annually on the scales and also on the otoliths. It was found that in California, fish of the year among the samples studied in 1938 had a modal body (standard) length of about 70 mm. (total length of about 3.3 in.) in June, when they first appeared in the bait fishery, and grew to about 120 mm. (total length of about 5.6 in.) by the following April, by which time the first annual mark had formed. At that time the modal length of fish having 2 marks was about 165 mm. (total length of about 7.7 in.), and of those having 3 marks, around 195 mm. (total length of about 9.1 in.). Though the study has been concerned only with young fish, it has, by defining age marks and proving their annual occurrence, made way for a similar study of the scales of older fish. Of these, there are 2 groups: Young adults usually caught during the fall months, and older adults caught in northern waters during the summer and in California waters during the winter. During 1939 an extensive collection was made of the scales of both groups from Grays Harbor, Wash., and from Monterey, Calif. A preliminary examination of the scale samples gives promise of success in determining the age of commercial-sized fish.

SAMPLING

Sampling of the commercial catch was carried on in California at San Pedro, Monterey, and San Francisco shore plants by the California State Fisheries Laboratory; at floating reduction plants operating off San Francisco and at Grays Harbor, Washington, by the U. S. Bureau of Fisheries; at Astoria by the Oregon Fish Commission; and at British Columbia by the Fisheries Research Board of Canada. Preliminary study of these samples, and of those taken in California in each of the preceding 20 years by the California State Fisheries Laboratory, indicates that the pilchard population is by no means distributed at random and that a simple summation of samples, however intensively taken, cannot be expected to represent fairly the population. Apparently the fishery draws on a succession of "runs" in each locality. These runs vary in their duration, and differ significantly with reference to the size and the abundance of fish composing them. These variations are probably connected with peculiarities in hydrographic conditions which change during the season, and from season to season. For example, a set of hydrographic conditions conducive to catching small fish for a relatively long period of time in one season, as compared with another set of conditions which permit fish of that size to be caught during a short

period of another season, will cause overrepresentation of the small size in the one season as compared with the other. During 1938-39 a method of weighting the samples to eliminate part of the distortion has been devised. Unfortunately, that method results in each run being given equal weight, and, though it is perhaps an improvement over an unweighted series, it still does not represent the relative abundance of the various sizes because the relative abundance of the fish in the various runs is not taken into account. A method of treatment which will accomplish the desired results remains to be discovered. Until then, our information on the relative strength of year-classes in the commercial fishery, the rate at which they have been consumed by natural and fishing mortality, in short, the condition of the resource, can only be understood imperfectly.

EARLY LIFE HISTORY

It has been reported⁵ that there is some relationship between temperature and successful survival. As yet it is unknown whether it is the temperature alone that governs survival, or whether it is other things associated with temperature, for example, ocean circulation. To investigate further the factors related to survival, a preliminary oceanographic survey of the waters off California, Oregon, and Lower California was carried on during the spring and early summer, when 90 stations were occupied; some of them as much as 320 miles offshore. The Scripps Institution of Oceanography cooperated by taking serial temperatures, making salinity and oxygen determinations, and phytoplankton and zooplankton hauls at all stations visited. The Institution is now studying the hydrographic data to elucidate the system of currents.

The Bureau's collections of fish eggs and larvae at the same stations will afford knowledge of the relationship between the distribution of young stages of pilchard and the various water masses in the circulation pattern. Off central, southern, and Lower California, substantial numbers of young stages of the pilchard were found well offshore in a band lying 125-175 miles off Monterey, 75-125 miles off San Pedro, and 75 miles off Enseñada. Thus the bulk of the planktonic stages were taken well outside the range in which most of the commercial fish are caught prior to the spawning season, indicating that the fish largely go offshore to spawn. No stations were occupied off northern California, owing to rough weather. A few eggs were taken at widely scattered stations off the Oregon coast, although not enough of them were obtained to define their zone of distribution. The survey off Oregon was made rather early in the season, possibly before the climax of pilchard spawning had been reached, and conversely in southern and Lower California rather late in the season, undoubtedly after the climax of spawning had passed. It was impossible to reach all parts of the area in the limited amount of time with only one boat. It is probable that the stations visited off central California were occupied near the time of the spawning peak in that locality. If so, the amount of spawning there was substantially less than in southern California.

⁵ Progress in Biological Inquiries, 1938.

To arrive at a more definite knowledge of the distribution of spawning requires simultaneous operation of several research boats, so that stations could be more closely spaced and visited a number of times during the spring and summer. The importance of such simultaneous surveys cannot be overestimated, for this is the most direct means, possibly the only one, of determining whether the spawning stock is being maintained at a sufficiently high level to provide adequate replacement for a large and intensive fishery. The possibility of a concerted oceanographic program would be greatly enhanced were a Bureau research boat available to participate with other agencies that maintain research boats in this region.

CONDITION OF THE RESOURCE

It is apparent from the foregoing that present information concerning the pilchard is imperfect, and that nothing final can be said relative to the exact status of its stock. Nevertheless, a number of observations already made indicate strongly that the present large commercial fishery is producing its effect. Prior to the season of 1937-38, fishermen in California always were able to supply as much fish as processors could accept, and often more. During this period the total catch rose at a logarithmic rate (i.e., at an equal percentage per annum), increasing 14 percent per annum, or, roughly, doubling every 5 years. In 1937-38, however, for the first time, the supply failed to meet the demand, in spite of a rise in price from \$10 to \$13 per ton. This situation could mean that during the preceding years the size of the stock had declined; it could signify that the availability of the fish changed abruptly that season; or it could indicate that the demand had outgrown the ability of the fishermen to supply pilchards at a price economically in line with other competitive raw materials. It could also mean, and probably does mean, that a combination of these three causes was effective. In any case, it is likely that further expansions of the industry might not be economically sound, regardless of whether or not there was an actual decline of pilchards in the sea.

A further apparent effort of exploitation in California, first observed during the season of 1937-38, is the occurrence in the catch of an unusually large proportion of small fish, or, conversely, a low proportion of large fish. This might, and probably does, signify that recent years had produced unusually successful year classes. If the large fish, however, were fully as abundant as formerly, then the addition of these quantities of small fish should have increased the abundance markedly, and the catch per boat should have risen by the season of 1938-39 substantially more than the observed 15 percent. Available information suggests that the population of older fish had been reduced more than had been offset by the accessions of young fish in 1938-39, although the current season of 1939-40 promises to constitute a more marked recovery.

In Oregon and Washington, it is difficult to appraise the condition of the pilchard resource; first, because the industry there is so young; and second, because of the suspicion that a varying proportion of the population of old adults migrate annually to the north to be caught in the fishery. It is fairly certain, however, that the abundance of

pilchards visiting Oregon and Washington waters must be limited by the size of the stock of old adults left after the much larger California fishery has taken its toll.

The evidence of exploitation discussed above, though subject to some uncertainties, taken together, indicate that the pilchard industry has reached maturity. By this is meant that it has arrived at a point where further expansion can result only in a rise of production cost. The industry is also at a point where it is likely to feel the effect of fluctuations in natural abundance more than it has in the past. It may even have overexpanded to the extent where the present level of total catch cannot be indefinitely maintained. If so, the effect of this situation may be that the successful year-classes, which occur as a rule only once in several years, will not persist long enough to last until succeeding successful year-classes appear. During such interims the industry will suffer for lack of raw material and this effect would probably be apparent rather soon. A second effect to be expected, theoretically, would not be so readily or so quickly apparent; i. e., a reduction in the spawning population to the point where so few eggs would be spawned that, even under conditions favorable for survival, the successful year-classes would not be so large as formerly. Thus, the fishery would have, over a long period, a downward trend, and would face not only a sharply fluctuating supply, but fluctuations at an increasingly lower level.

GREAT LAKES FISHERY INVESTIGATIONS

DR. JOHN VAN OOSTEN, *in charge*

The Great Lakes staff, under the direction of Dr. John Van Oosten, in 1939 as in 1938, devoted its attention largely to the continuation or completion of projects already under way. Ten publications appeared in 1939, and 4 papers, totalling 380 manuscript pages, are now in the hands of the printer. Several other reports are complete or nearing completion. Field work during the year was limited to a brief preliminary survey of the sport and commercial fisheries of Grand Traverse Bay, Lake Michigan.

One of the most significant events of the year was the revision of the commercial fishing regulations for the State of Wisconsin waters of Lake Michigan in October 1939, which constituted another important step toward the attainment of uniform regulations for all waters of that lake. The executive order, which was issued under the provisions of Wisconsin's discretionary power act, will, if enforced, bring the regulations for the Lake Michigan waters of that State as to size limits, mesh sizes, and closed seasons substantially in agreement with the State of Michigan regulations. Although a majority of the commercial operators previously had agreed to accept the provisions of the order, certain fishermen obtained a temporary injunction to prevent the conservation department from enforcing the new regulations. It is anticipated that the case will reach the State Supreme Court for final settlement.

On the whole, the past has been marked by an increasing interest on the part of the general public in the welfare of the Great Lakes fisheries. Newspapers in the Great Lakes region, and sportsmen's journals, have repeatedly carried articles calling attention to the

critical depletion of the commercial species and pointing out the need for adequate and uniform fishery regulations in Great Lakes waters. A similar interest in the Great Lakes fisheries was demonstrated by the resolution passed at the National Convention of the Izaak Walton League of America commending the Council of State Governments for its efforts to obtain the negotiation of a treaty with the Dominion of Canada for the establishment of an international board of inquiry "to the end that uniform regulations may be secured" in Great Lakes waters.

The rapidly increasing popularity of sport fishing in Great Lakes waters, with the consequent growing demand for the protection of game-fish species, and for the closure of certain waters to commercial fishing, bids fair to give rise to administrative problems of major importance. It is recognized generally that the monetary returns to Great Lakes communities for fish taken by tourists are far greater than the returns for an equal quantity of fish produced in the commercial fishery. It is economically expedient, therefore, to encourage the greatest possible development of sport fisheries and to provide adequate protection for game fish in those localities in which sport fisheries become established. On the other hand, it is unsound to place undue restrictions on the commercial fishery, particularly on the fishery for rough fish and other species of no interest to sportsmen. The indiscriminate closure of bays and other water areas to commercial fishing may provide valuable protection to game fish, but at the same time it may deprive local communities of revenues from commercial operations that could have been carried on without the slightest harm to the stock of game species. Unfortunately many sportsmen do not understand this situation. As a result, State legislatures are subjected continually to heavy pressure from sportsmen's organizations which seek to have this region or that region of the Great Lakes closed to all commercial fishing. Some extremely productive waters have already been closed when a few minor restrictions on commercial fishing operations would have been fully adequate for the protection of the game-fish species.

If the unwarranted closure of Great Lakes waters to commercial fishing is to be avoided, and if certain areas already closed are to be reopened, it will be necessary to obtain extensive factual data on the relationship between the sport fisheries and the commercial fisheries of the Great Lakes, and with this information to convince all concerned that there is no important conflict between the best interests of the sport and commercial fisheries.

Experience has demonstrated the special importance of preventing the development of antagonism on the part of the public toward the fishing industry. A bitter but valuable lesson on this point was obtained in connection with the closure, by act of the Michigan Legislature, of Potagannissing Bay in northern Lake Huron. Although an impartial survey conducted cooperatively by the Bureau and the Michigan Department of Conservation demonstrated conclusively that the commercial fishery in the bay was not harmful in any important degree to the stock of smallmouth black bass, and that only limited restrictions on commercial operations would provide that species with almost complete protection, the sport fishermen nevertheless insisted upon and obtained the complete closure of the waters under dispute.

In order to better acquaint sport fishermen with the true relationship between the sport and commercial fisheries, and to prevent a repetition of the misunderstanding that occurred in connection with the Potagannissing Bay controversy, Dr. Van Oosten has, within the past 2 years, accepted a number of invitations to speak before sportsmen's organizations in the Great Lakes area. He has agreed also to cooperate in an advisory capacity with the Michigan Department of Conservation in a survey of the sport and commercial fisheries of Grand Traverse Bay, Lake Michigan, the leading center of the "deep-sea" trolling fishery for lake trout.

The appointment of Dr. Van Oosten on Feb. 2, 1939, to the Water Resources Committee (of the National Resources Committee) for the Lake Ontario-St. Lawrence-Champlain Basins, gives the Bureau representation on the basin committees for the entire Great Lakes region. Dr. Van Oosten previously had been made a member of the Upper Great Lakes—Superior, Michigan, and Huron—and the Lake Erie Basin Committees.

The long-established policy of full cooperation with other agencies, particularly the State departments of conservation, was continued through 1939. Dr. Van Oosten attended 12 meetings and conferences at which Great Lakes fishery problems were considered, and with others was directly instrumental in obtaining the Governor's signature to the executive order containing revisions of the Wisconsin fisheries code. Five presentations of the moving picture, "Great Lakes Fisheries Investigations," were made before groups of scientists and sportsmen.

FISHERY STATISTICS

The completion of the analysis of the 1938 commercial fisheries statistics for the State of Michigan waters of the Great Lakes under the direction of Dr. Ralph Hile, made available detailed information covering a 10-year period on the fluctuations in the production and abundance of important commercial species, and in the intensity of the fishery in each of the 21 statistical districts into which the State of Michigan waters have been divided. The pronounced decline in the production and abundance of whitefish in Lake Huron constituted the outstanding feature of the 1938 data. The production of only 558,000 pounds was the second lowest on record and was only a little more than one-eighth of the record productions of 1931 and 1932. The abundance index for whitefish in 1938 was only 29 percent of the 1929-34 average. The decline of the Lake Huron whitefish has been, in large measure, due to the overproduction made possible by the use of the extremely efficient deep trap net. Although the deep-trap-net fishery was investigated thoroughly by the Bureau and the Michigan Department of Conservation in 1931 and 1932, and regulations for its control suggested in the latter year, effective laws restricting the use of this gear were not forthcoming until the whitefish stock of Lake Huron suffered serious, possibly irreparable, damage.

RED LAKES INVESTIGATION

In response to repeated requests by the Commissioner of Indian Affairs, addressed to the Commissioner of Fisheries, Drs. John Van Oosten and Hilary J. Deason made a brief survey of the fisheries and

fisheries resources of the Red Lakes during the period Aug. 23 to Sept. 10, 1938. The commercial fisheries of the Red Lakes, first begun in the fall of 1917, constitute one of the principal sources of livelihood of the Red Lake Indians who, since 1929, have marketed their catches through their own cooperative under the supervision of the Superintendent of the reservation. Regulations for the conduct of the fisheries are promulgated by the Commissioner of Indian Affairs, United States Department of the Interior. Frequent controversies over the regulations and criticisms of the methods of conducting the fisheries, as well as assertions that the Red Lakes were becoming depleted, led to the need for an investigation of the various problems in order to find some means for their solution. The biological data, statistical records, and historical and documentary information accumulated during the course of the survey have been studied and embodied in a formal report that is approaching completion.

The statistics of the annual production of the Red Lakes fisheries yield no positive evidence of a decline. The observance of an arbitrarily assigned maximum production limit of 650,000 pounds per year of the most desirable varieties appears to provide insurance against overexploitation of the stock. The catches per unit of fishing effort in the Red Lakes compare favorably with the catches per unit of effort in some of the best fishing areas of Lakes Michigan and Huron.

The growth of the wall-eyed pike (*Stizostedion vitreum vitreum*) is slower in Lower Red Lake than in Lake Erie, Lake Champlain, or Lake of the Woods, but is superior to the growth of the same species in Lakes Nipigon and Abitibi (Ontario). The relatively slow growth of the Lower Red Lake wall-eyed pike is compensated to some extent by its heavy stature, since the coefficient of condition, *K*, for wall-eyed pike was higher than for any population for which such data have been obtained. There is no basis for the assertion that the wall-eyed pike of Lower Red Lake are inferior to other populations for commercial purposes because of their slenderness. The Red Lake wall-eyed pike reaches the size limit of 14 inches, fork length (about 15 inches, total length), during the fifth year of life. The commercial catches consisted principally of members of age-groups IV and V. Studies of the percentage maturity at different lengths revealed that the 14-inch size limit (fork length) is adequate to permit the majority of females to spawn at least once before they reach commercial size.

The yellow perch (*Perca flavescens*) of Lower Red Lake grows more slowly than the perch of Lake Erie and Nebish Lake (northern Wisconsin), but more rapidly than the perch of two other northern Wisconsin lakes. As was true of the wall-eyed pike, the yellow perch of Lower Red Lake had a higher average value of the coefficient of condition than any other perch population for which data are available. The commercial catch of yellow perch was composed, in the main, of members of age groups V to VII, with age group VI predominating. Perch of younger ages and of smaller size could be taken with profit and without danger of depleting the stock. However, the gill-net mesh used in the Red Lakes must remain adjusted to the more abundant and commercially valuable wall-eyed pike, and therefore the most efficient utilization of the perch population cannot be

effected. The continued use of a gill-net mesh of no smaller than 3½ inches appears to be an adequate safeguard against depletion of the yellow perch.

The whitefish (*Coregonus clupeaformis*) of the Red Lakes, judging from the meager data available, grows at an intermediate rate compared with seven other North American populations. The Red Lakes whitefish had a larger coefficient of condition than the whitefish of Lakes Huron and Champlain. The growth of the goldeye (*Amphiodon alosoides*) compared favorably with the growth of the species in lakes of the Prairie Provinces of Canada; fish of some age groups averaged larger, and some smaller, in Lower Red Lake than in the Canadian lakes. The sheepshead (*Aplodinotus grunniens*) of the Red Lakes grew slightly slower but had a higher average coefficient of condition than the sheepshead of Lake Erie.

Records of the artificial propagation of Red Lakes wall-eyed pike and whitefish and the stocking of other waters at the expense of the Red Lakes have been assembled and considered with a view toward recommending a future policy of artificial propagation. A more definite mesh size for gill nets, and the adoption of the flexible rule as the official method of measuring nets, will be included among the final recommendations. Additional matters related to a future policy for the Red Lakes fisheries also are being considered.

MIGRATION OF LAKE MICHIGAN FISHES

The results of extensive tagging experiments on Lake Michigan fish, conducted between June 1929 and August 1931 by Smith Bros., commercial fishermen of Port Washington, Wis., are contained in a joint publication (in press) by Mr. Oliver H. Smith and Dr. John Van Oosten. The project resulted entirely from the interest and initiative of the late Lester Smith and of Oliver H. Smith, who jointly defrayed all expenses—an unparalleled undertaking among Great Lakes fishermen.

Of the 2,902 Lake Michigan fish tagged and released, 48.8 percent were lake trout, 20.4 percent lake herring, 15.7 percent whitefish, 5.1 percent rainbow trout, 4.2 percent yellow perch, 3.6 percent lake chubs, and 2.2 percent were other commercial species. A total of 388 fish, or 13.4 percent of the total number tagged, was recaptured. The percentages of returns for the lake trout, whitefish, and sturgeon indicate a tremendous fishing intensity in Lake Michigan. Four of the five tagged sturgeon were recovered. It was estimated that more than 31 percent of the baby lake trout (12.8 in.) and more than 44 percent of the young whitefish (11.8 in.) later entered the commercial nets. About 28 percent of the lake trout recovered were legal in size, and about 14 percent of the recaptured whitefish were of legal length. About 51 percent of the recovered fish were taken within 10 miles from Port Washington, the port of tagging, and 81 percent were taken within a radius of 25 miles from that port. Lake trout, rainbow trout, and sturgeon were found to be extensive travelers; lake herring, whitefish, chubs, pilots, and perhaps perch, did not migrate so extensively. Lake trout, herring, and whitefish tended to move in a northerly direction, perch in a southerly, and rainbow trout in an easterly direction toward the Michigan shore. Sturgeon apparently roam all over the lake.

Fifty-three percent of the recovered lake trout were recaptured within 1 year of release; 73 percent within 25 miles from Port Washington. It required 3 years for the trout to become fairly well scattered throughout the lake. With the attainment of adulthood lake trout moved in all directions from the port of release, although nearly 50 percent of the adults were retaken within 25 miles from this port.

Data are given on the growth and estimated age of the tagged lake trout, rainbow trout, whitefish, and sturgeon. It was found that the minimum size limits of lake trout and whitefish on the Great Lakes are economically unsound—they are too low—because they permit the capture of these species at the time of the most rapid increase in weight.

AGE AND GROWTH STUDIES

Saginaw Bay yellow perch.—A study of the age and growth of the yellow perch, *Perca flavescens* (Mitchill), of Saginaw Bay, by Dr. Ralph Hile and Mr. Frank W. Jobes, has been completed and the first draft of the report prepared. Age determinations and computations of individual growth histories were made from the examination and measurement of the scales of 820 individuals collected in 1929 and 1930. The investigation of the length-weight relationship was based on data from 1,483 specimens, and the ratio between total length and standard length was determined from measurements of 1,411 fish. The report contains also a review of the statistics of the commercial production of perch in Saginaw Bay in the years 1891–1908 and 1916–38. The average annual production in the years 1917–38 has been only 28 percent of the 1891–1916 normal.

The method of calculating growth from scale measurements, based on a study of the relationship between body lengths and the lengths (radii) of “key,” or selected scales from 512 fish, resembled that employed earlier for the calculation of the growth of the Lake Erie perch. The use of direct-proportion calculations was found to be valid for all calculated lengths above 101 mm. Calculated lengths of 101 mm. and less had to be corrected (from an empirical curve of the body-scale relationship) to compensate the disproportionate growth of body and scale in small fish. Both sexes of the Saginaw Bay perch attain the legal length of 8½ in. during the fourth year of life, just as they are entering on the period of most rapid growth in weight. Growth of females is slightly more rapid than males, both in length and in weight. The length-weight relationship (sexes combined) was described by the equation, $W = 0.9826 \times 10^6 L^{3.2174}$, where W = weight in grams and L = standard length in millimeters. The ratio of standard length to total length was found to increase with the increase in the length of the fish.

The Lake Michigan kiyi.—The kiyi, *Leucichthys kiyi* Koelz, is one of two species of chubs inhabiting the deepest waters of Lake Michigan that practicably may be exploited with gill nets. During the Lake Michigan investigation of 1930–32, scale samples, accompanied by data on length, weight, sex, and stage of maturity, were collected from 1,516 individuals. The scale samples, along with other data obtained during an analysis of the catches of experimental gill nets

of various sizes of mesh, have been employed for a study of the life history of the kiyi by Drs. Deason and Hile. The bulk of the scale material has now been studied. Growth rate is very rapid during the first year for fish in all parts of the lake, and averages about 100 mm. The increment during the second year is less than half of the first-year increment, and the growth rate decreases perceptibly during each of the later years of life. There appears to be an inverse relationship between latitude and the rate of growth. A slightly more rapid growth is indicated for the females than for the males. The scale collections, obtained from unsorted samples of the commercial catches of different sizes of mesh, between $2\frac{3}{8}$ and $2\frac{3}{4}$ in., stretched measure, consisted of members of age-groups II to VIII. The best represented age groups were III, IV, and V. The report will include also data on bathymetric distribution and on the occurrence of the kiyi in the different regions of Lake Michigan.

COOPERATIVE INVESTIGATIONS OF WISCONSIN LAKES

The Bureau continued to cooperate with the Wisconsin Geological and Natural History Survey in their limnological and fishery investigations of the lakes of northeastern Wisconsin by providing a small amount of financial assistance. Those investigations, conducted under the direction of Drs. E. A. Birge and Chancey Juday, are concerned with the study of long-term problems of theoretical and applied limnology and fishery biology.

Materials collected during the course of the cooperative investigations, 1930-32, during which time Dr. Ralph Hile, of the Bureau, was assigned to that work, have formed the basis for two fish papers, both of which are now in press.

Bathymetric distribution of fish.—Records of fishing operations with gill nets were employed by Drs. Hile and Juday in a study of the vertical distribution of fish in summer in five northeastern Wisconsin lakes. Comparisons of data for different lakes revealed that the depth of water inhabited by a single species varies rather widely from one lake to another; that the relationship between size of fish and depth of water inhabited varies from lake to lake; and that different species that live at the same depths in one lake may inhabit different depths in another. The variations in the bathymetric distribution of fish exhibited no clear-cut correlation with differences in temperature and the concentration of dissolved oxygen and free carbon dioxide. This lack of correlation was not taken as evidence that temperature and the concentration of dissolved gases are of little importance in determining the bathymetric distribution, but rather that other, undetermined factors may obscure the effects of physical-chemical conditions.

Growth of the rock bass.—The study by Dr. Hile of the growth of the rock bass, *Ambloplites rupestris* (Rafinesque), in northeastern Wisconsin placed emphasis on the problem of annual fluctuations in growth rate and the strength of year-classes. The growth rate of the Nēbish Lake rock bass varied from a maximum of 20.6 percent above average in 1931, to a minimum of 15.2 percent below average in 1928. The year-classes ranged in strength from the phenomenally rich

1923 year-class, which as age-group VIII made up 45.8 percent of the 1931 collection, to the extremely weak 1927 year-class, which as age-groups III to V contributed only 1.7 to 5.9 percent of the total collections of 1930-32. In general, strong year-classes occurred in years of good growth—in the second and later years of life—and weak year-classes were produced in years of poor growth. Peculiarly enough, first-year growth and the strength of the year-classes exhibited no correlation.

The analysis of the annual fluctuations in growth rate, and the strength of the year-classes of the Nebish Lake rock bass in relation to meteorological conditions, showed good growth to be correlated with high temperatures in June and September, and heavy rainfall in June. It was suggested that annual variations in temperatures in June and September may produce variations in the length of the growing season. The correlation between June precipitation and growth may depend on the enrichment of the waters of this extremely oligotrophic lake by materials washed in during periods of heavy downpour. Substances added in June may be more fully available for utilization than those introduced in other months. Strong year-classes were correlated with high temperatures and heavy precipitation in early season, with conditions in June especially significant. High temperatures and an enrichment of the lake by run-off water may produce favorable feeding conditions for small rock bass at a critical period of their life history.

Comparisons of the data for the Nebish Lake rock bass with similar data for stocks from neighboring lakes suggest that to some extent the effects of meteorological conditions on different populations may be similar. For example, the 1923 year-class of rock bass was exceptionally strong in Muskellunge Lake and Trout Lake, as well as in Nebish Lake. Furthermore, good growth of rock bass and high temperatures, especially in June, were correlated in Muskellunge Lake, and apparently in Silver Lake. On the other hand, a number of discrepancies suggested that conditions peculiar to the individual lakes at times may modify or obscure the effects of the weather on growth rate and the strength of year-classes. There was some evidence also that the growth rate and the survival of young in different calendar years may be affected by fluctuations in the density of the population.

Progress during 1939.—A study of the growth of the bluegill, *Lepomis macrochirus* Rafinesque, of Muskellunge Lake, has been completed and submitted for publication by Dr. Clarence L. Schloemer, who has also made progress with an investigation of the life history of the wall-eyed pike, *Stizostedion vitreum vitreum* (Mitchill), in Wisconsin waters, and a paper on methods of determining the magnitude of fish populations. Mr. David G. Frey has nearly completed his work on problems related to the carp, *Cyprinus carpio* Linnaeus, in Wisconsin lakes, and continued a creel census on Lakes Waubesa and Kegonsa. Mr. Willard A. Van Engel terminated a study of the growth of the northern pike, *Esox lucius* Linnaeus, in Wisconsin waters, and undertook an investigation of the black crappie, *Pomoxis sparoides* (Lacépède), which will be continued for 3 or 4 additional seasons. Dr. Schloemer and Messrs. Frey and Van Engel are members of the staff of the Wisconsin Geological and Natural History Survey.

SHELLFISH INVESTIGATIONS

DR. PAUL S. GALTSOFF, *in charge*

In accordance with the previously adopted program of the Bureau's shellfish investigations, the research on oysters was conducted during the past calendar year with the following objectives: (1) To increase our technical knowledge regarding the methods of propagation of oysters under various conditions of the coastal waters; (2) to find practical means of improving the quality of marketable oysters; (3) to improve the methods of protection of oysters against various pests and parasites; and (4) to determine the deleterious effects of pollution and to devise methods of rendering certain trade wastes harmless to oysters. Since the accumulation of technical knowledge remains useless until the findings of the experts are brought to the attention of interested persons, considerable effort was made to disseminate the acquired information by preparing memoranda and pamphlets containing summaries of the most recent investigations, and distributing them among the oyster growers.

In compliance with the request of the local oystermen, the Bureau's station at Milford, Conn., continued throughout the summer of 1939 to issue weekly bulletins containing information concerning the condition of oyster gonads and the expected time of setting, and supplied detailed data concerning the distribution of starfish in Long Island Sound. Although these bulletins contained only local information pertaining to a small area along the Connecticut shore of the Sound, demands for them were received from oystermen operating in the States of New York, Rhode Island, and Massachusetts.

As in the past, the Bureau's investigations were greatly facilitated through the cooperation of the following organizations: W. P. A., P. W. A., N. Y. A., Connecticut Shell Fish Commission, Virginia Commission of Fisheries, William and Mary College, North Carolina Fish Commission, South Carolina State Board of Fisheries, Beaufort County Commissioners, and Florida Department of Conservation.

Oyster-fishery studies were conducted at the Bureau of Fisheries Laboratories at Woods Hole, Mass.; Milford, Conn.; Yorktown, Va.; Beaufort, N. C., and Pensacola, Fla. Temporary headquarters for oyster-farming investigations were established also at Beaufort, S. C.

In compliance with the requests of the United States War Department, Corps of Engineers, special surveys were made of the oyster bottoms in the upper part of Buzzards Bay, and in Narragansett Bay, for the purpose of determining the effect of dredging operations on oysters. In cooperation with the Bureau of Construction and Repair, United States Navy, special observations on the fouling of ships' bottoms were conducted at Langley Field, Va., and at the Bureau's stations at Milford, Conn., and Pensacola, Fla.

OYSTER-CULTURE STUDIES

Woods Hole.—Laboratory studies of the factors controlling the spawning of oysters, conducted for a number of summers by Dr. Galtsoff at the Woods Hole Station, were completed and the results of the findings, summarized in three technical papers, were pub-

lished in the Biological Bulletin, Vols. 74, 75, and 78. It has been demonstrated by this investigation that an old concept of a single critical temperature that induces spawning in oysters is no longer tenable. Depending on the physiological state of ripeness, the oyster may spawn at various temperatures between 63° and 95° F. A thermic stimulus alone often is not sufficient to induce spawning, and a combined action of temperature and chemical stimulation are necessary to produce the desired effect. However, a number of chemical compounds were found to be effective in inducing spawning of the male oyster.

These physiological studies provide a key to a practical method of controlling the spawning of oysters under natural conditions. To speed up the discharge of spawn, ripe oysters from deep bottoms should be brought into shallow, warm water of the inshore areas and left there for a few days. Additional stimulus can be provided by opening a few ripe oysters, mincing their meats in sea water, and scattering this mixture over the bed of spawners. The method was tried with success by some of the oyster growers of Long Island Sound and in British Columbia.

Since it has been demonstrated that the proximity of both sexes is essential for a successful spawning of oysters, it would be expected that a considerable disparity in the sex ratio may interfere with their propagation. Previous field observations have demonstrated the prevalence of females among the adult oysters on certain oyster bottoms. An investigation of the problem, initiated by Dr. Galtsoff in 1937 and continued through the present year, showed that the increase in the female population is primarily due to the sex change among adult oysters. Continuing this study during the present fiscal year, 200 individually marked oysters, which were kept at Woods Hole and Milford, were retested for spawning. An analysis of the records obtained during the 3 consecutive summers shows that sex change among adult oysters occurs in both directions; i. e., from male to female as well as from female to male. It is interesting to note, however, that during the 3-year period 17.6 percent of the oysters under observation changed from female to male, as compared with 31.2 percent changes from male to female. Thus it is obvious that in spite of the change of a certain number of females to males, the proportion of females in the oyster population steadily increases with age.

From these data it is apparent that the maintenance of a more or less normal sex ratio is essential for successful propagation of oysters. For practical purposes, the problem can be solved by adding each year a sufficient number of 3-year-old oysters to the stock of old spawners.

A study of sex reversal in adult oysters is being continued with the view of determining genetic and environmental factors which control these changes.

Long Island Sound.—Observations on the development of gonads, spawning, setting, and mortality of oysters were continued by Dr. Victor L. Loosanoff and James B. Engle, of the Bureau of Fisheries Laboratory, Milford, Conn. The area under investigation, extending for about 30 miles from Bridgeport Harbor to Morgan Point, east of New Haven, represents the largest and most important part of

the Connecticut seed-oyster producing section. The methods employed in this study were the same as those used during the 2 previous years.

The development of gonads was followed since May 18, 1939, by making weekly inspection trips over the entire area under observation. By June 23, the average thickness of the gonad layer of oysters was about 2.8 mm., somewhat less than during the corresponding period of 1938 (3.3 mm.) and considerably below that of 1937 (4.3 mm.). From June 23 to June 28 the gonads increased to 3.1 mm. By this time many of the oysters were completely ripe, and some of them already had partially discharged their spawn. Two days later, partially spawned animals were found at almost all stations, and the average thickness of gonad layer decreased to 2.7 mm. Oysters from comparatively shallow areas were the first to spawn. Spawning soon began to be of more general occurrence, and on June 30 some oysters with partially discharged gonads were found at almost all depths ranging from mean low-water mark to 40 feet. As in the previous year, the temperature of water prior to and during the early period of spawning was several degrees below 20.0° C.

Systematic observations on the setting of oysters were made at 10 stations at Stratford Point, and 6 stations at Welch's Point. Additional weekly observations were made at 15 other stations located in different sections of the Connecticut oyster-growing area. The first light set of the year was recorded at Stratford Point on and around July 17, 1939, about 2 weeks after the first general spawning, at depths ranging from mean low water to 50 feet. Between July 20 and 24 the intensity of setting increased considerably, but decreased sharply after July 31. There was no setting between August 3 and 17. From then on until September 21, scattered and very light sets took place at medium depths and in shallow areas. Observations were continued until the first part of October but no new spat were found after September 21.

In the Welch's Point area the first setting occurred between July 18 and 21, and the last set was recorded on September 12. The peak of setting took place between July 25 and August 1. During that period setting was exceedingly heavy, especially at 30-foot depth, sometimes averaging over 380 spat per shell. In some samples, shells containing as many as 1,000 spat were found. After August 1 the intensity of setting sharply declined for the rest of the season.

Setting of oysters in 1939 was probably the heaviest since 1930, and certainly much heavier than in 1937 and 1938, although the quantity of spawn developed in 1939 was very small. This observation disproves the old idea that a good setting can be expected only in those years when the gonads develop large quantities of spawn. Of special interest is the observation that in 1939 the spawning and heavy setting of oysters took place during a period of prolonged and very severe drought. Prior to and during that period the river discharge, as well as the amount of precipitation, was exceedingly low. Considering the fact that setting in 1939 was much heavier than in many previous years, the question naturally arises whether the inflow of fresh water carrying certain substances is really important in inducing the setting of larvae.

North Carolina.—Experimental studies of the growth, reproduction and survival of oysters at different tidal levels were continued at the Beaufort, N. C., Laboratory, under the direction of Dr. Herbert F. Prytherch. The purpose of this investigation is to obtain the essential information required for improved cultivation of oysters on the extensive tidal flats of this region. Though conditions above low-water level are unusually favorable for growth, the oysters produced in this zone are of inferior quality because of the overcrowding resulting from prolific natural reproduction. Biological studies show that oysters in this region have two heavy spawning and setting periods; in June and September. The late set usually completely covers the first set, which is attached to the shells and other cultch scattered over the tidal flats. The chief problem, therefore, in producing oysters of good marketable size and quality on these areas, is to find a method of preventing "fouling" of cultch during the summer season. The principal lines of investigation undertaken were to determine the following: (1) The growth of seed and adult oysters at different tidal levels; (2) the intensity of oyster setting or other fouling of these oysters in relation to their vertical position; (3) the possibilities of controlling fouling by shifting of oysters in special holding devices to favorable depths during the spawning season, and (4) the value of specially constructed salt-marsh ponds and canals for intensive cultivation of oysters where control of depth, current velocity, and other factors is possible.

Four hundred oysters, 1 and 2 years of age, were attached to cement panels and studied with respect to growth in weight, volume, length, and width in relation to their position above and below low-water level. Additional records were kept of a series of 180 oysters, which were studied individually during the previous year to determine the effect of orientation on growth. Three series of panels were placed under the main pier in Beaufort Harbor, using the same arrangements described for the experiments in 1938. Four other series of 100 oysters each were placed at levels just above and below mean low-water mark in the improved marsh ponds and canals constructed adjacent to the laboratory. The unit panel employed in these experiments consisted of a reinforced slab of "Incor" cement, $34 \times 3 \times \frac{3}{4}$ in., to which the oysters were fastened with a detachable cement.

The general results of the entire series of experiments may be briefly summarized as follows: (1) In this region the most rapid growing level for oysters is found in the tidal zone extending from approximately 6 in. below low-water level to 12 in. above. (2) When seed oysters (year-old size) are placed in this zone they will reach good marketable size in 2 years and show an increase in volume ranging from 750 to 1,200 percent, and in weight from 860 to over 1,000 percent. (3) The essential conditions required for attaining this growth are a good circulation of water, ample space for expansion, exposure to air for short periods, and protection from overcrowding and smothering by other marine organisms. (4) The greatest increases in weight and size were obtained in the groups of seed oysters that were held in a vertical position with the hinge uppermost. Less than 10 percent of these oysters died during the 2-year period of experimentation. (5) The growth of oysters in North Carolina waters is most rapid during the late fall, winter, and early spring, and apparently

is associated with the more favorable conditions at that time for the growth of marine plant life.

Experiments in the improved marsh ponds and canals demonstrated that it was possible to utilize such areas for growing and maturing oysters because the attachment of spawn could be prevented by regulating the depth of water and velocity of currents. On adjacent outside beds the oysters had become "wrapped up" with spat by fall, while those in the ponds at the same level were free to continue their growth to a good marketable size. Even in experiments using the poorest type of seed from "coon" oyster beds, a growth in volume of over 300 percent was obtained the first year, and a long, fairly wide type of marketable oyster, for shucking purposes, developed. The seed oysters which were held on cement panels and in special trays showed an increase in volume of over 200 percent from August through December and were rapidly forming round, scalloped shells of the most desirable type. By holding seed in these devices it was possible in the experimental canals to cultivate oysters at concentrations equivalent to over 2,000 bushels per acre, regardless of the nature of the bottom. In general, the experiments indicate that the expensive procedure of cultivating oysters in controllable tidal bays and canals is practical because of the more favorable circumstances for protection and harvesting of the crop, and primarily because a high yield of better quality oysters may be secured. These experiments are being continued and developed on a small commercial scale in order to determine the maximum size and age attainable by oysters in these waters and the percentage of mortality to be expected according to age and environmental conditions.

South Carolina.—The experimental oyster farm established by the Bureau near Beaufort, S. C., late in 1938 has now been in operation for a full year, and considerable information respecting the problems of utilizing various types of bottom for seed production has been accumulated by Robert O. Smith, in charge of this investigation.

Distinctive conditions existing in the brackish waters of South Carolina and Georgia have long presented special problems to oyster growers. This section of the South Atlantic coast is unique in three major respects: (1) There is as much as 10 feet difference between high and low tide; (2), the great majority of natural oyster beds occur between tide lines; and (3), setting is so abundant that single seed oysters are difficult to obtain.

Under these conditions it is imperative that the oyster grower be provided with means for determining the relative value of various types of bottom for seed production, growth, and fattening of oysters for market. The cost of leasing bottom from the State is relatively high, making it economically unsound to lease sections which will be unproductive. At the same time practical methods of obtaining good seed at low cost must be found, and, in the case of market oysters, means of fattening them early, despite high water temperature, are desirable.

Using colored labor provided by a W. P. A. project sponsored by Beaufort County, and with the active cooperation of the South Carolina Board of Fisheries, about 25 acres in a representative creek are being devoted to oyster-cultural problems on a small commercial scale. Three creeks have been reserved by the State Board of Fish-

eries for Bureau use in experimental oyster farming, but present facilities are sufficient for operating only one.

During this first year emphasis has been placed on seed production. As a means of standardizing results, cultch material consisted exclusively of 60,000 bushels of clean oyster shells, made available from a local cannery, which were planted for catching spat and hardening the bottom.

Toward the end of the year 5 mud and shell dams were constructed to impound an area of about 25 acres of marsh, 5 acres of which are being utilized for growth studies of seed oysters. One thousand bushels of seed from the 1939 stock have been transplanted to this location.

Briefly summarized, the first year's work has provided data on the following subjects: (1) Daily hydrographic observations were made of the bottom water temperature, salinity, pH, and turbidity. (2) Although the water temperature reached 20.0° C. by the end of March, the oyster-setting season was observed to extend from the end of May to the first of November. Shell-bag collectors were found to be unsuitable for local waters due to the very slow rate of spat attachment. (3) The rate of growth of spat was determined during their first 6 months by measuring samples twice a month. A few early spat had reached 3 in. in length at the end of 6 months. (4) The relative value of various types of bottom for collecting seed was shown by actual production. A total of about 4,000 bushels of seed oysters was produced on the experimental area in Horse Pen Creek this year. (5) The existing belief that setting of oysters in South Carolina waters occurs only between tide lines was disproved. Oyster larvae readily set below low-water mark if clean cultch is provided. However, less than 10 percent of spat survive as long as 6 weeks at such depths.

Gulf of Mexico.—Oyster production on the Gulf coast has been at a low level for a number of years, and markets have found it necessary or advantageous to import oysters from the Middle Atlantic coast to satisfy the demand. Almost all of the oysters harvested on the Gulf coast, with the exception of those produced on private grounds, chiefly in Louisiana, are taken from natural oyster bars, or reefs, which have been built up by the slow accretion of centuries. Otherwise, little private oyster culture is practiced, although the various States attempt to maintain the natural oyster bars by extensive planting of cultch and seed.

The following difficulties are faced by State organizations in their attempts to maintain a large, dependable production of oysters: (1) More oysters are harvested than the grounds should produce, with the result that the size as well as the quantity harvested has been reduced. (2) There frequently is considerable mortality due to freshets, or periods of very low salinity in oyster-producing bays, caused by heavy rains or melting snow inland. (3) Some mortality caused by predators or parasites, such as conchs, sporozoans, and other organisms. (4) The effect of such nonparasitic organisms as the boring clam (*Martesia*), which inhabits the shells of oysters, is not yet known but will be determined.

In order to solve some of the most serious problems of the oyster industry on the Gulf coast, the Bureau of Fisheries established a permanent laboratory near Pensacola, Fla., in 1937. For this pur-

pose the Bureau took possession of the abandoned Pensacola Quarantine Station and adapted it to the needs of the shellfish investigations, with the aid of W. P. A. funds. Construction work at the station is expected to be completed during 1940.

In carrying out scientific investigations, Dr. A. E. Hopkins, director of the station, has cooperated extensively with oystermen and with conservation departments of the Gulf Coast States in formulating programs for the development and maintenance of natural oyster grounds, and the creation of new grounds, by planting seed and shells. In Florida, especially, much progress has been made in projects of this kind with the assistance of the W. P. A. During the year, surveys were made of the oyster grounds of Mobile Bay, Ala., and connected waters, and cooperation was given to the Alabama Department of Conservation in promulgating regulations designed to restore the grounds to their former productivity.

An experimental study was planned to obtain exact data on the effect of variations in salinity on oysters. However, the work has been deferred pending completion of large outdoor concrete tanks where the experiments can be carried on under controlled conditions. Observations were made during the summer in East Pensacola Bay, where there was a large mortality during a period of low salinity. Counts of live oysters and the intact shells of those that had died recently showed a mortality of 90.3 percent. The mortality was difficult to understand, since the freshet condition lasted only about 3 weeks, and since the oyster grounds are so located that they are supplied with salt water from the Gulf at high tide. A study of the data available indicates that the mortality was the result of a combination of factors, one of which was low salinity. The oysters had been heavily infested with a sporozoan parasite, *Nematopsis ostrearum*, which appeared to render the oysters less resistant to handling or transplanting. Also, the period of low salinity occurred in August, immediately after the oysters had completely spawned out and their resistance was greatly lowered. It is probable that low salinity decreases the feeding activities of *Ostrea virginica*. Dr. Hopkins found the same relationship between reduced feeding activity and low salinity in *Ostrea gigas*. The problem of the effect of salinity on oysters will be thoroughly studied as soon as possible.

RESPIRATION OF THE OYSTER

During past years considerable information has been accumulated by the Bureau's investigators regarding the nutritive value of oysters from different sections of the coast, and regarding the seasonal fluctuations in the mineral, water, and glycogen content of oysters in Long Island Sound. There is no doubt that the good qualities of marketable oysters are determined by a high percentage of solids, high glycogen content, and the presence of sufficient amounts of metals such as calcium, iron, copper, and iodine—important in a well-balanced human diet. The importance of producing oysters of highest nutritive value is now being recognized by the majority of the leading oyster growers. The difficulty lies, however, in the fact that present observational data provide no clue to the methods or procedures by which oysters of desired qualities could be produced. Practical solution of this problem rests on fundamental knowledge of

the carbohydrate and metal metabolism of the oyster. Since all the activities of an organism, in the final analysis, depend on respiration, the study of the gaseous exchange of the oyster was expected to throw light on other features of its metabolism. During the summer of 1939, experiments along this line were carried out at Woods Hole by Dr. Galtsoff, with the assistance of George Mishtowt. The purpose of the experiments was to determine whether the increased iron content had any effect on the rate of respiration. Oysters, poor in iron, were kept in water with high iron content until a great deal of the metal had been assimilated in the animal tissues. The rates of oxygen consumption of these oysters before and at the end of the experiments were determined and compared.

The excess of iron in the tissues seems to slightly increase the oxygen consumption, although the results of the summer's experiments are complicated by the change in the organisms caused by spawning. There was a general decrease in the oxygen consumption after spawning which amounted to 22 percent in the control oysters, while in the "iron fed" oysters it averaged only 19.4 percent. There was an apparently significant difference between the change of the metabolic rates of the male and female oysters, which is probably determined by their sex. In both sexes the lowest metabolic rate was found to occur during the after-spawning period, which is characterized by the poorest condition of the oyster meat. It is planned to continue this investigation by carrying out tests during the various seasons of the year.

OYSTER PESTS AND PARASITES

In addition to the starfish and oyster drill, which devour large numbers of newly set oysters, two other molluscs, namely, *Anomia* and *Crepidula*, were found to be responsible for the mortality among spat in the Long Island area. As a rule, the setting of *Anomia* and *Crepidula* occur almost simultaneously with the setting of oysters. However, because of the much lower rate of growth of oysters, *Anomia* or *Crepidula* soon suffocate the spat by covering it with their shells.

However, heavy mortality among oyster spat cannot be attributed solely to their enemies such as starfish, drills, *Anomia* and *Crepidula*. The oyster set died in some areas where these enemies were not numerous enough to inflict heavy losses. It is quite probable that in some areas of Long Island Sound the mortality of spat was due to a disease or infestation by some unknown parasite.

Starfish setting.—The first setting of starfish in 1939 took place in Long Island Sound between July 13 and 17, and continued until September 11 with two distinct peaks in the intensity, the first between July 20 and 24, and the second between July 31 and August 3. The heaviest setting took place at the stations located at 30- and 40-foot depths. The numbers of starfish that set in 1939 were small, and even at the height of setting the young starfish rarely averaged two per shell. However, because of a very high rate of survival among recently set starfish, and because of their rapid growth, they soon became a serious menace.

Distribution of starfish.—In accordance with the practice established last year, semiannual surveys of the distribution of adult starfish in Long Island Sound were made in March and November. As compared

with the conditions existing in November 1938, the density of the starfish population in different areas of the Sound in March 1939 remained virtually the same. In general, starfish were rather scarce or entirely absent. Even in the most heavily infested area between Charles Island and Stratford Point they did not exceed 77 per sample. The majority of the samples contained from 1 to 5 starfish only. The second survey, made in November, revealed a tremendous increase in the starfish population throughout the entire growing season. From 25 to 100 times as many were found in November as were found in March. The majority of starfish were of the 1939 set. The large increase in the numbers of starfish compelled the oystermen to carry on a vigorous campaign of eradication. A new method, consisting of spreading lime over the infested areas, was put into general use and proved to be quite satisfactory. At present this method is being relied upon by many oyster-growing companies operating in Connecticut, New York, and Rhode Island waters.

Oyster drill.—During the last few years the common oyster drill (*Urosalpinx cinerea*) has become very numerous in the waters of Long Island Sound, where it destroys large numbers of oysters. Experiments conducted at Milford Laboratory by Mr. Engle showed that the period of feeding lasted from late May until late November in 1939, with the peak of activity between the middle of August and the middle of September. The voracity of drills was observed under laboratory conditions. Several young *Urosalpinx*, less than 30 days old and about 2 mm. long, were put in an aquarium with oyster spat ranging from 2 to 4 mm. in diameter. Within 15 days 2 drills destroyed 142 oysters. The deposition of drill egg cases began early in June, when the water temperature was about 16.0° C. (60.8° F.), and continued through October. The heaviest egg case laying occurred from the middle of July through the middle of August.

Boring clam.—Another problem which has been attacked by the staff of the Pensacola Laboratory is the boring clam, *Martesia*, which is common on many parts of the Gulf coast. This clam apparently enters the shell wall at a small size and enlarges the cavity it occupies as it grows larger. Nothing is known of its life history at yet, save that it is a lamellibranch, and presumably has a free-swimming larval stage. In Mississippi Sound, near Biloxi and Gulfport, the infestation has begun to assume serious proportions. Fifteen years ago Dr. Galtsoff, after a thorough survey, reported no boring clams in that region. Oystermen claim that they have appeared only in the last few years, and now, on some grounds, living oysters are so infested with the clams that the shells crumble under slight pressure. It is not unusual for an oyster about 3 inches long to have 100 or more boring clams occupying each of its valves. As the clams grow to about one-fourth inch in diameter they consume the shell, leaving little protection for the oyster living within. An investigation of the life history of the boring clam, its habits and tolerance of environmental factors, has been undertaken at the Pensacola Station.

Sporozoan parasite.—A long-continued investigation of the sporozoan parasite of the oyster carried on by Dr. Prytherch at Beaufort, N. C., has been completed. A detailed description of the development and microscopic structure of this pest is incorporated in the manuscript entitled "The life cycle and morphology of *Nematopsis ostrearum*, sp.

nov., a gregarine parasite of the mud crab" (to appear in the *Journal of Morphology*). A report is in preparation on the other phases of this work dealing with field observations of oyster mortalities in Southern waters, and the effect of the parasite on the functioning of the adductor muscle of the oyster.

EFFECT OF PULP-MILL POLLUTION ON OYSTERS

The York River Investigations, carried on by Dr. Walter A. Chipman, Jr., and Dr. H. N. Calderwood, have been concerned with the continued search for the chemical or chemicals present in the effluents from pulp mills that cause changes in the physiology of oysters. This information is of importance in the problem of eliminating pulp-mill pollution. Progress has been made in the elimination of some fractions as causative agents, and in acquiring some knowledge as to the nature of these physiologically active materials. The investigations have not as yet progressed to a point where the actual causative agents can be definitely identified. As during the previous year, the work has been carried out in cooperation with the Virginia Commission of Fisheries, through an allotment of funds. Additional laboratory and office space were provided free of charge by the College of William and Mary.

Studies made prior to 1939 showed that effluents that enter the York River from the pulp and paper mill at West Point are effective in reducing the rate at which water is pumped by oysters. It has also been shown that the effluent that has the most active physiological effect arises from the making of pulp, and contains cooking liquor, weak black liquor, soaps, and foam, in addition to the wash waters. The work during 1939 demonstrated that the physiological activity of sulfate soap has been due to the black liquor it contained, and that the foam is no more than a mixture of soaps and black liquor. Samples of black liquor from which the soaps had been removed still maintained their potency. Consequently, the work has been directed towards fractionation of weak black liquor. The physiologically active material of the weak black liquor has been separated through procedures involving precipitation, extraction, and selective solution.

Chemical investigations on weak black liquor samples are being continued, with the object of discovering whether or not there is any correlation between the alkalinity and volatile sulfide content and the variations in the effect of these samples on oysters. It is hoped that the further fractionation of the weak black liquor and the analytical analyses of these fractions will supply definite information on the chemical nature of the physiologically active material, and thus allow steps to be taken leading to elimination of this type of pollution.

A small group of studies were made this year at the request of the Naval Mine Depot at Yorktown, Va., to ascertain whether or not wash waters resulting from the purification of stored TNT would be harmful to oysters and clams if emptied into the York River. As a result of the tests made it was found that no harmful effects could be expected at the dilutions to be discharged.

SPONGE-FISHERY INVESTIGATIONS

DR. PAUL S. GALTSOFF, *in charge*

Early in December, 1938, a heavy mortality broke out among the commercial species of sponge (wool, velvet, grass, reef, yellow, and hardhead) on the natural banks in the waters of the Bahama Islands. At the request of the Colonial Secretary of the Bahamas, and with the consent of the U. S. Department of State, Dr. Galtsoff was detailed to Nassau, Bahamas, to collaborate with the British Department of Sponge Fisheries in conducting the necessary investigation of the cause of the mortality. This detail, which involved no expenditures on the part of the Government, continued from February 15 to April 7, 1939. During this brief period extensive hydrographical, chemical, and biological observations were made in the area of greatest mortality, near Andros Island, with additional observations on the Little Bahamas Bank and in the inshore waters around New Province Island. Laboratory and field experiments were conducted at the same time at Nassau and the field station at Mastic Cay, Andros Island. The records of a spread of mortality over the natural and cultivated sponge beds of the Islands indicate that the sequence of infection was from east to west, following the trend of water movements within this area. Determinations of salinity, pH, dissolved oxygen, excess base, calcium, and analyses for phosphates, silicates, and heavy metals failed to disclose any factor which may have been responsible for the mortality. Microscopical examination revealed, however, the presence of fungal filaments in all diseased sponges. These filaments have not been found in healthy sponge tissues, nor in the remains of sponges which have been long dead. They are particularly abundant in the marginal zone between the newly dead and living tissues of diseased sponges. The infection spreads gradually through the tissues, starting often from an origin inside.

In the experiments conducted at Nassau, and at Mastic Cay, it was possible to infect reef and wool sponges with the fungus by contact with fragments of infected sponges of the same species. The fungus was tentatively identified as *Spongiophaga* sp. By the end of February the disease had spread to the northern coast of Cuba, and in March it was reported to have reached Key West, Fla.

A survey of the conditions of the Florida sponge fishery was made by Dr. Galtsoff immediately upon his return from the Bahamas. It was reported that during the first week of March large numbers of wool, yellow, and grass sponges were noticed on the reef extending along the Atlantic side of the Florida Keys. In a short time similar conditions were observed from Key West to Biscayne Bay. The mortality occurred almost simultaneously in Florida Bay, Barnes Sound, and Biscayne Bay, apparently spreading through the numerous passages which intersect the Keys and connect the waters of the Atlantic with those of the Gulf. Gradually the epidemic progressed westward over the entire area of Florida Bay as far as Cape Sable. Reports of the destruction of sponges in this region were received about the middle of April. At that time the mortality among commercial sponges reached such proportions that fishing became unprofitable, and had to be stopped long before the end of the season,

which usually lasts until August. It has been estimated that between 60 and 70 percent of the sheepswool sponges were destroyed and that yellow and grass sponges were almost completely wiped out. Reports from Cape Sable estimated about 80 percent mortality of sheepswool sponges.

Chemical and biological investigations established the striking similarity between the conditions found in the Bahamas and in the Key West area. There was nothing abnormal in the composition of sea water, plankton, and microplankton. On the other hand, microscopic examination of the diseased sponges showed the presence of a fungus morphologically identical with the microorganism found in the dying sponges of the West Indies.

During the spring, fishing in the Tarpon Springs area continued normally. None of the divers interviewed at that time reported any unusual conditions on sponge grounds. Rumors were persistent, however, of the presence of diseased sponges on some of the bars in the northeastern corner of the Gulf. Finally, one diver reported the presence of a large number of diseased sponges on the bars between Cedar Keys and Carabelle. Through the courtesy of Captain Maurice Gay, who offered free of charge the facilities of his boat, diving equipment, and the services of his crew, a survey was made of the affected area. Diseased sponges were found on the bars off Carabelle at the depths between 5 and 6 fathoms. The infection was light, however, and resulted only in a partial destruction of the sponge body. At the time of the investigation there was no pronounced mortality among these sponges. Because of lack of funds for sponge investigations field studies were discontinued, but arrangements were made with Captain Gay and the Florida Department of Conservation for collecting and preserving additional diseased sponges which were forwarded to the Woods Hole and Washington laboratories for microscopical examination. Throughout the summer and fall samples of diseased wool sponges were studied. A high percentage of them were found to be infected by fungus. In the meantime, reports received in the Washington office indicated the spread of the disease to the Tarpon Springs area. Increased mortality of commercial sponges on all deep-water grounds become so pronounced that in December fishing on bars situated below 8 fathoms was discontinued, and an unusually large number of sponge boats concentrated in a comparatively shallow area off Cedar Keys. At the end of the year, the number of sponges brought to the Tarpon Springs Sponge Exchange noticeably diminished, and the sponge fishermen and dealers were greatly concerned regarding their only means of livelihood. The future of this unique and highly specialized industry appears to be quite dark. Comprehensive plans for investigation and conservation of valuable sponge fishery resources have been prepared. Their execution depends, however, on the appropriation of necessary funds.

AQUICULTURAL INVESTIGATIONS

DR. H. S. DAVIS, *in charge*

The ever-increasing popularity of sport fishing has resulted in increased demands on our lakes and streams which can only be met by the development of scientific methods of fish conservation and man-

agement. While there is a limit to the production of fish in any body of water, it is probable that, in many cases at least, the yield of game fish can be materially increased. Investigations have shown that present methods of stocking and other practices often fail to produce the results expected, and it is evident that much remains to be done before fish management can be established on a sound basis.

These problems are being attacked along three principal lines. One deals primarily with the artificial propagation and rearing of game fishes; a second with the parasites and diseases of fish, especially those prevalent at hatcheries and which frequently seriously curtail the output; and a third line of investigation is concerned with field problems relating to fish management, such as comparative survival and growth of hatchery and wild fish under natural conditions, the ecological requirements of different species of game and food fishes, and the possibility of increasing fish production in natural waters.

In the interest of greater efficiency, the headquarters of the Aquicultural Investigations was moved to the experimental hatchery at Leetown (P. O. Kearneysville), W. Va., in the spring of 1939. This station, operated primarily for experimental work with both trout and warm-water fishes, also has adequate laboratory facilities, and hence affords an excellent opportunity for studies related to hatchery operations.

TROUT

Investigations on trout have been concerned chiefly with field studies of the results of artificial stocking and other problems related to fish management, with the development of cheaper and better diets for hatchery fish, and with selective breeding for the purpose of developing strains that are superior to those ordinarily found at hatcheries.

Feeding experiments.—Feeding experiments were continued at the Leetown Station by Dr. J. S. Gutsell. These experiments were designed primarily to develop better methods of feeding animal meals, since previous work had shown that these products, when combined with fresh meat, make an excellent and economical diet for trout. It was found that under ordinary conditions it is not advisable to use more than 50 percent dry meal in the diet. While trout can subsist on diets containing considerably larger amounts of meals, the meals are utilized less efficiently and there is considerably more waste in feeding. The rate of growth of trout on those diets is materially increased by the addition of small amounts of either cod-liver oil or kelp meal and is increased still further if both are included in the diet.

Experiments designed to show the effect of food on the quality of trout eggs have confirmed the belief of many fish-culturists that overfeeding is distinctly detrimental, since a larger percentage of the eggs fail to hatch. To produce eggs with the greatest hatchability, at the lowest cost, the fish should be fed a well-balanced diet in moderate amounts.

Experiments at Leetown, and at Hackettstown, N. J., in cooperation with the New Jersey Fish and Game Commission, have shown conclusively that frozen fish, when fed continuously in considerable

quantities, produce definite toxic effects. The trout become dark colored and eventually die.

Feeding and nutrition experiments conducted at the cooperative hatchery at Cortland, N. Y., are discussed in a separate section of this report.

Selective breeding.—Breeding experiments with brook trout were continued at the Pittsford (Vt.) Hatchery and have resulted in more than doubling the rate of growth and also the production of eggs. Strains of fish also have been developed that are more resistant to hatchery diseases, especially furunculosis.

Breeding experiments with rainbow trout are being carried on at the Leetown Station, but have not yet been continued long enough to produce significant results.

WARM-WATER FISHES

Studies on the black basses and other warm-water fishes are being conducted at the Leetown and Welaka (Fla.) stations. Hatchery and field investigations were carried on at both stations, but at Leetown the smallmouth black bass received most attention, while at Welaka the largemouth black bass was the center of interest.

Studies at Leetown.—The work on smallmouth bass streams in this region, under the direction of E. W. Surber, was confined to (1), the collection of 100 adult smallmouth black bass for food and parasite studies from each of the following streams: Cacapon River, South Branch of the Potomac River, and the Shenandoah River; and (2), the collection of temperature and turbidity records in the Shenandoah River.

Previous studies on the spawning of smallmouth bass in these streams have shown that large numbers are hatched each year, but that the number of young bass decreases rapidly a short time after they leave the nest. The loss is probably greater than in hatchery ponds under ordinary conditions. A large part of this loss in streams is believed to be due to predacious fish, especially young smallmouth bass in their second and third year of life. Some of the loss appears to be caused by parasitization.

Experimental work at Leetown has been limited, due to lack of suitable ponds. However, 28 new ponds, designed especially for experimental work, were completed during the past year and will be available for use in 1940. Some experiments with forage fish, carried on during 1939, demonstrated that when ponds are stocked heavily with black-head minnows before smallmouth bass fry are added, large numbers of fry disappear, presumably because they are eaten by the minnows. Largemouth bass fry, however, have a better chance of survival. The results indicate that 1,000 to 3,000 black-head minnows per acre can be used successfully if ponds are not stocked with minnows until the bass fry are too large to be eaten.

Studies at Welaka.—The work at this station is under the direction of O. Lloyd Meehan. During the season 1939 only 8 ponds were available for experiments, and were fertilized with cottonseed meal at weekly intervals. Four ponds were stocked with bream (bluegills) and golden shiners to serve as forage, and the remaining 4 ponds were stocked with largemouth black bass only. The ponds

that contained forage fish produced an average of 5,120 largemouth bass fingerlings per acre. The results, however, varied greatly in the different ponds, and indicate that much is still to be learned concerning the ecology of ponds that contain forage fish. In ponds where fertilizer alone was used the yield of bass fingerlings was much more uniform, with an average yield of 11,390 per acre.

In previous experiments in other localities Mr. Meehan found that in fertilized ponds, without forage fish, no matter how heavily the pond may be fertilized, the bass grow rapidly until they reach a length of 2.5 to 3 in., when growth practically stops. It was thought that if sufficient forage fish were present the bass fingerlings would continue to grow throughout the season, but this was not true. Growth was arrested at approximately the same time regardless of whether or not the ponds contained forage fish.

The largemouth black bass fry grew to a length of 2.5 in. in approximately 2 months. One pond was then drained and stocked a second time with largemouth bass fry, and yielded a total production of 19,047 2.5-in. fingerlings per acre for the season. After removal of the largemouth bass fingerlings the pond was stocked with bream (bluegills), which yielded 47,179 1.5-in. fingerlings per acre when drained in the fall. The total yield of this pond for the season was 66,227 largemouth bass and bream fingerlings, which is believed to be a record.

FIELD STUDIES

Fish management studies on trout waters were carried on at the Pittsford (Vt.) and Leetown (W. Va.) Stations, in the Pisgah Game Preserve in North Carolina, and in Utah, Idaho, and California.

Test waters.—The field work at the Pittsford Station, under R. F. Lord, has been confined to the so-called "test waters," which have been operated in cooperation with the Vermont Fish and Game Service. This work was begun in 1935 on Furnace Brook. The following year two more streams and Chittenden Reservoir were included in the program, increasing the number of test waters to four, the maximum number allowed by law. However, in 1939, two of the streams were discontinued as test waters and observations were made only on Furnace Brook and Chittenden Reservoir.

The total catch on Furnace Brook for the season of 1939 consisted of 1,321 brook trout and 1,676 rainbow trout, a total of 2,997 fish, as compared with a total catch of 4,647 in 1938. This was the lowest catch recorded since the study began, and was probably due, in large part at least, to the severe flood of September 1938, which did great damage to Vermont streams. It is interesting to note, however, that, as in 1938, the catch of rainbow trout exceeded that of brook trout, even though no rainbow trout have been planted in the stream for years, while it receives a heavy stocking of brook trout annually.

Artificial stocking appears to have given better results in Chittenden Reservoir, although the results are by no means conclusive, due to incomplete data. However, fishing in this lake has improved greatly since it has been stocked annually with large rainbow trout. An accurate count of marked fish captured by anglers was made on only a few days, and 27.5 percent of the fish taken were

hatchery reared. It is noteworthy that one-third of the marked fish were planted in 1937, the remaining two-thirds in 1938.

St. Mary River.—On the basis of observations made on the St. Mary River by Mr. Surber, from 1935 to 1939, it was concluded that the stream is well-suited to trout, so far as temperature and other physical and chemical conditions are concerned. The stream is rather poor in food, however, and an examination of the stomachs of 51 brook trout and rainbow trout showed a numerical predominance of terrestrial over aquatic insects. This was especially true of the brook trout. Rainbow trout consumed considerably greater numbers of aquatic forms, as well as considerable quantities of algae. Artificial stocking with brook and rainbow trout has had little effect on the fishing. Of 11,107 marked trout planted since 1935, only 268 or 2.4 percent have been recovered. The observations also revealed a very slow growth rate of stocked fish; a marked downstream migration of rainbow trout; an increase in the populations of both brook and rainbow trout due to natural propagation; and a gradual decrease in the numbers of planted rainbow and brook trout.

It is planned to continue the work on this stream during the coming year, and it has already been stocked with marked brook and rainbow trout fingerlings. North Creek, a stream of quite different type, also will be placed on an experimental basis next year. This stream is believed to provide much better conditions for trout, and will afford an excellent opportunity to determine whether or not rainbow trout will show a greater tendency to remain where planted when the environment is more suitable.

Pisgah Game Preserve.—The United States Forest Service has complete control of the wildlife on the Pisgah Game Preserve, and consequently the streams of this area afford an exceptional opportunity for experiments in fish management and for a demonstration of what can be accomplished by scientific methods. That the management program, under the direction of T. K. Chamberlain, is producing results is indicated by the fact that in 1939 it was possible to accommodate more anglers and permit a longer season than in previous years. In spite of the increases in total fishing intensity, the number of fish caught per angler was practically the same in 2 successive years, 4.8 in 1939, as compared with 4.9 in 1938. A cursory examination of the streams after the fishing season had closed indicated that many of them could have been fished more intensively without danger of depletion. In fact, some streams apparently are in danger of becoming overpopulated with trout, and therefore it is proposed to allow a material increase in the amount of fishing during 1940.

Since anglers are required to have their catches examined at checking stations, complete data are obtained on the species, size, and markings of all fish caught. However, no information can be obtained from this source concerning the migrations of fish within a particular drainage, or of trout below legal size. This, and other information which is not obtainable from an examination of anglers' creels, are essential for successful fish management. The required information can be procured most satisfactorily by sampling the fish population, but it is practically impossible to use a seine in the average trout stream. In an attempt to work out a satisfactory method for sampling our streams, the chemical method of conducting a fish census is being investigated.

Lake management studies in Ocala National Forest.—Field studies in Florida have been confined largely to the Ocala National Forest which affords exceptional opportunities for the investigation of lake-management problems, since there are a large number of lakes that may be opened or closed to fishing as necessity dictates. Surveys of these lakes have been carried out in cooperation with the Forest Service. A stocking program based on these surveys was initiated in the fall of 1939, under which all the important lakes within the area will be adequately stocked.

Certain immediate objectives have been set up for study and a group of 11 lakes has been set aside by the Forest Service, with the consent of the Florida Commission of Game and Fresh Water Fish. A second group of 8 lakes was closed to fishing in 1939 for the purpose of determining the fishing load which lakes of various food grades may be able to maintain with or without a stocking program.

In the study of fish populations it is planned to kill and examine fish of various food grades in lakes which have already been closed for scientific study. The value of this information lies in its application to all of the lakes in the area, and a more intelligent evaluation of their crop capacity.

Intermountain Region.—The work in this region is under the direction of Dr. Stillman Wright, who has devoted much of his time to an investigation of Bear Lake. This lake, which is situated almost equally in Utah and Idaho, at one time supported a large population of native trout. Marked depletion of the stock was noted as early as 1884, and presumably the decline has continued up to the present time. At a meeting of representatives of interested agencies at Pocatello, Idaho, in March 1939, it was agreed that each State would contribute \$600 to aid the Bureau in a biological survey of the lake to serve as a basis for a management plan. This amount was later increased to \$800 and 2 biologists spent the summer on the lake. The survey is being continued during the winter months by occasional visits to the lake, and will be carried on intensively during the summer of 1940, each State having contributed \$920 for the purpose.

The Bureau has continued to cooperate with the Utah Game Commission in the control of undesirable species of fish in Fish Lake. This lake is probably one of the most productive in the country, but recently there has been a marked decrease in the catch, especially of brook trout. It was thought that an important factor in the depletion might be the increased abundance of the Utah chub. Accordingly, great numbers of these fish were killed with rotenone (derris root). There is evidence that the condition of the brook trout improved following the reduction of the chub population in Fish Lake, and this fact is believed to justify a continuation of the program of chub control.

While most of Dr. Wright's activities were concerned with the Bear Lake and Fish Lake projects, some attention was given to a number of minor problems. An inquiry was made into the cause of an extensive mortality of whitefish in Lake Pend d'Orielle, Idaho, and 1 week was spent in Colorado investigating a number of fishery problems.

CALIFORNIA TROUT AND SALMON INVESTIGATIONS

The management problems now being investigated, under the direction of Dr. P. R. Needham, include three major phases: (1) Cooperative stream and lake surveys and catch record work with the United States Forest Service in California and Oregon; (2), operation of the Convict Creek experimental stream, near Bishop, Calif.; and (3), studies of salmon that will be prevented from migrating to their spawning grounds on the upper Sacramento River because of the Shasta Dam.

Cooperation with the Forest Service was curtailed, owing to lack of funds. However, stream and lake surveys were carried on in the Mount Hood and Fremont National Forests in Oregon, and the Whitman National Forest in Washington. Complete catch records were secured for a third angling season on Squaw Creek, in the Shasta National Forest, California. A report covering 3 seasons' work on this stream is now in preparation.

Mexican trout.—A second trip was made to Lower California to secure *Salmo nelsoni* to replace the first lot lost during the flood in March 1938. These trout, inhabiting the warm and isolated Rio Santo Domingo, were secured to try and develop a stock which will be tolerant of warm water and nonmigratory. The trip was highly successful, and 325 fingerlings between 2 and 4 inches long were transported by truck to the experimental stream near Bishop, without the loss of a single fish. Later they were transferred to the Clarkamas Hatchery, near Portland, Oreg.

Convict Creek experimental stream.—The season's work was begun on April 25. Construction of the large cabin begun in 1938 was completed, and a diversion ditch was excavated around the experimental area to by-pass excess water during spring floods.

Studies were again concerned with the problem of the survival of trout after planting. Winter conditions in this region permit only seasonal operation. In the season of 1937 the planting experiments were operated for a period of approximately 75 days; in 1938 this was extended to 90 days; and, in 1939, to 107 days.

A new experimental section over 800 feet in length was made available by the construction of a concrete flume screened at the upper and lower ends. All wild fish were removed from the section which was then stocked with 1.4-in. Loch Leven trout. The survival after 107 days was 87 percent, and the average length 2.64 in. In general, survival rates in 1939 were less than in 1938, which is surprising in view of the fact that the number of wild fish competing with the planted fish was greater in 1938. Survival records for 3 years have now been accumulated, but owing to limited personnel a thorough analysis of the data has been impossible.

A population study was made in two series of pools in Convict Creek—one below the experimental area in open waters, and one within the area where no fishing is permitted. It was found that the section open to angling contained 3.8 trout, 6 in. long, per pool, while in the closed section there were 14.5 trout per pool. While pools in the section open to angling contained fewer large trout, they contained larger numbers of fish of the younger age-groups than pools in the closed section. It is interesting that such

a short closed section (less than one-half mile) protects the large fish. Evidently they did not exhibit much movement during the summer.

Shasta Dam studies.—Surveys to determine the most feasible means of salvaging chinook salmon whose migration will be blocked by the Shasta Dam were continued on funds provided by the Bureau of Reclamation. These surveys showed that none of the tributaries of the Sacramento River below the dam site afford either spawning areas or suitable water for transference of the salmon.

In order to provide a suitable stream to which the salmon runs can be transferred, it is proposed to bring water by flume from the McCloud River to Stillwater Creek, and thus provide a permanent flow into this stream. Stillwater Creek rises in the foothills on the southern edge of the future reservoir and flows south about 24 miles to join the Sacramento River south of Redding. At present this stream has an intermittent flow and is dry during part of the summer and fall. Nevertheless, chinook salmon spawn in it naturally, and its gravel bed should provide excellent spawning grounds if a permanent flow is provided. The plan also includes a hatchery, with holding and rearing ponds, at the head of Stillwater Creek.

Counts of adult salmon that passed over the dam at Redding were continued during 1939. Between April 17 and December 9 a total of 21,897 chinook salmon were recorded. These counts do not include fish that ran in late fall, winter, or early spring, and it is estimated that the total run now passing the site of Shasta Dam is approximately 25,000 fish. A preliminary report on the entire Shasta Dam salvage problem is in preparation and will be completed early in 1940.

PARASITES AND DISEASES OF FISH

Increased facilities for pathological work at Seattle, Wash., have enabled Dr. Frederic F. Fish to carry on his work to much better advantage. His most important contribution during 1939 was the discovery that formalin is a most effective agent for the control of the external parasites of fish. In the formalin treatment, fish-culturists now have at their disposal a safe, practical, and economical method of eliminating ectoparasitic protozoans, and possibly other parasites as well. Heretofore the great limitation to prolonged treatments has been the lack of a disinfectant possessing a sufficiently large factor of safety between effective and lethal concentrations. Comparative tests with a protozoan parasite (*Trichodina* sp.) showed conclusively that formalin was far more effective than any other disinfectant used. Exposure of heavily infected fish to a 1:4,000 solution of formalin for 60 minutes resulted in complete elimination of the parasite, without injury to the fish.

However, prolonged treatments in the standing water of a fish pond, although simple, effective, and cheap, involves oxygen depletion and the accumulation of carbon dioxide. A comprehensive investigation of this problem is now under way, the ultimate objective being the preparation of a series of tables giving the time required to exhaust the dissolved oxygen to an arbitrary level of 4 p. p. m. under all normal hatchery conditions.

A second major investigation was the study of an epidemic of *Costia necatrix* at the Bureau's hatchery at Birdsvew, Wash., in

cooperation with the Division of Fish Culture. These studies indicate that *Costia* may be a forerunner, and probably a direct cause, of the Western type of gill disease. It is believed, however, that *Costia* is not the sole cause of this type of gill disease, which presumably may result from any prolonged irritation of the gill epithelium. Infection by *Costia* can be prevented by weekly treatments with a 1:6,000 solution of formalin.

During the past year an effort was made to place the losses that occur at the Bureau's trout hatcheries on an accurate statistical basis. Records, based insofar as possible upon actual counts of 288 lots of fish at 22 separate hatcheries, were analyzed for the percentage loss occurring among progressive size groups at half-inch intervals. The average loss between the eggs and 4-inch fingerlings was approximately 50 percent, which is much less than is believed to occur in nature. These results further emphasized the importance of hatchery losses and the need for more investigations of their causes. In 102 lots of fish, where both food and mortality records were available, it was found that the cost of food fed to these fish was \$5,732. The economic value of the dead fish among the 102 lots was conservatively estimated at \$35 817.

Several investigations of losses of fish at hatcheries in the general vicinity of Seattle, and losses among wild fish in the field, were made by Dr. Fish. Of the latter, losses among silver salmon, which apparently were caused by excessive sunshine, and attacks by fungus (*Saprolegnia*), which inflicted serious losses among adult chinook salmon and steelhead trout liberated in the Entiat River in the Columbia River salvage operations at Rock Island, were most noteworthy.

At the Leetown Station, George E. Klak made a study of a strigeid worm which is very abundant in the black-head minnows. He found that these worms caused sterility when their number was in excess of 1,000 per fish. In some cases they occurred in such numbers as to rupture the abdominal wall.

Dr. Davis continued his studies on a suction parasite of the smallmouth black bass. This parasite occurs on the gills, and when very abundant may seriously injure the host and eventually cause its death. It does not affect the largemouth bass, even when in the same pond with heavily infected smallmouth bass.

Studies are also being carried on at Leetown on the common bacterial gill disease of trout. It has been found that this disease may also affect largemouth and smallmouth black bass and has caused serious mortality among both young and adult fish. Other parasites of bass and trout are being studied for the purpose of clearing up certain points in their life history and developing better methods of control.

The disease service, which was inaugurated 4 years ago to assist fish-culturists in the control of hatchery diseases, continued to be heavily patronized during the past year. This service has proved to be very popular and has been an important factor in reducing losses.

NUTRITION STUDIES AT THE CORTLAND HATCHERY

The experimental hatchery at Cortland, N. Y., is operated under a cooperative agreement between the New York Conservation De-

partment, Cornell University, and the United States Bureau of Fisheries. The principal members of the staff of the hatchery are C. M. McCay, Cornell University; A. V. Tunison and A. M. Phillips, New York Conservation Department; and C. R. Mitchell and E. O. Rodgers, Bureau of Fisheries. The investigations at Cortland are of two general classifications; the development of feeding mixtures and methods, and studies of the transformation of food within the body of the trout.

The utilization of carbohydrates.—The inclusion of carbohydrates, such as sugar and starch, in fish diets provides an opportunity for reducing feeding costs. The greater the percentage of carbohydrate materials that can be used by the fish, the cheaper the diet. If concentrated sources of carbohydrate material are to be used to replace meat proteins, the fish must be able to utilize them in the sugar or starch form in which they are administered. A series of experiments designed to study the rate of digestion and absorption of carbohydrates was conducted. Trout are able to digest and absorb large amounts of sucrose (cane sugar). Coating the sugar with melted tallow reduces the loss in water when fed in a meat mixture and the melted tallow also retards the rate of disappearance of the sucrose from the intestinal tract. The use of tallow introduced a fat complex into the study. The sucrose was administered in gelatine capsules inserted directly into the digestive tract by means of a fine forceps. Brook trout weighing from 6 to 14 g. were used in the studies. The capsule usually is penetrated in about 1 hour and the sugar starts to dissolve in the gastric fluid. When the trout were killed immediately after feeding, from 96 to 100 percent of the sugar was recovered from the digestive tract. At the end of 3 hours the sucrose had disappeared from the capsule entirely.

Sucrose was administered in 10-, 25-, and 50-mg. feedings, placed in capsules. The experiments, in which brook trout were killed at various intervals of from 3 to 72 hours after feeding, showed that the amount of sucrose absorbed was dependent on the amount available in the gastro-intestinal tract. No sucrose was found after 72 hours, indicating that absorption is practically complete by that time.

Effect of diets on the liver.—Brook trout fed diets rich in cooked starch, sugar, or dextrin, developed large livers that contained a high percentage of glycogen. Those fed raw starch or cellulose, instead of cooked starch, sugar, or dextrin, developed livers comparable in size and glycogen content to the livers of brook trout fed meat alone. An analysis of the livers of trout fed diets containing various carbohydrates was made in terms of percentage of total body weight constituted by the liver, percentage of dry matter in the liver, percentage of dry protein in the liver, percentage of fat in dry liver and milligrams of glycogen per gram of fresh liver.

Experiments on staining bones in vitro.—In experimental stream studies, and in some nutritional studies, it would be a great aid if fish could be marked by some ingredient introduced into the hatchery diet. Since the staining of bones in the growing fish might be developed into a method of marking large numbers of fish, preliminary experiments were conducted. Madder root in the diet in a proportion of 0.5 part per hundred had produced no results at the end of 12 weeks, when the madder content of the diet was increased to 15

parts per hundred. Then the vertebrae assumed no color but the rib bones became definitely pinkish. At the end of 20 weeks the rib bones retained little color but the mandible had a distinct pink color. Since the size of the bone may have some effect on the absorption of madder, the experiments are to be continued. Purified chemicals and other brands of madder root also will be tried.

Growth of three strains of brook trout.—Growth studies were conducted using 3 strains of brook trout, 2 from commercial trout hatcheries and 1 from the Bureau's Craig Brook (Me.) Station. They were fed the same diet, similar amounts of food in terms of percentage of the body weight, and were held in troughs at the same weight per cubic foot of water. Although the fry did not start to feed at the same time, during a period of 32 weeks, the growth curves for each strain were surprisingly similar. The average percentage gain in weight by 4-week periods for the entire duration of the experiment was approximately the same for each population.

Source of protein as a factor in growth.—Protein is the most costly nutrient of the diet and may be derived from either plant or animal tissues. Diets were compared that consisted of 50 percent pig spleen, 2 percent salt and raw starch, and various percentages of the following ingredients, individually and in combination: Dried skim milk, cottonseed meal, whitefish meal, and wheat flour middlings. The amounts of the ingredients were so adjusted that in combination with the pig spleen the total protein content of each diet was 29 percent. The greatest and an almost equal percentage gain in weight was obtained by the use of the three diets that contained dried skim milk, whitefish meal, or a combination of the four ingredients, in addition to the pig spleen, salt, and raw starch. The diets that contained cottonseed meal and wheat-flour middlings as the variable source of protein gave results somewhat inferior to the other three diets, but which were practically identical.

Comparative growth of six groups of trout.—To improve the technique for conducting feeding experiments, and to determine the probable variability between troughs, similar diets were fed to 6 groups of brook trout during a period of 24 weeks. Only 1 group of the 6 showed a statistically significant difference from the mean growth of all 6 groups. The growth during the first 12 weeks averaged 36 to 39 percent; during the second 12 weeks, 18 to 22 percent; and during the entire 24-week period, 28 to 31 percent.

Assay method for "Factor H."—In order to develop an assay method for "Factor H," brook-trout fingerlings were fed a synthetic diet of raw corn starch, dextrin, casein, yeast, mineral mixture, and cod-liver oil for a period of 4 weeks when the accelerated condition of mortality indicated Factor H depletion. The group was divided into 12 lots, and each lot was placed in a separate trough. Three lots were fed the same diet. The various diets contained 10 percent, 15 percent, and 20 percent beef liver in addition to the synthetic diet, and the synthetic diet alone.

After 2 weeks, 40 percent of the fish fed on the synthetic diet alone had died. The remainder were then fed 100 percent beef liver. At the end of 16 weeks the fish on the all-liver diet had stopped drying and had resumed normal growth. The inclusion of only a percentage of beef liver in the diet failed to arrest mortality.

Different results, however, were obtained with each diet. The conclusion was reached that the diet must include in excess of 20 percent fresh meat in order to revive brook trout after they have suffered Factor H depletion.

Factor H depletion was accompanied by a decreased erythrocyte count, and led to the production of severe anemia. The addition of beef liver to the synthetic diet caused an increase in the red-cell content of the blood. A count of red blood cells may provide an indication of the presence of anemia, even before the onset of heavy mortality.

The effect of diet on condition.—The condition factor of brook trout, which is an index of the relative heaviness of a fish, in terms of a mathematical expression, increases with the length. Trout of the same size fed on the same diet show little variation in condition. The value of the condition factor showed a positive relationship to the protein content of the diet.

Protein requirements of trout.—Experiments conducted by Dr. McCay and associates, in 1931, proved that the protein requirements of trout was 14 percent or slightly higher. The experiments were resumed in 1939 to define more precisely the protein requirements of growing trout. Groups of trout were fed diets that contained 5, 10, 12, and 16 percent protein for 24 weeks. The trout were weighed periodically during the course of the experiment and showed the following average gains in weight for 4-week periods: 5 percent protein, 7 percent gain; 10 percent protein, 17 percent gain; 12 percent protein, 20 percent gain; and 16 percent protein, 29 percent gain. The mortality decreased as the percentage of protein was increased. With a diet containing 5 percent protein, 9 percent was converted into body protein; a 10 percent diet resulted in the conversion of 15 percent; a 12 percent diet gave 17 percent conversion; and a 16 percent protein diet resulted in 22 percent conversion.

Practical diets.—Experiments were conducted to test and compare the cost and efficiency of diets for practical use. Mixtures of dry foods bound together with salted spleen were tested. The diet considered most useful consists of equal parts of dried skim milk, cottonseed meal, wheat-flour middlings and fish meal combined with 4 percent of their weight of salt and an equal weight of ground frozen spleen. Diets that contained salmon-egg meal and seal meal produced considerable mortality, accompanied by a slimy condition of the body and a gill disease. Until more is known of the toxicity of salmon-egg meal and seal meal they should not be used in fish diets.

INVESTIGATIONS IN INTERIOR WATERS

DR. M. M. ELLIS, *in charge*

Pollution studies.—The pollution studies of the Bureau have been centered at the University of Missouri, at Columbia, where a generous provision of laboratory space and other facilities has been made. A portion of the investigations has been conducted at a subsidiary laboratory located at Fort Worth, Tex. The pollution problems throughout the United States, both specific and general, are so manifold that their permanent solution necessitates a continuation of a program of laboratory research designed to analyze thoroughly the

cause-effect complex that is involved in every type of situation. Because immediate and epidemic situations are frequently of a transient nature, the research program is more concerned with an analysis of the cumulative physiological effects of pollutants related to the fish themselves than with the application of palliatives. The investigational program also attempts to determine the precise agent or agents in pollution situations that are responsible for deleterious effects on the fish populations and their habitat.

Three major lines of investigations organized in 1938 were carried forward in 1939 by the Columbia, Mo., field unit in conjunction with the laboratories at Columbia, and at Fort Worth.

Analytical studies.—Waters, muds, and aquatic organisms collected in the field are sent to the central laboratory for detailed analyses, which are carried out by Dr. B. A. Westfall and his assistants. In addition to the materials collected by the staff, in the course of field work, a large number of samples are sent in for examination by the various State agencies.

Bioassays.—As during previous years, the specific effects of materials found in waters, muds, and pollutants, on living fish, and other aquatic animals, were determined by the bioassay method. The bioassays of pollutants sent to the Columbia unit, by State authorities and other agencies, have become an important function of the laboratory, and many determinations are constantly in progress.

Physiological investigations.—The underlying causes for the actions of the various substances found in natural waters and pollutants on living fish are sought through studies of the physiology of fish conducted under the direct supervision of Dr. Ellis at the Columbia and Fort Worth laboratories. As in 1938, one of the major fields of physiological investigation during 1939 was a study of the effects of various components of larvacides and herbicides on fresh-water fishes, and their associated aquatic food organisms. Because the biochemical and physiological tests necessitate technique of considerable precision, each fish is maintained and studied separately and receives individual feeding and care, frequently for several months. More than 300 fish are constantly under observation at Columbia, and numbers of catfish, bass, and other fishes are under observation as part of this investigation at Fort Worth. These studies have progressed to the point where it is possible to conclude that there is impairment of the growth and nutrition of fishes in waters treated even with small quantities of arsenicals and several other materials commonly used as mosquito larvacides. A separate report on this subject has just been presented to the Malaria Control Committee as part of the cooperative program on mosquito-control measures conducted in the T. V. A. area.

Throughout the year physiological studies, with concurrent analyses, have been made on the effects of several substances dangerous to fish life which were found in natural waters in the West in the course of the field investigations, with particular reference to the natural pollution picked up by waters used for irrigation during their passage over fields and through irrigation ditches. Marked concentrations of various mineral salts have been discovered in many return irrigation waters, and the detrimental effects on fishes noted. Through the application of physiological, biochemical, and metabolic methods to the study of fishes from irrigation waters, it has been

established that many fish in such waters are definitely below par in general physiological condition and reproductive capacity. Irrigation, therefore, constitutes a major and growing hazard to fish life in many of our Western streams.

Utilizing these same methods, the studies of fishes from streams polluted by mine wastes have demonstrated chronic injuries to fishes resulting from much higher dilutions of the wastes than has heretofore been recognized. A detailed report on the effects of lead, gold, silver, arsenic, zinc, and copper mining is in preparation, based on the data obtained during these studies.

Summer field surveys.—During the summer of 1939 intensive studies of stream pollution were made along the Atlantic seaboard, and throughout the greater part of the Western United States, and considerable new information was collected on the nature and effects of polluted waters. Observations were made in the States of North Carolina, South Carolina, Florida, Texas, Arizona, Nevada, California, New Mexico, Oregon, Washington, Idaho, Wyoming, and Montana. Over 9,000 analyses were made in the field and additional material was returned to the laboratory at Columbia, Mo., for further analyses:

Early in the summer Dr. Ellis and a field party continued the field work in the headwaters of the Grand River in Oklahoma, Kansas, and Missouri, relative to the pollution of the Grand River impoundment which is being constructed near Vinita, Okla. This work was completed in the fall and a report submitted to the Grand River Authority, pointing out the hazards of the chatfields and other sources of pollution found in this area.

From Oklahoma the party continued south to Fort Worth for work on the catfish under observation at the Bureau of Fisheries' Fort Worth Station, thence to Medina Lake and Uvalde, Tex., where special studies of bass and Rio Grande perch are in progress.

On completion of this trip the field party visited North Carolina and worked southward through the coastwise streams to Florida for a series of paper-mill and phosphate-mine pollution studies. A stop was made at the Welaka (Fla.), Station, to obtain bass material to be used in connection with the studies of mosquito control.

Late in July the field party moved west through South Dakota, Montana, and Idaho on the mine-pollution problems, and gave particular attention to the Black Hills gold-mine pollution of the Belle Fourche River, the copper-mine pollution of Clarks Fork, in the vicinity of Deer Lodge, Mont., and the lead and zinc pollution of the Coeur d'Alene River in Idaho.

From Idaho the party proceeded to Mt. Rainier and Mt. Shasta for a continuation of glacial-water pollution studies which have been in progress there for 3 years, and to make specific checks of silt conditions which will contribute to the fishery problems in the Sacramento River following the construction of a new dam, now in progress near Redding, Calif.

From California the party returned via Lake Mead, central Utah, Arizona, and New Mexico, stopping at established stations in these States where stream-pollution studies from mines and irrigation are in progress.

Studies of impounded waters were continued at Elephant Butte Reservoir, in cooperation with the United States Reclamation Service and the National Research Council, and at Lake Mead in cooperation with the same agencies and the National Park Service.

HYDRAULIC SECTION

HARLAN B. HOLMES, *in charge*

For a number of years the Bureau of Fisheries has felt the need for a well-organized section in the Division of Scientific Inquiry in which the combination of biological and engineering talent could be applied to fish and fishery problems created by the construction of dams, reservoirs, and diversions for the purposes of power, irrigation, navigation, and flood control. The perpetuation of fish populations following the development of such projects requires a detailed analysis of the changes in biological and physical conditions, and of the biological requirements of the fish that inhabit the areas involved. As a general rule, the solution of those problems involves the construction of fishways to enable upstream migrants to pass over dams and other obstructions, and the installation of screens to prevent the entrance of downstream migrants into irrigation diversions and hydraulic turbines, in which they would be lost or injured.

For the study of these problems of fish protection, and the construction and operation of fishways, screens, and other protective works, there has been created within the Division of Scientific Inquiry a Hydraulic Section. Mr. Harlan B. Holmes has been appointed to the position of Aquatic Biologist, in charge, and Mr. Olaf W. Lindgren has been employed in the capacity of Associate Hydraulic Engineer. Funds for this section first became available in July 1938, but activities were not begun until late in the year when Mr. Lindgren entered the service. Mr. Holmes, who for a number of years has been loaned to the War Department, Corps of Engineers, in connection with fish problems at the Bonneville Dam, was not available to the Bureau of Fisheries until October 1939. Other members of the biological staff of the Seattle Laboratory have taken part in the work of fish protection.

The work of the Hydraulic Section during the year has included the partial construction of 4 large fish screens in Federal irrigation canals, the reconstruction of 2 existing screens, the operation of 6 screens throughout the irrigating season, aid in the study of fish problems in connection with the Shasta Dam Project, being constructed on the Sacramento River in California, and a preliminary study of fish problems in connection with many other Federal water projects. Consulting assistance in connection with fishway and screen problems also has been furnished to the conservation agencies of several States.

All of the screens operated by the Bureau of Fisheries were on Federal canals in the Yakima Valley; the Kittitas, Tieton, and Sunnyside canals on Bureau of Reclamation projects; and the Altanum, Old Indian, and Wapato canals operated by the Indian Service.

One of the screens reconstructed during the year is in the Pishkun Reservoir of the Sun River Project in Montana. It is a bar-type

stationary screen. As originally designed, it provided insufficient screen area when the water level in the reservoir was low. The screen also had become damaged by ice. It was reconstructed and modified to correct the difficulties.

ICHTHYOLOGICAL INVESTIGATIONS

Fishes collected in the Panama Canal.—Complete lists of the fishes collected in the locks of the Panama Canal in 1935 and 1937, together with discussions of the intermingling in the Canal of fresh- and brackish-water species from the opposite slopes of the Canal Zone, and the extensive invasion of fresh or nearly fresh water by marine fishes, are included in a recently published paper by Dr. Samuel F. Hildebrand, entitled "The Panama Canal as a passageway for fishes, with lists and remarks on the fishes and invertebrates observed." As indicated in the title, some invertebrates also are mentioned. Although many marine fishes enter and some pass through the locks, only one species, the tarpon, is known definitely to have completed the transit; in this case, from the Atlantic to the Pacific. Brackish- and fresh-water species from the opposite slopes intermingle freely.

Fishes of Tortugas, Fla.—A large monograph of the fishes of Tortugas, Fla., left unfinished by the late Prof. William H. Longley, was completed by Dr. Hildebrand. A total of 435 species are listed, 29 of which were discovered during the investigation. Much information of taxonomic importance was gained, and the knowledge of the life histories of many species was greatly extended, especially of the shallow-water forms which could be observed in their natural environment by the use of a diving hood.

American anchovies.—Taxonomic revisional studies of the American anchovies were continued by Dr. Hildebrand. Many interesting relationships, unrecognized species, and many misidentified specimens in various museum collections have been found. The numerous misidentified specimens in collections serve to show how imperfectly the species hitherto have been known.

Systematic studies.—Isaac Ginsburg continued his systematic studies of American fishes. Accounts were prepared of the genera *Enyphias*, *Barbutifer*, *Coryphopterus*, and *Parrella*. Material was gathered on the systematics of a number of other gobiid genera, with the object of preparing needed revisions. Population studies were made of some of the common species of *Microgobius*, *Lepidogobius*, and *Bathygobius*.

Population studies strike at the very root of one of the fundamental problems, not only of fishes, but of all biology, and that is the species problem. Offhand, this would hardly seem to be a problem. The layman, especially if he is of the observant type, seems to be able to distinguish well enough the comparatively few species of animals and plants with which he is familiar. The specialist, however, if he is a careful worker, sooner or later is confronted with the following questions: What is a species? What is a subspecies? What is a race? This is a real and fundamental problem in biology, about which a considerable degree of misapprehension exists, even among systematists. In connection with the population studies an attempt was made to reach down below the surface of the problem, and to evolve general principles and a method that will contribute

to its solution. A paper was published supplementing others that have previously been published, dealing with this problem. Another paper, treating of another phase of the question, has been prepared and is now in press. The problem also has an important practical bearing. In our work of conservation it is important to distinguish properly, and understand, the interrelationship of the populations that make up the economically important fishes.

INDEPENDENT ACTIVITIES OF THE BIOLOGICAL LABORATORIES

WOODS HOLE, MASS.

During the summer, the U. S. Fisheries Laboratory at Woods Hole served as headquarters to Dr. Paul S. Galtsoff, In Charge of Shellfish Investigations, and the acting director and his staff. The laboratory facilities of the station were also used by John R. Webster, of the Bureau's North Atlantic staff, for studying the effects of various types of tags on mackerel.

As in previous years, the privilege of occupying facilities in the laboratory at the Woods Hole Station was extended to a small number of private investigators. Following is a list of such persons and the problems of their research during their stay at Woods Hole: Dr. Hugh M. Smith, former U. S. Commissioner of Fisheries, taxonomic studies of local fishes; Dr. Joseph M. Odiorne, Colby College, behavior of melanophores of *Fundulus*; Dr. Rastum Maluf, Johns Hopkins University, osmoregulative mechanisms in crayfish; Dr. Raymond W. Root, College of the City of New York, effect of carbon dioxide on the respiratory function of marine fish blood; Dr. Henry Brown, College of the City of New York, assistant to Dr. Root; Dr. Bolton Davidheiser, Johns Hopkins University, the effects of X-ray on males of *Sciara*.

BEAUFORT, N. C.

Research facilities were provided throughout the year at the Beaufort Laboratory for biological studies of marine organisms and certain species of fish and shellfish of importance to the commercial fisheries of this region. During the summer season 28 investigators from other institutions conducted studies here in various fields of zoology. The chief investigations carried on by the Bureau's staff, under the direction of Dr. H. F. Prytherch, consisted of experiments in controlling the growth and reproduction of oysters; the utilization of improved marsh ponds and canals for intensive cultivation of clams and oysters, the propagation of diamond-back terrapin; and the rearing and live storage of certain marine fishes held in captivity in tidal bays. The fishery research program of the laboratory has been drastically reduced during the past year because of the lack of personnel and the necessity of supervising extensive improvements to the laboratory with funds provided by the P. W. A. and the W. P. A.

Cooperative enterprises.—Assistance and advice was given to the following agencies on matters pertaining to the marine fisheries and related industries of this general region: U. S. War Department, Corps of Engineers, concerning the construction of a larger inlet at the mouth of the New River, and its possible effect on the local oyster

fishery; cooperation with the conservation departments of North Carolina, South Carolina, Virginia, and Maryland, on matters pertaining to the propagation and regulation of oysters, crabs, and terrapin, and certain commercial fishes; a joint program with Duke University for studies of ecology of marine organisms, and particularly the parasites of marine fish and crustacea was continued; for the Union Carbon and Carbide Corporation, corrosion tests with stainless steel cable in sea water were made; for the Aluminum Company of America and the United States Navy, antifouling and corrosion tests were made of various paints used on aluminum ship plate; and improvement of the laws for encouragement of oyster farming and the protection of the natural oyster resources of this State were suggested to the Shell-fish Committee of the North Carolina State Legislature. The terrapin-propagation operations of the laboratory were made available to representatives of the Universal News Service and Fox Movietone, Inc., who prepared motion-picture films of this activity for public display. Supervision of the operation of the North Carolina Fisheries, Inc., was continued and arrangements carried out for handling fish during periods of overproduction, with the assistance of the Federal Surplus Commodities Corporation, and for the creation of a better market for clams through local processing, for a large canning concern.

Independent investigations.—The 28 independent investigators from other institutions, who were provided with laboratory facilities at various times of the year, were engaged in the following studies: Dr. W. C. George, University of North Carolina, lymphocytes of lamellibranchs; Dr. A. S. Pearse, Duke University, assisted by Helen J. Ramsey, environmental factors and faunas of sand beaches, parasites of marine animals; Dr. F. H. McCutcheon, North Carolina State College, respiration and blood of turtles; Dr. Bert Cunningham, Duke University, chemical studies of incubation of terrapin eggs; Dr. Walter E. Southwick, physiology of spermatozoa; Dr. Lawrence S. Ritchie, Womans College of the University of North Carolina, nuclear changes in protozoa; L. J. Flemister and Dr. Sarah E. Culbreth, Duke University, physiology of the swim bladder of fishes; Dr. William L. Engels and Dr. Richard A. Edwards, University of North Carolina, vertebrates of coastal islands; Dr. Wm. A. Kepner assisted by Wayland J. Hayes, Jr., University of Virginia, anatomy of Turbellaria; Dr. M. A. Stirewalt and Dr. F. F. Ferguson, University of Virginia, study of Rhabdocoeles; Dr. Katharine R. Jeffers, Duke University, effect of pituitary hormones on ovaries of marine fishes; Coit M. Coker, University of North Carolina, embryology of echinoderms; Dr. and Mrs. Paul A. Meglitsch, Wright Junior College, Myxosporidia and Sarcodina of fish; Dr. Sewell H. Hopkins, Texas A. & M. College, life cycle of parasites (especially Trematoda) of marine fishes; Dr. and Mrs. George W. Wharton, Jr., Duke University, the ecology of sand beaches; Wm. E. DeTurk, Duke University, parasites of crustacea; Dr. Gordon H. Tucker, University of North Carolina, egg development of an ascidian; J. Harry Allen, University of North Carolina, distribution of marine invertebrates; Sidney Shapiro, American Museum of Natural History, differential growth in scombriform fish; A. B. Hardcastle and Margaret Hardcastle, Duke University, life history and parasites of menhaden.

Propagation of the diamond-back terrapin.—The total production of young terrapin hatched and reared at Beaufort, N. C., amounted

to 14,140 for the present season, and is the highest record obtained thus far in the culture of this species. The greatest previous annual production was obtained in 1938, when 13,600 were hatched in the 7 concrete breeding pens surrounding the station. This is the world's largest terrapin farm, or hatchery, and has supplied approximately 144,000 of these salt-marsh turtles for restocking coastal areas since the artificial propagation of this species was undertaken in 1909. The 1939 brood has been placed in special hibernating boxes in the large rearing house and will be distributed next spring throughout the South Atlantic region in cooperation with the various State conservation agencies.

The increased yield from these operations in the past 2 years can be attributed to experimental improvements made under the direction of Dr. Prytherch and Capt. Charles Hatsel, with respect to reducing the concentration of brood stock in certain of the breeding pens. For example, in one pen where the adult terrapin were provided with twice as much space in 1938 and 1939 as in 1937, the production of young increased from an average of 8 per female in 1937 to 10 and 11½ per female, respectively, in 1938 and 1939. Also, in the two new large pens, which provide ample room for the brood stock, the total production of young for each group of 500 adults—consisting of 400 females and 100 males—increased from 1,200 in 1937 to 3,360 in 1938, and 3,490 in 1939. In all of the experimental pens, in which crowding has been reduced, the average production of eggs per female terrapin showed increases ranging from 20 to nearly 200 percent in the past 2 years, with a fertility of over 95 percent. The increased production of young diamond-backs in 1939 is particularly significant and encouraging because seasonal conditions in that year were apparently less favorable for breeding than usual, as the 2 "control," or unimproved pens showed a decrease of over 20 percent in output in comparison with the average result obtained over a previous 5-year period. Also, during 1939, the brood terrapin were frequently disturbed, and their egg-laying activities were interfered with to a considerable extent while a P. W. A. project was in progress. This project made extensive improvements by elevating the concrete walls of all the pens, providing new tidal gates, and by enlarging the area of the egg beds.

The total brood stock at present consists of 570 males and 2,025 females, most of which have been in captivity for a period ranging from 10 to 25 years. In 1937 one of the pens was stocked with 320 wild terrapin, at a ratio of 70 males to 250 females, in order to determine the length of time required to reach satisfactory egg production. The output of young terrapin from this group increased from 460 in 1938 to 790 in 1939. Considerable interest in the terrapin-culture method developed at the Beaufort Station has been shown by the fisheries commissioners of Maryland and Virginia, who plan to inaugurate similar operations in their States within the next 2 years. In the spring, the output of the Beaufort Station usually is distributed in the coastal region from Maryland to Florida, after the young terrapin have been protected and fed for the first 9 months of their lives. This work has not only provided a large supply of young terrapin for restocking depleted salt-marsh areas, but has saved thousands from destruction by natural enemies such as rats, gulls, crabs,

and other predators, by protecting them during the time of egg incubation and the hibernating period during the first winter, when they are in hiding along the shore just above high-water level.

Experiments in marine fish farming.—Over 15,000 salt-water fish, consisting chiefly of striped mullet, did not migrate as usual this winter, but instead were forcibly detained in experimental tidal ponds constructed at the biological laboratory at Beaufort, N. C. Two years ago these ponds were constructed in cooperation with the W. P. A. and the North Carolina Conservation Department in order to determine the possibility of utilizing salt-marsh ponds and small coastal bays for rearing and live storage of fish, and for oyster culture. The experimental operations, conducted here since 1938 under the supervision of Dr. Prytherch, have demonstrated that by improvement of tidal areas through the construction of dikes, sluice gates, or other devices, it is possible to grow mullet, spotted trout, flounders, channel bass, sheepshead, croakers, and several other common species in captivity, or store them in a live, healthy condition for many months until there is a favorable market. The ponds also proved satisfactory for protected natural spawning and rearing of the mullet, which is the most important food fish taken in the South Atlantic and Gulf States. The production of the striped mullet in this region amounts to approximately 40 million pounds annually, with a return to the fishermen of nearly 1½ million dollars. During periods when the markets are glutted with mullet the coastal ponds would make possible the temporary live storage of a considerable quantity, thus maintaining better prices for the fishermen and making available a supply of fresh fish at any season of the year.

In the fall of 1938 the experimental ponds were stocked with over 3,000 fish ranging in size from roe mullet, weighing over 5 pounds, to small immature fish having a length of 6 to 8 inches, which were approximately 1 year old. The fish were captured with nets during their fall migration and were transported to the pond by means of a perforated boat, or live car having a capacity of approximately 400 pounds. Most of the mullet were placed in the larger tidal pond, which has an area of approximately 2½ acres at low water, and a maximum depth of 15 feet, and receives an exchange of over 5 million gallons of water daily through the two tidal gates. Several hundred immature mullet were placed in the smaller observation pond, and in large concrete pools at the laboratory, where they have been studied with respect to feeding habits and ability to survive low water temperatures during the past 2 winters. The adult mullet spawned in captivity during November 1938, and stocked the pond with thousands of young which, by the latter part of December, had attained a length ranging from ½ to ¾ inch. Though no attempt was made to hold these young fish in the pond by the use of fine-meshed screen on the tidal gates, there was, nevertheless, a considerable number that remained in the ponds and grew to an average length of over 6 inches during the first year. Less than 1 percent of the fish died from injuries sustained during collection and transportation, or during the subsequent period of 15 months that they were held in captivity.

Operations during 1939 were conducted on a small commercial scale, using a special barge equipped with a built-in live box and

water-circulating system, and capable of transporting 3,000 to 5,000 fish ranging in weight from $\frac{1}{2}$ to 1 pound each. The catches of mullet were obtained from regular fishing crews who were able to transfer them directly into the barge without exposing the fish to air for more than a few seconds. On arrival at the storage pond the fish were released from the barge into a receiving lock, from which they swam into the pond with the flood tide. A total of over 12,000 mullet were placed in captivity by this procedure, along with a few hundred specimens of croakers, spot, pigfish, white perch, and other species.

No additional roe mullet were placed in the ponds in 1939, because it was important to first determine whether those held in captivity since the previous year had continued to grow and develop spawn to the extent that they would under natural conditions. A number of the largest fish were caught in October and November 1939 and examined as to quantity of spawn, condition of the flesh, and number of growth zones on the scales. These specimens, ranging in weight from $2\frac{1}{2}$ to 5 pounds, were found to contain ripe roe which weighed from $6\frac{1}{2}$ to 12 ounces, according to the size of the fish. Experienced local fishermen expressed the opinion that these mullet were in as fine condition, and as fully developed with roe, as those being captured at that time in the commercial fisheries. Studies of the scales showed that the growth of the impounded fish had been considerable since their last winter spawning period, and equivalent to that found in free individuals which had spent the previous summer in these waters. The general results indicate, therefore, that ponds of this type can be used not only for growing mullet without artificial feeding, but also as automatic marine hatcheries having an approximate output of 500 million fry per acre. The tidal flats and shallow areas in the ponds were also used successfully for oyster culture, which, at the same time, improved conditions for production of the natural food of the mullet.

Improvements to the Beaufort Laboratory.—Extensive repairs and improvements were made to the buildings, equipment, and grounds of the laboratory with funds provided by the P. W. A. and the W. P. A. The main laboratory and dormitory rooms were refinished inside with suitable wallboard, some new flooring was laid, and modern plumbing fixtures and improved electrical conduits and outlets for the experimental tanks and other special equipment were installed. The salt-water system was greatly improved by the installation of new pipe lines with continuous flow and valve arrangements that permit complete flushing and removal of sediment without interference with experiments. A new supply of fresh water is obtained from a 3-inch artesian well drilled on the island, which has an overflow of 25 gallons per minute that is distributed to the 8 terrapin pens. In the various laboratory rooms 10 new experimental tanks have been constructed and provided with flood lights and outlets for salt and fresh water, electricity, and compressed air.

The terrapin-rearing house was completely remodeled, and 12-foot additions were placed on each side; one for a small aquarium and the other for the storage of lumber, equipment, and supplies. In the aquarium a small exhibit of marine fish, turtles, crustaceans, and other aquatic animals has been made possible by the installation of 2 large

circular tanks, 4 shallow rectangular tanks, and 12 glass aquaria. Five large outdoor tanks of reinforced concrete have been constructed for displaying large specimens. Considerable repairs were made to the sea wall, the terrapin pound, walks, driveways, and building foundations. A small pier and a 20,000-gallon storage tank for salt water were erected adjacent to the terrapin-rearing house in order to improve facilities for the feeding and care of the young terrapin.

With the assistance of the National Youth Administration it has been possible to improve considerably the exhibits of fish, crustacea, shellfish, etc., in the laboratory museum. An inexpensive method has been perfected for making accurate lifelike reproductions of marine fishes, from materials which appear satisfactory for permanent use in this climate. Casts of the following specimens have been added to the museum collection: A 75-pound ocean sunfish; 250-pound spotted whiplay; 7-foot sailfish; 100-pound stingray; 6-foot sandshark; hammerhead shark; tarpon; amberjack; dolphin fish; sheepshead; angel shark; sturgeon, tripletail; Spanish mackerel; long-finned albacore; black drum; and many other common species of smaller size. This project is being continued in cooperation with a division of the W. P. W. that is preparing visual aids to education for use in schools, libraries, etc. Small exhibits are being developed showing interesting phases of fish life, commercial methods of capture, and the nutritional importance of marine fish and shellfish.

APPROPRIATIONS

Numerous changes in the sources of funds for the Division of Scientific Inquiry brought about what appears to be a diminished amount available for fishery investigations during the fiscal year 1940. The appropriations for specific activities during the fiscal year 1939 included funds for travel and vessel operation made available from the deficiency appropriation of \$76,000 during that year for the Bristol Bay salmon investigations. The appropriations for that work during the fiscal year 1940 were placed under the proper headings. The grand total of the appropriations for the fiscal year 1940 exceeded the 1939 grand total by \$20,430. When proper adjustments are made for non-recurring items in both fiscal years, an actual increase of \$19,000 was realized in 1940.

The actual appropriation for the construction of fish screens and ladders in 1940 was equivalent to one-half of the 1939 sum, and an additional total of \$4,380 was supplied from other sources in order to maintain the program. Provision was made in the 1940 appropriations for the construction of a small permanent laboratory at Little Port Walter, in Southeastern Alaska.

Additional funds were received for the fiscal year 1940 from the Works Progress Administration for the improvement of the biological station at Pensacola, Fla. The National Industrial Recovery allotment provided \$25,000 for the completion of a new biological laboratory at Milford, Conn., and \$125,000 for the reconditioning and alteration of a commercial trawler which will become the new fishery research vessel, *Albatross III*.

Approximately one-half of all available funds of the 1939 and 1940 appropriations were spent during the calendar year 1939. A state-

ment of the appropriations, allotments, and special funds available for the use of the Division is given in the following table:

Project	1939	1940
Regular appropriations:		
Commercial fishery investigations.....	\$222, 300	\$186, 115
Oyster-cultural investigations.....	50, 620	54, 000
Aquicultural investigations.....	46, 880	55, 950
Conserving fish by screens and ladders.....	20, 000	14, 380
Water quality studies.....	11, 100	10, 600
Washington laboratory and administration.....	7, 100	4, 655
Construction of Southeastern Alaska laboratory.....		7, 500
Administrative reserve for savings.....		6, 300
Total.....	358, 000	339, 500
Allotment for traveling expenses.....	31, 620	38, 200
Allotment for maintenance and operation of vessels.....	30, 450	62, 800
Total.....	62, 070	101, 000
Grand total.....	420, 070	440, 500
Special funds:		
State of Virginia oyster fund.....	5, 000	
State of Maine lobster fund.....	2, 500	
Public Works Administration projects.....	281, 050	
Works Progress Administration projects.....	127, 645	19, 000
National Industrial Recovery projects.....		150, 000
Total.....	416, 195	169, 000



UNITED STATES DEPARTMENT OF THE INTERIOR
HAROLD L. ICKES, Secretary
BUREAU OF FISHERIES
CHARLES E. JACKSON, Acting Commissioner

Administrative Report No. 40

ALASKA FISHERY AND FUR-SEAL INDUSTRIES IN 1939

By WARD T. BOWER

APPENDIX II TO REPORT OF COMMISSIONER OF FISHERIES
FOR THE FISCAL YEAR 1939



UNITED STATES
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ADMINISTRATIVE REPORT SERIES

Since the beginning of the Administrative Report Series, considerable confusion has arisen concerning the system of numbering the separates composing it. Inasmuch as the Reports of the Divisions vary in order from year to year, many have found their designations as "Appendix No. I, II, III, or IV" very confusing. To relieve this, it has been decided to number them as "Administrative Report No. —." Inasmuch as 20 separates had already been printed in this series before starting the numbers, it was deemed advisable to begin the numbering with Administrative Report No. 21. Of course, numbers cannot be printed on those already off the press, but for the information of those who wish to know what the first 25 were, they are numbered for filing purposes as follows:

- No. 1. Report, Commissioner of Fisheries, 1931.
- No. 2. Alaska Fishery and Fur-Seal Industries, 1930.
- No. 3. Fishery Industries of the United States, 1930.
- No. 4. Progress in Biological Inquiries, 1930.
- No. 5. Propagation and Distribution of Food Fishes, 1931.
- No. 6. Report, Commissioner of Fisheries, 1932.
- No. 7. Alaska Fishery and Fur-Seal Industries, 1931.
- No. 8. Fishery Industries of the United States, 1931.
- No. 9. Progress in Biological Inquiries, 1931.
- No. 10. Propagation and Distribution of Food Fishes, 1932.
- No. 11. Alaska Fishery and Fur-Seal Industries, 1932.
- No. 12. Progress in Biological Inquiries, 1932.
- No. 13. Fishery Industries of the United States, 1932.
- No. 14. Propagation and Distribution of Food Fishes, 1933.
- No. 15. Fishery Industries of the United States, 1933.
- No. 16. Alaska Fishery and Fur-Seal Industries, 1933.
- No. 17. Progress in Biological Inquiries, 1933.
- No. 18. Propagation and Distribution of Food Fishes, 1934.
- No. 19. Alaska Fishery and Fur-Seal Industries, 1934.
- No. 20. Fishery Industries of the United States, 1934.
- No. 21. Progress in Biological Inquiries, 1934.
- No. 22. Propagation and Distribution of Food Fishes, 1935.
- No. 23. Alaska Fishery and Fur-Seal Industries, 1935.
- No. 24. Fishery Industries of the United States, 1935.
- No. 25. Propagation and Distribution of Food Fishes, 1936.

Note that the last Commissioner's Report was for 1932. Since then its place has been taken by a reprint from the report of the Secretary of Commerce under the title "Bureau of Fisheries." Inasmuch as it is no longer a Bureau publication, it is not numbered; but it will be supplied to any who request the Report of the Commissioner for any year since 1932.

ALASKA FISHERY AND FUR-SEAL INDUSTRIES IN 1939 ¹

By WARD T. BOWER, Chief, Division of Alaska Fisheries

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¹ Administrative Report No. 40, Appendix II to the Report of the U. S. Commissioner of Fisheries for 1940. Approved for publication July 18, 1940.

INTRODUCTION

The preservation of the fishery resources of Alaska on a sound economic basis, while encouraging maximum utilization consistent therewith, and the protection and management of the fur seals that breed on the Pribilof Islands constitute the major activities of the Bureau of Fisheries in Alaska. Acting Commissioner Charles E. Jackson spent several weeks in the Territory in the summer of 1939 and initiated the policy of holding annual hearings in various fishing centers at the close of the season in order that persons engaged in the industry might have full opportunity to express their views. An investigation of the fisheries of Alaska was made also by a subcommittee of the Committee on Merchant Marine and Fisheries, assisted by a delegation from the Territorial legislature.

Regulations for the protection of the fisheries were modified in some respects during the progress of the season to suit unforeseen conditions. Evidence presented at the hearings and in briefs filed subsequently, as well as data gathered by Bureau employees engaged in fishery patrol and investigative work, was used as a basis for the revision of fishery regulations to be effective in the following season.

Law-enforcement duties and stream-survey work for the purpose of appraising the escapement of spawning salmon were carried on by a force of approximately 100 temporary employees in addition to the regular personnel. Fourteen vessels of the Bureau, 1 chartered vessel, 5 speed boats, and a number of small power boats were engaged in this work, and chartered airplane service was used for limited periods in some localities. Weirs were again operated in 12 typical salmon streams for counting the escapement of brood fish. Scientific studies with respect to the salmon and herring were continued.

Detailed statistics of the fisheries are published herewith. These include for the first time data with regard to the number of residents and nonresidents employed in the Alaska salmon canning industry, and the wages paid by that industry within and outside the Territory.

At the Pribilof Islands 60,473 fur-seal skins were taken; 2,109 more than in the preceding year. Killings in general were of surplus 3-year-old male seals, and provision was made for a suitable reserve of this age group. It was computed that the fur-seal herd as of August 10, 1939, contained 2,020,774 animals. Attention was given during the winter to the management of blue foxes on the Islands, and 1,258 fox pelts were obtained in the 1939-40 season.

The byproducts plant on St. Paul Island was again operated for rendering oil and meal from the fur-seal carcasses and blubber, and the output amounted to approximately 28,000 gallons of blubber oil, 4,800 gallons of oil from carcasses, and 251 tons of meal. Limited quantities were retained at the islands, chiefly for use in fox feed, and the remainder of these products were shipped to Seattle. A substantial portion of the meal and the entire shipment of oil were sold for commercial use.

The maintenance and upkeep of the villages, as well as the buildings and equipment devoted to the sealing industry, received attention, and some additional construction was undertaken, including work started on four new houses for natives on St. Paul Island. Some repairing and resurfacing of roads was done on both islands.

As heretofore, valuable cooperative service was rendered by the Coast Guard in maintaining a patrol for the protection of the fur seals and sea otters of Alaska, and by the Navy Department in detailing a vessel for transporting the annual shipment of supplies from Seattle to the Pribilof Islands and bringing out the season's take of fur-seal skins.

Acknowledgment is made of the assistance by members of the Bureau's staff in the preparation of this document.

CONGRESSIONAL INVESTIGATION OF THE FISHERIES OF ALASKA

On July 17, 1939, the House of Representatives adopted Resolution 162 authorizing and directing the Committee on Merchant Marine and Fisheries, or a subcommittee thereof, to make an investigation of the fisheries of Alaska, particularly with reference to the use of traps in the catching of salmon, the advisability of maintaining or changing the prescribed fishing seasons, the effect of herring fishing operations upon the salmon fishery, offshore fishing by foreign nationals for crabs and salmon, and other matters concerning the conservation of the fisheries of Alaska and a reasonable development of the fishing industry.

Pursuant to this resolution a subcommittee was appointed, consisting of the following Members of Congress: Schuyler Otis Bland, Virginia, Chairman; Monrad C. Wallgren, Washington; Ambrose J. Kennedy, Maryland; Frank W. Boykin, Alabama; Richard J. Welch, California; George N. Seger, New Jersey; and James C. Oliver, Maine. This committee, accompanied by James W. Gulick, clerk, and Ralph J. Sterling, reporter, sailed from Seattle on August 20 on the Coast Guard cutter *Ingham* to conduct the investigation as directed.

In Alaska the Congressional committee was joined by a joint Territorial committee, appointed pursuant to House Concurrent Resolution No. 1 at the 1939 session of the Territorial Legislature to facilitate and assist in the Congressional investigation petitioned by that resolution. Five members of the Territorial Legislature had been appointed to the Territorial committee, as follows: Joseph Hofman, of Seward, and Henry Roden, of Juneau, members of the senate; and Harvey J. Smith, of Anchorage, A. P. Walker, of Craig, and James V. Davis, of Juneau, of the house of representatives. The committee which carried out the purpose of the resolution, however, was composed only of the four last-named members, as Senator Hofman died soon after the legislature adjourned and the vacancy was not filled.

Owing to the outbreak of war in Europe and the probability of an early call of a special session of Congress, the committee's work in Alaska was greatly accelerated, but hearings were held at all places scheduled, as follows: Anchorage, September 1 and 2; Kodiak, September 4; Cordova, September 5 and 6; Sitka, September 7; Juneau and Petersburg, September 9; Wrangell and Craig, September 10; and Ketchikan, September 11. Upon completion of the work in Alaska the committee left Ketchikan on the *Ingham* and arrived at Seattle

on September 13. A further hearing on the Alaska fisheries was held by the committee at Seattle on September 14.

At every meeting supplemental statements and briefs were invited, and these, together with much additional information of a factual nature, were made a part of the record of the hearings.

A report of the investigation and recommendations of the committee with respect to various problems concerning the development and preservation of the Alaska fisheries was published as Report No. 2379 under date of June 5, 1940.

VISIT OF ACTING COMMISSIONER OF FISHERIES AND OTHER OFFICIALS TO ALASKA

Acting Commissioner of Fisheries Charles E. Jackson, accompanied by Doyle C. Tripp as clerical assistant and reporter, left Washington on August 9 and sailed from Seattle on August 16 by commercial steamer for Alaska to investigate fishery matters and conduct a number of hearings with respect to the regulations. They disembarked at Ketchikan and continued the journey to Juneau aboard the *Brant*, returning later to Ketchikan to join the Congressional party on the Coast Guard cutter *Ingham* on August 22, for a cruise to points in southeast and central Alaska.

Public notice was given through the press that the Bureau would conduct hearings at specified places at the close of the salmon fishing season in connection with the fishery regulations for 1940 and, in addition to oral testimony presented there, would accept written evidence in the form of briefs at any time prior to December 1, 1939. These hearings, which were independent of those conducted by the Congressional committee, were held as follows: Anchorage, September 2; Kodiak, September 4; Cordova, September 5; Sitka, September 7; Petersburg, September 9; Wrangell, September 10; Ketchikan, September 11; and Juneau, September 16. After his return to Seattle on September 21, Mr. Jackson conducted hearings there also on September 25 and 26.

Seton H. Thompson, Assistant Chief of the Division of Alaska Fisheries, who was detailed to Alaska, with headquarters at Juneau, to exercise general field supervision of the Division's activities, participated in all the hearings conducted by the Bureau in the Territory. Mr. Thompson's detail from Washington began on May 28 and ended on October 14. He sailed from Seattle on the *Brant* on June 17 for Juneau and returned to Seattle by commercial steamer on September 29.

During the 1939 season a comprehensive investigation of the Bureau's work with respect to the fisheries, fur seals, and sea otters in Alaska, as well as a study of matters pertaining to the Bureau of Biological Survey, was made by Dr. Carl L. Hubbs, Curator of Fishes, University of Michigan, Ann Arbor, on behalf of Harold L. Ickes, Secretary of the Interior. Dr. Hubbs left Washington for the Pacific coast on June 17 and sailed from Seattle by commercial vessel on July 14. At Ketchikan he transferred to the *Brant* and proceeded to Juneau, where a schedule of his further itinerary was arranged. This included a trip on July 8 by airplane to Fairbanks, thence a journey to Anchorage via McKinley National Park, and on July 11 an airplane trip to Naknek. After several days in the Bristol Bay district, Dr. Hubbs

was transported on the Alaska Game Commission's vessel *Brown Bear* to the Pribilof Islands and then to Unalaska, where he transferred again to the *Brant* to continue his journey, stopping at various fishing centers en route to Juneau. He returned to Seattle on the *Brown Bear* on September 20.

FISHERIES EXPERIMENTAL LABORATORY

Steps were taken in 1939 toward the establishment of a fisheries experimental laboratory in Alaska to aid in developing production from the unutilized fishery resources and improved methods of curing and preserving species now utilized, particularly with a view to spreading employment in the fisheries over a longer period of the year.

This project was envisaged by the Territorial legislature in 1937, when it appropriated \$20,000 for the purpose, the sum to be made available when the United States or some department or agency thereof should match or agree to match the amount in cash, equipment, or services. The Territorial act provided also for the establishment of a Fisheries Experimental Commission, consisting of the Governor of Alaska, the Alaska Agent of the Bureau of Fisheries, and a third member to be appointed by the Governor, to select a supervisor of the laboratory, obtain a suitable site and buildings, acquire necessary scientific instruments and equipment, and hire technical and clerical assistants.

Pursuant to this act, the sum of \$50,000 having been allocated by the Public Works Administration for the construction of the laboratory in Alaska, the Commission members—Governor John W. Troy, J. W. Mendenhall of Ketchikan, and Seton H. Thompson, Assistant Chief of the Alaska Division of the Bureau of Fisheries and acting agent in charge of the division's work in Alaska during the season—met at Juneau on August 20 for the transaction of business. Governor Troy was elected chairman and Mr. Mendenhall secretary.

The Commission decided to enter into a cooperative agreement with the Bureau of Fisheries for the operation of the fisheries experimental laboratory and concurred in the recommendation of the Bureau that the laboratory be located at Ketchikan. It was decided also to establish the office of the Commission at the laboratory building when constructed, and Mr. Mendenhall was designated liaison officer with authority to contact appropriate officials of the Bureau regarding construction, maintenance, and operation of the laboratory. The laboratory will serve as headquarters for the Alaska technical and economic research staff, who will conduct studies on the capture, preservation, and marketing of Alaska fishery products.

Secretary Ickes approved the recommendation that the laboratory be erected on property under the control of the Treasury Department to the south of and adjoining the site of the Federal Building and Post Office in Ketchikan. Construction of the building will be started in the spring and it is anticipated that the work will be completed and the laboratory will be put in operation in the fall of 1940.

PROTECTION OF WALRUSES AND SEA LIONS

A new (ninth) edition of Department of Commerce circular No. 286 was issued under date of June 29, 1939, containing the laws and regulations for the protection of walruses and sea lions in Alaska. The

prohibition on the killing of walrus was extended to cover the period from July 1, 1939, to June 30, 1941, and the restrictions on the taking of sea lions were continued in effect. Walrus may be taken only by natives for food or clothing, by miners or explorers when in need of food, or by collectors of specimens for scientific purposes under permits issued by the Secretary. Similar conditions apply in respect to the taking of sea lions, and their killing is permissible also in the necessary protection of property or while the animals are destroying salmon or other food fish.

JAPANESE VESSELS IN BERING SEA

The only reported fishing operations by Japanese vessels in Bering Sea waters in 1939 were those led by the crab-fishing depot ship *S. S. Toten Maru*, owned and operated by the Nippon Suisan Kabusiki Kaisya (Japan Aquatic Products Co.), accompanied by 3 self-navigating vessels and with 10 small craft carried on board, which arrived in Bering Sea on April 17 to engage exclusively in fishing for crabs. Its principal area of operation was in the open sea between latitude 55° and 57° N., and between longitude 163°30' and 168° W. The Coast Guard on May 7 observed the *Toten Maru* anchored at latitude 56°22' N., longitude 161°21' W., with 5 sampans working gear near by and 2 approximately 80-foot Diesel craft setting gear to the southward. The vessels left Bering Sea by the middle of May and therefore did not interfere with the salmon fishery in that region.

In accordance with preliminary arrangements, the Japanese training ship *Hakuyo Maru*, of the Tokyo Fisheries Institute, made a training cruise in the Pacific Ocean and called at St. Paul Island on July 11 and 12 to give the students an opportunity to acquaint themselves with conditions concerning the breeding of fur seals and the facilities provided for their protection while breeding. On the morning of July 12 one party was furnished transportation to Webster Field at Northeast Point, and later in the morning a second party was taken to visit the Reef rookery from Observation Rock.

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 of special investigation or inquiry.

NEW FISHERY REGULATIONS

The regulations for the protection of the fisheries of Alaska, issued February 11, 1939, were amended by the following regulations issued under the dates indicated:²

[June 2, 1939]

ALASKA PENINSULA AREA

Salmon fishery.—Regulation No. 14, prohibiting commercial fishing for salmon by means of gill nets in certain waters west of 161 degrees west longitude, is hereby revoked.

ALEUTIAN ISLANDS AREA

Herring fishery.—Regulation No. 1 is amended to prohibit commercial fishing for herring, except for bait purposes, from January 1 to June 15, both dates inclusive, and from November 1 to December 31, both dates inclusive.

PRINCE WILLIAM SOUND AREA

Herring fishery.—Commercial fishing for herring, including bait fishing, is prohibited within one statute mile of Tatitlek village.

[July 13, 1939]

BRISTOL BAY AREA

Salmon fishery.—Regulation No. 18 is amended to increase by 24 hours the total weekly closed period for salmon fishing in all sections of the Kvichak-Naknek district, extending the midweekly closing to include the period from 12 o'clock midnight Tuesday to 12 o'clock midnight Thursday of each week.

[July 21, 1939]

BRISTOL BAY AREA

Salmon fishery.—Regulation No. 12 is hereby amended to prohibit commercial fishing for salmon in the Kvichak-Naknek district from 6 o'clock postmeridian July 22, to 6 o'clock antemeridian August 3.

[August 2, 1939]

SOUTHEASTERN ALASKA AREA

Herring fishery.—Regulation No. 4 is amended to read as follows: All commercial fishing for herring, except for bait purposes, is prohibited in the waters along the west coasts of Chichagof and Baranof Islands, including the coasts of adjacent small islands, from Cape Cross to Cape Ommaney and along the southeast coast of Baranof Island from Cape Ommaney to the light at Port Armstrong.

[August 5, 1939]

PRINCE WILLIAM SOUND AREA

Salmon fishery.—Regulation No. 10 is amended to read as follows: Commercial fishing for salmon is prohibited during the remainder of each calendar year after 6 o'clock postmeridian August 8: *Provided*, That this prohibition shall not apply (a) to 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, (b) to trolling in the period from 6 o'clock postmeridian August 8 to 6 o'clock postmeridian September 20 in the waters of Prince William Sound east of 147 degrees west longitude, exclusive of all waters of Valdez Arm north of Point Free-mantle, and (c) to the operation of set or anchored gill nets in the period from

² Pursuant to the Reorganization Act approved April 3, 1939, Reorganization Plan No. II dated May 9, 1939, and Public Resolution No. 20 approved June 7, 1939, the Bureau of Fisheries was transferred from the Department of Commerce to the Department of the Interior, effective July 1, 1939, and the duties with respect to the protection of the fisheries of Alaska devolved, accordingly, upon the Secretary of the Interior as of that date.

6 o'clock postmeridian August 8 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 12.

[August 22, 1939]

KODIAK AREA

Salmon fishery.—Regulation No. 12 is amended so as to permit commercial fishing for salmon by means of set or anchored gill nets from 6 o'clock antemeridian September 1 to 6 o'clock postmeridian September 30 in waters of Olga and Moser Bays which are not closed throughout the year to commercial salmon fishing.

SOUTHEASTERN ALASKA AREA

SUMNER STRAIT DISTRICT

Salmon fishery.—Regulation No. 7 is amended so as to permit commercial fishing for salmon by means of gill nets and beach seines in Wrangell Narrows, exclusive of all waters within one statute mile of the mouth of Petersburg Creek, from 6 o'clock antemeridian September 1 to 6 o'clock postmeridian September 15.

[August 22, 1939]

KODIAK AREA

Herring fishery.—Regulation No. 2 is amended so as to prohibit commercial fishing for herring, except for bait purposes, for the remainder of the calendar year after 6 o'clock postmeridian August 22: *Provided*, That this prohibition shall not apply to the use of gill nets.

[September 25, 1939]

PRINCE WILLIAM SOUND AREA

Herring fishery.—Regulation No. 1 is amended so as to prohibit commercial fishing for herring, except for bait purposes, for the remainder of the calendar year after September 25: *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 18 to December 15, both dates inclusive.

[October 5, 1939]

SOUTHEASTERN ALASKA AREA

Herring fishery.—All commercial fishing for herring, except for bait purposes, is prohibited in the waters of Barlow Cove south of a true line westward from the outer extremity of Barlow Point.

[October 10, 1939]

SOUTHEASTERN ALASKA AREA

SUMNER STRAIT DISTRICT

Salmon fishery.—Regulations Nos. 6, 7, and 8 are amended to permit commercial salmon fishing, except by traps, from 6 o'clock antemeridian October 1 to 6 o'clock postmeridian October 20.

CLARENCE STRAIT DISTRICT

Salmon fishery.—Regulations Nos. 6, 7, 8, and 10 are amended to permit commercial salmon fishing, except by traps, from 6 o'clock antemeridian October 1 to 6 o'clock postmeridian October 20.

SOUTH PRINCE OF WALES ISLAND DISTRICT

Salmon fishery.—Regulations Nos. 6 and 7 are amended to permit commercial salmon fishing, except by traps, from 6 o'clock antemeridian October 1 to 6 o'clock postmeridian October 20.

SOUTHERN DISTRICT

Salmon fishery.—Regulations Nos. 6 and 7 are amended to permit commercial salmon fishing, except by traps, from 6 o'clock antemeridian October 1 to 6 o'clock postmeridian October 20.

Revised regulations effective in 1940 for the protection of the commercial fisheries of Alaska were issued by the Secretary of the Interior under date of January 4, 1940, copies of which may be obtained, without cost, upon application to the Fish and Wildlife Service, Washington, D. C.

ANNETTE ISLAND FISHERY RESERVE

As in the previous year, the Annette Island Canning Co. operated the salmon cannery at Metlakatla under its lease from the Department of the Interior.

Eight salmon traps were operated by the company, the catch of which totaled 878,523 salmon of all species, and 11,845 salmon taken by seines and gill nets in the waters of the reservation were purchased from natives. In addition, 462,450 salmon were purchased from independent operators of seines, gill nets, and traps outside the reserve. All these fish were packed in the company's plant. In the operation of the cannery and fish traps employment was given to 51 whites and 319 natives.

The estimated profits to the Metlakatlan Indians of the reserve on the cannery operations for 1939 under the provisions of the lease amounted to \$58,500.

STREAM IMPROVEMENT

No extensive program was carried on in 1939 for the clearing of salmon streams to assure the accessibility of all spawning areas to brood fish. The only work of this kind, other than that performed by Bureau employees in connection with fishery patrol duties, was that conducted in the Cook Inlet area under an allotment of funds from the Territorial appropriation and contributions of the local salmon packers for clearing salmon streams. Two men were employed in that area for about a month, examining conditions of the spawning beds in tributaries of Knik Arm, and a third man was engaged for a short time in similar work on the Kenai River system. A number of beaver dams in these localities were opened to permit the passage of salmon to the spawning grounds.

The removal of log jams and other debris that prevented the ascent of salmon was reported for a few districts. Some work was done on the stream connecting the lower and upper lakes at Kafia Bay, which stream is shallow and unusually rapid. A definite channel was constructed and crude resting pools were made at frequent intervals to facilitate the progress of spawning fish.

CONTROL OF PREDATORY TROUT

In some parts of Alaska which are sparsely settled and infrequently visited by sport fishermen, Dolly Varden trout are exceedingly numerous and are regarded as unmistakable enemies of the commercially valuable fish, inasmuch as they feed voraciously on salmon eggs and fry. To curb their depredations, therefore, the Territorial Legislature for many years has appropriated funds, matched by contributions of local salmon packers, for the payment of bounty on Dolly Varden trout in certain red-salmon spawning streams, notably

in the important Bristol Bay watershed. Some payments of this kind have been made also in the Cook Inlet area and at Yakutat.

Under these allotments a bounty of 2½ cents each is paid for predatory trout taken by bona fide residents of Alaska in the above-mentioned districts. The work is administered by the Bureau of Fisheries in connection with its patrol of the fishing grounds. During the period from October 1 to March 31, 4 special wardens of the Bureau, in addition to the watchman at the Naknek Marine Ways, attended to receiving and counting trout tails in the Bristol Bay area.

In 1939 the bounty for Dolly Varden trout in the Bristol Bay area amounted to \$15,820.75, payments being made to 314 residents, of whom 96 were whites and 218 of one-fourth or more native blood. In the Yakutat district, 30,254 Dolly Varden trout were taken in 1939, for which the bounty was \$756.35; and in the Cook Inlet area 32,547 trout were taken, the bounty amounting to \$813.66.

Traps for catching Dolly Varden trout were placed in the four streams on Kodiak Island where salmon-counting weirs were operated. The catch of trout in these streams was as follows: 51,500 in Karluk River, 52,852 in Red River, and 22,769 in Olga Bay streams.

Studies of the Dolly Varden trout in the Kodiak area were continued.

STREAM MARKING

New markers defining areas closed to commercial fishing were erected to replace those which had become defaced, and changes were made in the positions of others to conform to changes made in the regulations with respect to closed areas.

STREAM GUARDS

The Bureau employed 105 men in 1939 as stream guards, weir operators, and special workmen in connection with law-enforcement duties. Of these, 49 were stationed in southeast Alaska, 33 in central, and 23 in western Alaska. Some of the workers were engaged for only a few days, but the average period of employment ranged from 2 to 5 months.

In southeast Alaska 22 stream watchmen provided their own launches and were assigned to patrol larger bodies of water or in the vicinity of several streams.

In central Alaska 6 guards were stationed in the Seward-Katalla district, 8 on Cook Inlet, 11 in the Kodiak-Afognak district, 3 at Chignik, and 5 in the Ikatan-Shumagin district. Two of the stream guards in the Seward-Katalla district provided their own launches.

In western Alaska 21 guards were on Bristol Bay and 2 on the Yukon River.

There were also 11 special employees engaged in scientific work—2 on herring and 9 on salmon investigations. In addition, there were 12 statutory employees and 50 men on the Bureau's vessels.

The foregoing makes a grand total of 178 persons identified with fishery protective work in Alaska in 1939, as compared with 209 in 1938.

VESSEL PATROL

Fourteen vessels of the Bureau were engaged in the patrol for the protection of the Alaska fisheries in 1939. Of these, the *Auklet*, *Kittiwake*, *Merganser*, *Murre*, and *Widgeon* were operated in southeast

Alaska, the *Blue Wing* was on Prince William Sound, the *Eider* in the Kodiak area, the *Ibis* at Chignik, the *Red Wing* in the Alaska Peninsula area, the *Scoter* on Bristol Bay, and the *Coot* on the Yukon River.

The *Teal* patrolled the Cook Inlet area until August 24 and then proceeded to Prince William Sound to assist in the survey of salmon spawning grounds there. From September 30 to November 20 the vessel was detailed for cooperative work with the Alaska Game Commission in that district, under the direction of Wildlife Agent Clarence Rhode.

In the spring the *Crane* made a trip to southeast Alaska for the Division of Scientific Inquiry, carrying a cargo of cement and towing a scow load of construction materials for the Little Port Walter project. After delivering these supplies, the vessel was used in herring investigations along the west coast of Baranof Island, and later for a brief time in the vicinity of Craig. The entire trip from Seattle covered the period from March 4 to April 14. The *Crane* sailed again on May 18 to patrol the Alaska Peninsula area and returned to Seattle in September. The Bristol Bay field crew and supplies were carried on the trip north, in accordance with the usual practice.

The *Brant*, flagship of the patrol fleet, with Assistant Agent Fred R. Lucas aboard, sailed from Seattle for Juneau on January 4 to render service to the Territorial Legislature during its biennial session. From February 12 to 25 it assisted in the search for a passenger plane of the Marine Airways that was lost with 6 passengers while flying between Ketchikan and Juneau. In March a number of C. C. C. workers were transported from Juneau to Little Port Walter. The *Brant* returned to Seattle on March 30 and sailed again for Alaska on June 17. During the fishing season the vessel was used for the most part in supervisory work. From the middle of July to mid-August a trip was made from Juneau westward as far as Unalaska, with stops at intermediate points, primarily in connection with fishery investigations conducted by Dr. Carl L. Hubbs. Later the vessel participated in the survey of spawning streams and patrol of the fishing grounds in southeast Alaska, as well as furnishing transportation to Bureau and other officials as required.

Five speedboats were in operation: No. 1 on Bristol Bay, No. 4 in Prince William Sound, No. 3 on Olga Bay in the Kodiak area, and Nos. 5 and 6 in the Ketchikan and Juneau districts, respectively. Speedboat No. 6 was detailed to the Wrangell district during part of the season. Ten other small powerboats were in use also, of which 4 were on Bristol Bay, 2 at Chignik, and 1 each on Cook Inlet, on Prince William Sound, in the Yakutat district, and on the west coast of Prince of Wales Island.

In addition to the foregoing, the *Wingham* was again chartered to assist in the patrol of Copper River flats and Prince William Sound.

Besides its fishery patrol work, the *Scoter* participated in the fur-seal patrol at Neah Bay, Wash., in April, during the northward migration of the fur-seal herd.

The *Red Wing*, whose launching after the usual spring overhaul was delayed until June 18 because the ways upon which it rested had been damaged by earthquake, rendered short and unsatisfactory service during the season. Examination by local inspectors of the Bureau of Marine Inspection and Navigation showed that the vessel was in such poor condition that expenditure for additional repairs was

unwarranted, and upon recommendation of that Bureau in August it was condemned and dismantled.

On May 21 the *Crane* struck a rock in Grenville Channel, which damaged the keel so that it was necessary to have the vessel hauled out for a few days on the marine ways at Ketchikan for repairs.

AERIAL PATROL

The use of airplanes to supplement the vessel patrol of traps and fishing grounds for the protection of the Alaska fisheries, although limited by available resources and at times by unfavorable weather conditions, is of distinct advantage in the conservation work and should be greatly expanded. The speed with which distances may be covered along the indented coast line makes this type of patrol highly effective in deterring as well as in apprehending violators.

Chartered airplane service for the patrol of the fisheries in 1939 was furnished by 6 companies on 31 days. The total flying time was 64½ hours, during which the planes traveled 6,859 miles. This patrol included 2 trips made from Cordova in which evidence for convictions in 6 violations was obtained. One trip was made in the Cook Inlet area covering the east side of the Inlet from Anchorage to Kenai and the west side on the return to Anchorage. In southeast Alaska, from 6 to 11 hours flying time was used in each of the Juneau, Ketchikan, Wrangell, and west coast of Prince of Wales Island districts.

In addition, chartered airplane service was used for survey and photographic work in connection with scientific investigations of the salmon in the Bristol Bay region from May to October. Transportation was provided on 67 days during this period, the total flying time was 206 hours, and the distance covered was 20,645 miles. Considerable patrolling was done by aircraft in the Bristol Bay area, thus compensating, in part at least, for the lack of adequate patrol boats.

COMPLAINTS AND PROSECUTIONS

In 1939, 57 cases of violation of the Alaska fishery laws and regulations were referred to representatives of the Department of Justice for prosecution. Six traps, 22 seine boats, 24 gill nets, and 5 trolling boats were involved in these violations.

Two cases were tried in the District courts, one at Juneau by jury, and one at Ketchikan by the court. In each of these cases the defendants were found guilty and were given substantial fines. All the other cases were tried in the U. S. Commissioner's court. Of these, the defendants in 42 cases pleaded guilty to the charges preferred against them and were fined. In addition, the salmon in their possession at the time they were apprehended were seized and sold for the account of the Government. In 6 cases the defendants were given suspended sentences, and in 2 cases they demanded trial by jury and were found not guilty. Five cases were dismissed.

In addition to the above, 4 gill nets and 1 purse seine that were being used in violation of the fishery laws and regulations were seized, the owners of which were not apprehended. The fish in the nets were released or sold and the gear was confiscated.

The following schedule lists the violations, by districts, and includes the penalties imposed.

Details of complaints and prosecutions involving violations of Alaska fishery laws and regulations in 1939

KETCHIKAN DISTRICT

Class of gear	Name of offender	Nature of offense	Disposition of case
Seine boat <i>Bogdan</i>	Mike Ukropina.....	Fishing during weekly closed period in Behm Narrows, Behm Canal.	Fined \$50. Fish seized, value \$35.67.
Seine boat <i>Mermaid</i> ...	James Leask, James Leask, Jr., Harry Leask, William Peratovich, and James Tatsuda.	Fishing within 500 yards of mouth of a salmon stream in Leask Cove, George Inlet.	Case dismissed.
Fish trap 39-442.....	Owner: Estate of H. Pinkerton, represented by W. S. Balcom. Watchmen: Harry Bolt and Ben Arnold.	Fishing during weekly closed period.	Owner fined \$200. Watchmen fined \$50 each.
Seine boat <i>Tyee</i>	Angelo Bussanich, Nels Henderson, and B. Gomez.	Fishing during weekly closed period in Boca de Quadra.	Each man fined \$50. Costs assessed \$87.55. Fish seized, value \$204.73.
Seine boat <i>Claire</i>	Solomon Guthrie, Ralph Bolton, Sr., and Mathias Simpson.	Fishing in closed waters of Very Inlet.	Fined \$50.
Seine boat <i>Islander</i>	T. J. Brown and H. F. Godfrey.	.....do.....	Fined \$50. Fish seized, value \$130.60.
Seine boat <i>Sea Rose</i> ...	Richard Bratland, Charles Moore, Charles Granger, Al Cummings, and Arthur Orr.	Fishing in closed waters of Behm Canal at Roc Point.	Fined \$125. Fish seized, value \$345.51.
Trolling boat <i>Hercules</i> .	John Heikkila and George Wheeler.	Fishing during weekly closed period off Point Nelson.	30-day suspended sentence.
Trolling boat <i>Si-A-276</i> .	Pete Knutsen.....	Fishing during weekly closed period in Behm Canal.	Do.
Seine boat <i>Ann Page</i> ..	George Kegan, John Dexter, Arthur Hobbs, Frank Howard, Benson Johns, and Jim Barton.	Fishing during seasonal closed period in Kegan Cove, Moira Sound.	Each man fined \$50.
Seine boat <i>Justna Deanna</i> .	George S. James, Robert Snook, John Anniskit, and Sheldon James.	Fishing in closed waters of Karta Bay.	Each man fined \$100.

SOUTH PRINCE OF WALES ISLAND DISTRICT

Fish trap 39-392.....	Scow Bay Packing Co.	Fishing during seasonal closed period.	Owner fined \$100.
Trolling boat <i>Thelma</i> .	N. E. Nelson.....	Fishing during weekly closed period near McLeod Bay, Dall Island.	Case dismissed.
Trolling boat <i>Jeanetta</i> .	Y. Allain.....	.....do.....	Do.
Trolling boat <i>Lorena</i> .	Paul Nelson and William Jones.	.....do.....	Nelson fined \$50. Jones fined \$25.
Seine boat <i>Sea Hag</i> ...	Ray Hammer, Warren Todd and, Harry J. McCallister.	Fishing with short gill nets in salmon stream near Klakas Lake.	Case dismissed; insufficient evidence. Illegal gear destroyed.
Seine boat <i>Bertha</i>	Frederick George, Robert Cogo, Rob-fuson Beatty, and Seymour J. Samuelson.	Fishing in closed waters of Keete Inlet.	Defendants found not guilty by jury in U. S. Commissioner's court.
Seine boat <i>Alert</i>	Paul Cogo, Harry Natkong, and Thad-deus Morrison.	.....do.....	Do.

WRANGELL-PETERSBURG DISTRICT

Seine boat <i>Christine II</i> .	Otto Feller.....	Carrying extra seine aboard fishing vessel at Thoms Place.	Fined \$50. Fish seized, value \$1.18.
Seine boat <i>Wesley</i>	S. N. Harvio.....	Fishing in closed waters of Bradfield Canal.	Fined \$50. Costs assessed \$9.60.
Gill net.....	Owner not apprehended.	Anchored gill net less than 50 fathoms in length fishing in closed waters of Red Bay.	Gear confiscated. Fish released.

Details of complaints and prosecutions involving violations of Alaska fishery laws and regulations in 1939—Continued

WRANGELL-PETERSBURG DISTRICT—Continued

Class of gear	Name of offender	Nature of offense	Disposition of case
Gill net.....	Owner not apprehended.	Barricading mouth of Big Creek, Red Bay.	Gear confiscated. Fish seized, value \$13.75.
Purse seine.....	do.....	Found in closed waters at head of Log Cabin Lake.	Gear confiscated. Fish released.
Gill nets.....	do.....	Found in Andrews Creek, a tributary of Stikine River.	Gear confiscated and destroyed.
Fish trap 39-417.....	Owner: Alaska Pacific Salmon Co. Watchmen: George Lindberg and Walter Day.	Fishing during seasonal closed period.	Company fined \$1,000.
Fish trap 39-247.....	Owner: Alaska Pacific Salmon Co. Watchmen: A. U. b. r. e. y. Schmidt and Olaf Gordon.	do.....	Do.
Gill net boat <i>Erna</i>	Thomas Rustad.....	Carrying three nets aboard fishing vessel, Red Bay.	Fined \$50.
Seine boat <i>Loccolite</i> ...	Joe Pettieraw, Everett Pettieraw and Alan McKay.	Fishing in closed waters of Salmon Bay.	Trial in district court at Ketchikan, without jury. Fined \$219.43. Costs assessed \$135.80. Fish seized, value \$430.57. Sixty-day jail sentence against each of the Pettieraws, suspended.
Fish trap 39-393.....	Scow Bay Packing Co.	Fishing during seasonal closed period.	Fined \$100.
Set gill net.....	Martin Nore.....	Fishing within 500 yards of the mouth of Stikine River with illegal type of gear.	Fined \$25 on each of two counts.

JUNEAU DISTRICT

Fish trap 39-402.....	Owner: Alaska Pacific Salmon Co. Watchmen: A. J. Bebean and Antone Thomsen.	Fishing during weekly closed period.	Jury trial in district court. Company fined \$750. A. J. Bebean fined \$150. A. Thomsen found not guilty.
Seine boat <i>Skipjack</i> ...	Amel Teague, R. W. Brundage, Alex Hurman, and Albert Sharp.	Fishing in closed waters of Saginaw Bay.	Teague fined \$50; each of others fined \$25. Fish released. Ninety-day jail sentence against each man suspended.
Seine boat <i>31-B-186</i> ...	Fred Miller.....	Fishing for fox feed during seasonal closed period in Pybus Bay.	Fined \$40. Costs assessed \$5.
Seine boat <i>Agnes</i>	Frank Wooten.....	do.....	Fined \$40. Costs assessed \$9.50.
Seine boat <i>Starlite</i>	David Howard, Joe Johnson, Charles Jacob, and Ernest John.	Fishing at mouth of stream in Nakwasina Passage.	Captain Howard fined \$50 and 3 crew members each \$25; fines suspended.

SEWARD-KATALLA DISTRICT

Clam digging.....	Henry Mattson.....	Taking clams less than 4½ inches in length for commercial purpose.	Fined \$25.
Gill net boat <i>31-B-636</i> ...	Joe Anderson.....	Fishing in closed waters at Cottonwood Point.	Fined \$50. Fish seized, value \$10.50.
Gill net boat <i>31-C-326</i> ...	Sigurd Ness.....	do.....	Fined \$50. Fish seized, value \$8.70.
Gill net boat <i>31-C-65</i> ...	Harris Makis.....	Fishing in closed waters near Russian River.	Fined \$25. Fish seized, value \$6.60.
Gill net boat <i>31-D-863</i> ...	Bill Skuffis and Mike Michel.	Fishing in closed waters between Cottonwood Point and Kokenhenik Island.	Each man fined \$15.
Gill net boat <i>31-A-742</i> ...	Einer Nelson.....	do.....	Fined \$25.
Gill net boat <i>31-B-819</i> ...	Jack Brady.....	do.....	Do.
Gill net boat <i>Emma</i>	Walter Hansen and A. L. Clift.	Fishing with anchored nets during weekly closed period in Bering River area.	Each man fined \$25. Fish seized, value \$39.80.

Details of complaints and prosecutions involving violations of Alaska fishery laws and regulations in 1939

KETCHIKAN DISTRICT

Class of gear	Name of offender	Nature of offense	Disposition of case
Seine boat <i>Bogdan</i>	Mike Ukropina.....	Fishing during weekly closed period in Behm Narrows, Behm Canal.	Fined \$50. Fish seized, value \$35.67.
Seine boat <i>Mermaid</i> ...	James Leask, James Leask, Jr., Harry Leask, William Peratovich, and James Tatsuda.	Fishing within 500 yards of mouth of a salmon stream in Leask Cove, George Inlet.	Case dismissed.
Fish trap 39-442.....	Owner: Estate of H. Pinkerton, represented by W. S. Balcom. Watchmen: Harry Bolt and Ben Arnold.	Fishing during weekly closed period.	Owner fined \$200. Watchmen fined \$50 each.
Seine boat <i>Tyee</i>	Angelo Bussanich, Nels Henderson, and B. Gomez.	Fishing during weekly closed period in Boca de Quadra.	Each man fined \$50. Costs assessed \$87.55. Fish seized, value \$204.73.
Seine boat <i>Claire</i>	Solomon Guthrie, Ralph Bolton, Sr., and Mathias Simpson.	Fishing in closed waters of Very Inlet.	Fined \$50.
Seine boat <i>Islander</i>	T. J. Brown and H. F. Godfrey.	.....do.....	Fined \$50. Fish seized, value \$130.60.
Seine boat <i>Sea Rose</i> ...	Richard Bratland, Charles Moore, Charles Granger, Al Cummings, and Arthur Orr.	Fishing in closed waters of Behm Canal at Roe Point.	Fined \$125. Fish seized, value \$345.51.
Trolling boat <i>Hercules</i> .	John Heikkila and George Wheeler.	Fishing during weekly closed period off Point Nelson.	30-day suspended sentence.
Trolling boat <i>51-A-275</i> .	Pete Knutsen.....	Fishing during weekly closed period in Behm Canal.	Do.
Seine boat <i>Ann Page</i> ...	George Kegan, John Dexter, Arthur Hobbs, Frank Howard, Benson Johns, and Jim Barton.	Fishing during seasonal closed period in Kegan Cove, Moira Sound.	Each man fined \$50.
Seine boat <i>Justna Deanna</i> .	George S. James, Robert Snook, John Anniskit, and Sheldon James.	Fishing in closed waters of Karta Bay.	Each man fined \$100.

SOUTH PRINCE OF WALES ISLAND DISTRICT

Fish trap 39-392.....	Scow Bay Packing Co.	Fishing during seasonal closed period.	Owner fined \$100.
Trolling boat <i>Thelma</i> ..	N. E. Nelson.....	Fishing during weekly closed period near McLeod Bay, Dall Island.	Case dismissed.
Trolling boat <i>Jeanetta</i> .	Y. Allain.....	.....do.....	Do.
Trolling boat <i>Lorena</i> ..	Paul Nelson and William Jones.	.....do.....	Nelson fined \$50. Jones fined \$25.
Seine boat <i>Sea Hag</i> ...	Ray Hammer, Warren Todd and, Harry J. McCullister.	Fishing with short gill nets in salmon stream near Klakas Lake.	Case dismissed; insufficient evidence. Illegal gear destroyed.
Seine boat <i>Bertha</i>	Frederick George, Robert Cogo, Robinson Beatty, and Seymour J. Samuelson.	Fishing in closed waters of Koete Inlet.	Defendants found not guilty by jury in U. S. Commissioner's court.
Seine boat <i>Alert</i>	Paul Cogo, Harry Natkong, and Thaddeus Morrison.	.....do.....	Do.

WRANGELL-PETERSBURG DISTRICT

Seine boat <i>Christine II</i> .	Otto Feller.....	Carrying extra seine aboard fishing vessel at Thoms Place.	Fined \$50. Fish seized, value \$1.18.
Seine boat <i>Wesley</i>	S. N. Harvie.....	Fishing in closed waters of Bradfield Canal.	Fined \$50. Costs assessed \$9.50.
Gill net.....	Owner not apprehended.	Anchored gill net less than 50 fathoms in length fishing in closed waters of Red Bay.	Gear confiscated. Fish released.

Details of complaints and prosecutions involving violations of Alaska fishery laws and regulations in 1939—Continued

WRANGELL-PETERSBURG DISTRICT—Continued

Class of gear	Name of offender	Nature of offense	Disposition of case
Gill net.....	Owner not apprehended.	Barricading mouth of Big Creek, Red Bay.	Gear confiscated. Fish seized, value \$13.75.
Purse seine.....	do.....	Found in closed waters at head of Log Cabin Lake.	Gear confiscated. Fish released.
Gill nets.....	do.....	Found in Andrews Creek, a tributary of Stikine River.	Gear confiscated and destroyed.
Fish trap 39-417.....	Owner: Alaska Pacific Salmon Co. Watchmen: George Lindberg and Walter Day.	Fishing during seasonal closed period.	Company fined \$1,000.
Fish trap 39-247.....	Owner: Alaska Pacific Salmon Co. Watchmen: A u b r e y Schmidt and Olaf Gordon.	do.....	Do.
Gill net boat <i>Erna</i>	Thomas Rustad.....	Carrying three nets aboard fishing vessel, Red Bay.	Fined \$50.
Seine boat <i>Loccolite</i> ...	Joe Pettieraw, Everett Pettieraw and Alan McKay.	Fishing in closed waters of Salmon Bay.	Trial in district court at Ketchikan, without jury. Fined \$219.43. Costs assessed \$135.80. Fish seized, value \$430.57. Sixty-day jail sentence against each of the Pettieraws, suspended.
Fish trap 39-393.....	Seow Bay Packing Co.	Fishing during seasonal closed period.	Fined \$100.
Set gill net.....	Martin Nore.....	Fishing within 500 yards of the mouth of Stikine River with illegal type of gear.	Fined \$25 on each of two counts.

JUNEAU DISTRICT

Fish trap 39-402.....	Owner: Alaska Pacific Salmon Co. Watchmen: A. J. Bebean and Antone Thomson.	Fishing during weekly closed period.	Jury trial in district court. Company fined \$750. A. J. Bebean fined \$150. A. Thomson found not guilty.
Seine boat <i>Skipjack</i>	Anel Teague, R. W. Brundage, Alex Hurman, and Albert Sharp.	Fishing in closed waters of Saginaw Bay.	Teague fined \$50; each of others fined \$25. Fish released. Ninety-day jail sentence against each man suspended.
Seine boat <i>51-B-185</i>	Fred Miller.....	Fishing for fox feed during seasonal closed period in Pybus Bay.	Fined \$40. Costs assessed \$5.
Seine boat <i>Agnes</i>	Frank Wooten.....	do.....	Fined \$40. Costs assessed \$9.50.
Seine boat <i>Starlite</i>	David Howard, Joe Johnson, Charles Jacob, and Ernest John.	Fishing at mouth of stream in Nakwasina Passage.	Captain Howard fined \$50 and 3 crew members each \$25; fines suspended.

SEWARD-KATALLA DISTRICT

Clam digging.....	Henry Mattson.....	Taking clams less than 4½ inches in length for commercial purpose.	Fined \$25.
Gill net boat <i>51-B-530</i>	Joe Anderson.....	Fishing in closed waters at Cottonwood Point.	Fined \$50. Fish seized, value \$10.50.
Gill net boat <i>51-C-320</i>	Sigurd Ness.....	do.....	Fined \$50. Fish seized, value \$8.70.
Gill net boat <i>51-C-65</i>	Harris Makis.....	Fishing in closed waters near Russian River.	Fined \$25. Fish seized, value \$6.00.
Gill net boat <i>51-D-369</i>	Bill Skuffls and Mike Mitchel.	Fishing in closed waters between Cottonwood Point and Kokenhenik Island.	Each man fined \$15.
Gill net boat <i>51-A-742</i>	Einer Nelson.....	do.....	Fined \$25.
Gill net boat <i>51-B-819</i>	Jack Brady.....	do.....	Do.
Gill net boat <i>Emma</i>	Walter Hansen and A. L. Clift.	Fishing with anchored nets during weekly closed period in Bering River area.	Each man fined \$25. Fish seized, value \$39.80.

Details of complaints and prosecutions involving violations of Alaska fishery laws and regulations in 1939—Continued

SEWARD-KATALLA DISTRICT—Continued

Class of gear	Name of offender	Nature of offense	Disposition of case
Gill net boat <i>91-A-181</i>	J. R. Webber.....	Fishing with set nets during weekly closed period in closed waters of Bering River.	Fined \$50. Fish seized, value \$112.20.
Gill net boat <i>Eunice H.</i>	Clarence Hahn.....	Fishing during weekly closed period in closed waters, Bering River.	Fined \$100. Fish seized, value \$71.10.
Gill net boat <i>Ya Sute.</i>	Dick Fitzgibbons.....	Fishing in closed waters of Bering River Slough with set nets.	Fined \$100.
Gill net boat <i>91-B-791</i>	Jim Mahturis.....	Fishing with set nets in closed waters of Russian Slough.	Fined \$50. Fish seized, value \$9.30. Gear confiscated.
Gill net boat <i>91-C-24</i>	A. Robbins.....	Fishing with set nets in closed waters of Dago Slough.	Fined \$50. Fish seized, value \$9.30.
Gill nets.....	Owner not apprehended.	Fishing with anchored nets near Grassbanks, Copper River delta.	Fish seized, value \$53.10. Gear confiscated and destroyed.
Seine boat <i>Three Brothers.</i>	D. Patsos, Nick Poulas, and Nick Makarka.	Fishing in closed waters, Crab Bay.	Captain Patsos fined \$50 and 2 crew members each \$25.
Seine boat <i>91-B-678</i>	Jim Lafkiotis, Peter George and John Halostes.	Fishing in closed waters of Sheep Bay.....	Captain Lafkiotis fined \$50 and 2 crew members each \$25.
Seine boat <i>Wanda</i>	Owner: A. S. Day. Operators: John Bang, Clifford Stoner and Angus McDonald.	Fishing during seasonal closed period in Valdez Arm.	Owner fined \$375. Fish seized, value \$127.80.

COOK INLET DISTRICT

Gill net boat <i>Emard 70</i>	Elmer Hedberg.....	Fishing with set gill nets exceeding 35 fathoms in length and less than 600 feet apart between Susitna and Ivan Rivers.	Fined \$50.
Gill net boat <i>Emard 76</i>	Chris Dinnsen.....	Fishing with set gill nets exceeding 35 fathoms in length between Susitna and Ivan Rivers.	Fined \$50. Two king salmon seized and sold.
Gill net boat <i>G. F. C. 24.</i>	George Johnson.....	Fishing with set gill nets exceeding 35 fathoms in length and less than 600 feet apart near Ivan River.	Fined \$100. One king and 18 red salmon, seized and sold.
Gill net boat <i>Emard 72.</i>	Andrew Ness.....	Fishing in Ivan River with set net exceeding 35 fathoms in length.	Fined \$50. Twelve king salmon seized and sold.

ALASKA PENINSULA DISTRICT

Seine boat.....	John Verskin.....	Beach seine fishing in closed waters of Thin Point Lagoon.	Fine \$500, suspended. Fish seized, value \$80.
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BRISTOL BAY DISTRICT

Gill net boat <i>A. P. A. 198.</i>	John Trumure and Steve Bacich.	Fishing during weekly closed period, Naknek.	Case dismissed.
Gill net boat <i>A. P. A. 25-A.</i>	John A. Knudsen and Nick Yakullik.	Fishing during weekly closed period in Kvichak Bay.	Fines \$25 each, suspended.
Gill net boat <i>A. P. A. A-72.</i>	Eurea Andrew and Mike Wassili.	Fishing during weekly closed period in Kvichak Bay with gear not properly marked.	Do.
Gill net boat <i>A. S. Co. 6.</i>	Ole Hagen and P. I. Anderson.	Fishing within 100 yards of a stake net near Ekuk Bluff, Nushagak Bay.	Fined \$25 each.
Gill net boat <i>C. R. P. A. A-39.</i>	C. Wamser and Wayne J. Niemi.	Setting net within 100 yards of another net near Naknek Point.	C. Wamser fined \$25. Wayne J. Niemi acquitted.

TERRITORIAL LEGISLATION

At its biennial session in 1939 the Alaska Legislature passed an act increasing the bounty on hair seals, which are destructive to salmon and other fishes in certain localities. The amount of the bounty is now \$3 instead of \$2 as formerly. No change was made with regard to the regions in which such bounty is applicable.

The sum of \$60,000 was appropriated for bounties on hair seals, including unpaid bounties earned during the previous biennium, and \$25,000 was appropriated for the clearing of salmon streams as provided by law. An appropriation of \$10,000 was made to defray expenses of a Joint Committee on Fisheries, to be chosen from the Territorial Legislature to assist a Congressional committee in an investigation of the Alaska fisheries.

The law of 1933 relative to the licensing of fishermen was amended to clarify the definition of the term "resident fisherman."

An act was passed to protect women workers in Alaska, prohibiting the employment of a female person under the age of 16 in any mercantile or industrial business, establishing minimum wage rates for those over the age of 18 and maximum hours for women in domestic employment, making it a misdemeanor to discriminate against an employee for testifying in any investigation relative to the enforcement of the act, and limiting the penalty for violation of any provision of the act.

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 Oscar G. Olson, Territorial Treasurer, under date of May 14, 1940, gives the collections made to the close of April for the year 1939, representing the taxes on operations of the previous year. It was stated that collections under the several schedules were fairly complete, although several of the fishery companies had not yet made full settlement.

Fishery license taxes collected by Territory for fiscal year ended Dec. 31, 1939

Schedule	Division No. 1	Division No. 2	Division No. 3	Total
Salmon canneries (pack)	\$83,289.04	\$15.20	\$346,562.96	\$429,847.20
Clam canneries (pack)			88.02	88.02
Salteries	1,477.50	60.74	1,112.81	2,651.05
Cold-storage plants	1,175.00		10.00	1,185.00
Fish-oil works and fertilizer and fish-meal plants	9,706.00		14,689.26	24,375.26
Fish traps	55,000.00		29,500.00	84,500.00
Trap catches in excess of 100,000 fish	3,585.15		12,224.27	15,809.42
Gill nets	607.20	10.00	4,632.00	5,149.20
Seines	3,960.00		2,111.00	6,071.00
Clam diggers:				
Resident	2.00		243.00	245.00
Nonresident			30.00	30.00
Fishermen:				
Resident	2,514.00		2,542.00	5,056.00
Nonresident	19,025.00		60,400.00	79,425.00
Total	180,210.80	85.94	474,125.32	654,422.15
Salmon canneries (net income) not possible of segregation as to judicial division				8,712.83
Total collections				663,134.98

KUSKOKWIM RIVER

No patrol was maintained by the Bureau on the Kuskokwim River in 1939, and the only information available concerning the fisheries there is that obtained through correspondence by the Inspector in charge of the Yukon district. It was stated that the catch of king salmon was about the same as that for 1938 but there was a shortage of other species all along the river, and the catch thereof was only about a third of that for the preceding year. Only one operator, Robert Gierke, engaged in commercial fishing for the outside market; his production amounted to 2,000 pounds of pickled king salmon.

It was estimated that fishing operations for local food requirements were carried on by the same number of persons as in the preceding year, namely, 380 natives, and that they used 500 gill nets of 13,000 fathoms, 47 wheels, and several small boats. Their total production was estimated at 75 tons of dried chum salmon, 6 tons of dried reds, and 21 tons of dried kings.

YUKON RIVER

As in the previous year, three outfits on the Yukon River prepared mild-cured salmon for the outside market, as follows: the Northern Commercial Co., which operated on a scow in Acheron Channel; St. Mary's Mission, at the head of Sunshine Bay in Acropok Slough; and Chris Lauridsen, at Kwiguk Slough. Their total output of mild-cured salmon was 166 tierces³ of kings. Only natives are employed in this district and the industry, although on a very small scale, means a great deal to them, as it gives them an opportunity to earn a little money with which to buy necessities which they would not otherwise have.

A patrol of the Yukon River was again maintained by Inspector Calvin F. Townsend, aboard the *Coot*. The vessel left Nenana on May 25 for the mouth of the Yukon and returned there on September 26. In all, it traversed 4,328 miles during the season.

On the trip downstream, from May 25 to June 8, the *Coot* afforded transportation to Acting Director Charles G. Burdick, of the C. C. C. in Alaska, who was making a survey of the people residing along the Yukon in order to plan the conservation work in that locality. From August 30 to September 6 Vera B. Harmon, Supervisor of Social Welfare of the Office of Indian Affairs, was a passenger, visiting the camps at which stops were made between Marshall and Anvik.

King salmon were late in entering the Yukon, as the ice was still solid at the mouth of the river on June 7 and did not go out until June 10. The first catch was made on June 16, or about 10 days later than in former years. The largest catch for the season was made on June 22, after which there was a gradual decline. Commercial fishing for export was discontinued on July 15. The kings this year were unusually large, averaging 55 to the tierce. During the early part of the run, a boat from Nome came into the Yukon and purchased 200 fresh kings for transfer to that place. A price of 50 cents each was paid for these fish.

Chum salmon began to enter the river at the same time as the kings, and the run reached its peak on July 9, declining gradually thereafter

³ For the purposes of this Report the tierce has been computed on a basis of 800 pounds net.

so that by July 29 no chums were being caught. Although the fish were of large size, they were lacking in oil, and when dried they shriveled to less than 1 pound each.

The silver salmon began to run on August 10, but, except for a few days, they did not appear in large numbers while fishing was being carried on. This species often comes late in September, after most of the natives have quit fishing. The silvers this year were about the usual size and very fat.

In general, the catch along the Yukon during the season was light, except at a few places. The catch all along the Tanana was said to be even lighter than in the preceding year, when a marked shortage had been reported.

Products of the Yukon and Tanana fisheries, including those shipped to the outside market, were as follows: 152 cases of king salmon canned; 166 tierces of mild-cured and 3,200 pounds of dry-salted kings; and 126 tons of dried chums. Apparatus consisted of 204 wheels, 67 gill nets of 1,244 fathoms, 3 motor vessels of 43 tons, 1 launch, 3 power dories, 9 gill-net boats, and 30 rowboats.

WEIRS FOR COUNTING SALMON ESCAPEMENT

Twelve weirs for counting the escapement of salmon en route to the spawning grounds were operated during the 1939 season in representative salmon streams of southeast and central Alaska for the purpose of determining the ratio of escape to commercial catch, with a view to reserving 50 percent of the runs for spawning, as required by law.

The Chignik weir was successfully operated again, after having been discontinued in the previous year when unusually high water prevented its installation at the beginning of the season. A weir structure was used for the first time in the Kalgin Island Creek, where counts of brood fish had previously been made without the aid of any structure, this being a relatively small stream. The Klawak weir, which had been in operation from 1930 to 1938, except in the 1933 season, was not installed this year.

ALITAK BAY

In the two major red-salmon streams of Olga Bay, tributary to Alitak Bay, weirs were again installed through which the brood fish were counted as they passed upstream. At the cannery station creek counting began on May 19 and continued through September 19, during which time the escapement was 59,486 red salmon, 20,002 pinks, 12,439 cohos, and 7 kings. At the upper station weir counting was carried on from June 7 to September 19, inclusive, and the escapement totaled 336,479 reds and 4,186 pinks. In addition, it was estimated that 3,000 red salmon ascended the stream at the upper station before the weir was in operation and 20,000 ascended after the structure was removed.

Traps operated at both weirs for taking Dolly Varden trout captured 22,769 of these predatory fish. Of this number, 8,893 were taken at the upper station and 13,876 at the cannery station.

Weir operations at the upper station were carried on by George Thompson until about the middle of August and then by Woodrow Buckley; while at the cannery station Lloyd T. Burns again was in

charge. Warden J. Steele Culbertson supervised their work until his transfer to Juneau the middle of July, after which Special Agent Ralph A. Ferrandini directed operations in the area.

CHIGNIK RIVER

Construction of the Chignik weir was begun on May 4 at a site about 75 feet above that used in 1937. The structure was completed on May 25 but the salmon did not begin to pass upstream until May 31, on which date 82 reds were tallied. A heavy run began on June 13 and the bulk of the season's escapement occurred during the next 3 or 4 weeks, reaching its peak on June 27, when 96,020 red salmon were counted. When counting was discontinued at the close of September 5, the total escapement numbered 1,615,207 red salmon, 2,235 kings, and 13,770 cohos. The commercial catch of red salmon from the Chignik run was 1,411,979.

The seaward migration of fingerlings during the season appeared to be very light. The first migrants were seen going down the river on May 6, but no appreciable numbers were observed until June 10. The best migration occurred from June 15 to July 8, after which it gradually diminished and ended on August 10. A local resident at Chignik Lake stated that after the earthquake of December 10, 1938, which was quite severe in that locality, he observed great numbers of dead fingerlings floating on the lake. This may be the reason for the light migration.

Warden Charles Petry was in charge of the weir operations at Chignik.

CHINIK CREEK

The weir in Chinik Creek, a tributary of Kamishak Bay, Cook Inlet, was operated in 1939 by Gilbert M. Chambers under the direction of Capt. R. L. Cole. From July 3 to 28 there were counted 4,076 red salmon. It was estimated that 500 fish were in the creek below the weir at the time the structure was removed.

ENGLISH BAY

The weir in the red-salmon stream at the head of English Bay was completed and ready for operation on May 27. Counting began on May 28 and was continued through August 16, when the total escapement numbered 48,777 red salmon and 958 pinks. This is the largest count that has been made at this weir since its operation began in 1927 and is more than twice the previous record escapement of 24,025 in 1928. This increased escapement may be attributed, in part at least, to the fact that the fish trap which was previously operated to the south of the stream near Flat Island was not installed this year. Percy G. Maltbie was again in charge of operations, under the direction of Capt. R. L. Cole.

FISH CREEK

Fish Creek, flowing into Knik Arm, is the most important of the red-salmon streams of Cook Inlet in which the Bureau maintains a weir for the counting of brood salmon. The first red salmon passed

through the Fish Creek weir on July 11. About a week later the run began in substantial numbers, and the bulk of the escapement came in the next 3 weeks. Counting was continued through August 12, at which time the total escapement consisted of 116,783 reds, 2,764 cohos, and 332 pinks. The peak of the red-salmon run was on July 22, when 14,961 fish were counted through the weir. George T. Press carried on the work at this place, under the supervision of Capt. R. L. Cole.

KALGIN ISLAND CREEK

A weir was installed in Kalgin Island Creek for the first time, and from June 24 to August 11, inclusive, there were counted 27,424 red salmon and 8 pinks. It was estimated that an additional 2,500 red salmon passed upstream before the weir was put in. The escapement was the largest ever recorded at this stream. Although no weir had been operated previously, a fairly accurate count of the brood fish had been made nearly every year from 1927 to 1938 by the stream guard stationed there, without the use of a rack, as the stream is very narrow and shallow. Hans Peter Jensen operated the weir in 1939, under the direction of Capt. R. L. Cole.

KARLUK RIVER

The Karluk weir was completed on May 19, although considerable difficulty was experienced with its installation because of high water. A large body of red salmon came into the lagoon below the weir the week following its completion, but only a small number passed upstream prior to June 4. The first run, which was far below average, was over shortly after the middle of July. The second run developed fairly well during the first 2 weeks in August but in the next 2 weeks showed a decided decline. Beginning on August 29 the run again picked up and the bulk of the escapement from the second run came in from that date until September 12. The weir records show an escapement of 666,004 red salmon, 6,232 kings, 31,944 pinks, and 12,308 cohos. In addition it was estimated that about 40,000 reds passed upstream after counting was discontinued and the weir was removed at the close of September 22. The commercial catch of red salmon from the Karluk run was 493,948.

As the commercial catch of red salmon exceeded the escapement by 38,000 on July 22, the Karluk area was closed to commercial fishing at that time and was not reopened until 6 o'clock antemeridian August 5.

Two traps for the capture of predatory Dolly Varden trout were again operated at the Karluk weir. During the early part of the season they were set to catch the downstream migrants, and later, when the Dolly Vardens started coming back into the stream from the sea, they were set to catch the upstream migrants. In all, 51,500 Dolly Varden trout were captured and destroyed. A small number of steelhead trout entered the traps along with the Dolly Vardens, but they were liberated without injury.

James O'Brien, who was again weir foreman, sustained a serious injury by a fall from the weir on August 21, and Tom Frost was in charge of operations thereafter. The work was under the supervision of the warden.

LITTLE PORT WALTER

In view of the extensive research program contemplated at Little Port Walter by the Division of Scientific Inquiry, a new type of weir was designed and constructed there to be used in connection with the Division's investigations. Unlike the usual tripod type of weir, which is installed in the spring and dismantled at the close of the season, this new weir has a permanent base of reinforced concrete. Upon the concrete foundation panels of wooden pickets, much the same as those used on the usual type of weir, are erected for the period of weir operation. In addition to counting the escapement of brood fish, it is the purpose to count the migrants coming downstream in the spring, in order to obtain further information concerning the returns from escapements of known size.

Counting began on August 17 and continued through September 26. The run in general was rather irregular, but the bulk of the escapement came during the period from August 21 to September 11, reaching its peak on September 7, with a count of 4,514 pink salmon for that day. The total count for the season numbered 16,830 pinks, 122 cohos, 117 chums, and 7 reds.

ORZENOI RIVER

From June 17 to August 3, inclusive, there were counted through the weir in Orzenoi River 10,414 red salmon, 858 pinks, 393 chums, and 44 kings. The peak of the run was on July 18, when 1,665 red salmon were tallied. At times during the first part of the season the water was black from the settling of ash from volcanic eruptions. Gordon Ashton was again in charge of the weir work, under the direction of Warden Mark A. Logan.

RED RIVER

The weir structure at Red River was completed on May 28, the work having been handicapped somewhat by high water. Some salmon were seen passing upstream while the work was in progress, but the number was small. The total count of salmon through the weir from May 28 to August 24, inclusive, was 183,627 reds, 8,077 kings, 5,649 pinks, and 1,624 cohos.

Because of the light run, the Red River district was closed to all commercial fishing on July 22, and it was not reopened. Two trout traps operated in connection with the weir caught 52,852 Dolly Varden trout during the season.

Tom Frost was in charge of the weir, under the supervision of the warden.

SITUK RIVER

The weir in Situk River was in operation from June 10 to August 1, inclusive, after which high water practically wrecked the structure and it became necessary to remove it from the stream. Commercial fishing was suspended on July 3 and 4 in order to provide for necessary additional escapement. Situk had a normal run of reds, of which about 50 percent escaped for spawning purposes. The total escapement numbered 167,620 red salmon, 2,117 kings, and 9,141 pinks. Alex W. Tveter was in charge of the weir, under the direction of Warden William B. Berry.

SALMON TAGGING

In continuation of the tagging experiment conducted in southeast Alaska in 1938 with respect to the pink salmon run in lower Chatham Strait, 2,100 pink salmon were tagged in 2 Tebenkof Bay traps in 1939, the work being carried on during the weekly closed periods throughout the commercial fishing season by the Division of Scientific Inquiry. Of the total number tagged, 684 were recaptured, mostly within 5 days from the date of their release and at a distance of 40 miles or more from the place of tagging. One of the recaptured fish had traveled 162 miles. The returns indicated that the general trend of migration of the pink salmon entering lower Chatham Strait is northeast into the inside waters of Frederick Sound, Stephens Passage, and the Stikine River region.

Tagging experiments were carried on also on the south side of the Alaska Peninsula between the Shumagin Islands and Isanotski Strait to develop further information concerning the migration routes of salmon in those areas.

Analyses of the data with regard to the above tagging experiments are contained in Administrative Report No. 39, entitled "Progress in Biological Inquiries, 1939."

SALMON LIFE-HISTORY STUDIES

Studies of the life histories and fluctuations in abundance of the Pacific salmon in Alaska were continued in 1939 by the staff of the Fisheries Biological Laboratory at Seattle, Wash. The major investigations of the red salmon in Bristol Bay and at Karluk, on Kodiak Island, and the pink salmon at Little Port Walter, in southeast Alaska, were carried on as formerly.

The cutter *Redwing* was detailed by the U. S. Coast Guard to carry on the hydrographic studies in Bristol Bay. These studies are yielding valuable information on the soundings, currents, temperatures, and chemical properties of the waters in the Bristol Bay region of Bering Sea. Two large seine-type boats were chartered for experimental salmon fishing in these waters to determine the migration routes, abundance, and availability of the salmon in the offshore waters.

An aerial survey was made of the large river systems in Bristol Bay in which the salmon reproduce. This survey was made for the purpose of estimating the potential spawning areas in the streams and lakes available to the salmon and the extent to which they were seeded.

The study of the factors responsible for the fluctuations in the abundance of the Karluk River red salmon was continued with special reference to the influence of predatory Dolly Varden trout on the survival of the young salmon during their sojourn in the tributary streams and lakes.

The study of the factors responsible for the fluctuations in the abundance of the pink salmon of southeastern Alaska was continued at Little Port Walter. During the past year a permanent counting weir and small laboratory were constructed at Little Port Walter through the cooperation of the United States Forest Service, which furnished C. C. C. labor for the construction.

OBSERVATIONS ON THE ESCAPEMENT OF SALMON

The runs of salmon in each district of Alaska are observed closely by field employees during the commercial fishing season, and regulations are modified wherever necessary to permit the fullest possible utilization of this resource consistent with conservation requirements. Following the close of commercial operations a survey is made of the spawning areas in representative streams in each section of the Territory. These surveys provide an accurate measure of the adequacy of existing regulations and also serve as an index for determining the probable extent of runs in future cycle years.

Southeastern Alaska.—In the Ketchikan section, embracing the southern district and that part of the Clarence Strait district south of Ernest Sound, pink and chum salmon runs were the weakest in recent years, while reds appeared in about average volume. The run was the latest that has occurred in the past 4 years. Some streams that contained practically no fish by the middle of September were comparatively well stocked by the latter part of that month. Ketchikan Creek was the only stream in which salmon were observed in considerable numbers before the latter part of September.

In the southern district good escapements were found in Robinson Creek, Chickamin River, and in some streams in Mink Bay, Boca de Quadra and Smeaton Bay, while other streams on the east side of Behm Canal had only fair or poor escapements. In the west arm of Behm Canal good escapements were observed in streams of Yes Bay, Moser Bay, and at Loring, although a number of other streams in this section were inadequately seeded. Along the east coast of Prince of Wales Island certain streams were especially well seeded, and good escapements were found also in the Crab Bay stream on Annette Island and in the Vallenar Bay stream on Gravina Island. In general it may be said that the runs of pinks and chums in the Ketchikan section were small and that the escapement of these two species was spotted, while the run and escapement of red salmon were about average.

In the Wrangell district, including Sumner Strait and the northern section of Clarence Strait, the escapement was satisfactory for the most part, although unevenly distributed. Pink salmon streams in the northern section of Clarence Strait were unusually well stocked, while the escapement along the eastern shore of Kuiu Island and on the southern shore of Kupreanof Island was below normal. Chum and coho spawning areas were poorly seeded, and the escapement of reds was about normal.

The run of pink salmon on the west coast of Prince of Wales Island was very late and was at no time heavy or sustained. An increase in abundance occurred after August 19, but the peak of the run was reached by August 26, before the season closed. A late showing of pinks in the southern part of the district provided a fair escapement in this section. Streams in the northern part of the district were poorly seeded, with the exception of those in Calder Bay and Davidson Inlet. Staney Creek in Tuxekan Passage had a very poor escapement. In general, the escapement of pinks, chums, and cohos was inadequate, while the seeding of red salmon streams was satisfactory.

Pink and chum salmon runs in the Icy Strait and Western districts of the Juneau section were among the poorest on record, and the escape-

ments of these species were light or entirely inadequate in most streams. The escapement of red salmon, however, was above average, and this species appears to be increasing in relative abundance in both districts. In the Eastern district of the Juneau section, including lower Chatham Strait, Frederick Sound, and Stephens Passage, the pink salmon run was good and most of the spawning areas were adequately seeded. The run of chums, although smaller than usual, was sufficient to provide an adequate escapement of this species.

In the Yakutat district better than average escapements of all species occurred in Dry Bay, Ahrnklin River, and Situk River, while good escapements were observed in Italo River and Lost River. This was accounted for in part by stormy weather and heavy rains, which curtailed commercial fishing operations. The pink salmon run in Humpback Creek was very light, but it is believed that a relatively good escapement occurred as a result of the curtailment of commercial operations there. It is felt that the excellent escapement in most sections of the Yakutat district may be nullified to a considerable extent by the destruction of spawn, owing to unusually heavy rains and flood conditions in the streams and rivers.

Prince William Sound and Copper River region.—The run of pink salmon in Prince William Sound was one of the poorest on record, and the annual survey of spawning streams revealed a corresponding deficiency in escapement. At no time was there a heavy sustained run in this section, and both run and escapement compared very unfavorably with the run and escapement of pinks in the previous cycle year of 1937. The Port Wells area had the poorest escapement of any section of the Sound, and the showing in streams on Hinchinbrook and Montague Islands was but little better. Streams in Chenega Bay, Jackpot Bay, Port Nellie Juan, and Culross Passage also were inadequately seeded, as were streams in Eaglek Bay and Long Bay. The escapement in Unakwik Inlet streams was fair but below normal. The best escapements occurred on the eastern side of Prince William Sound, particularly in the streams of Valdez Arm and Sheep Bay. Several streams in Port Fidalgo and in Port Gravina also had fair escapements.

The run and escapement of chums were of average proportions in this region. Observations on the red salmon spawning areas of Copper River reveal a better than average escapement of this species, due in part to a heavy early run that passed up the river prior to the commencement of commercial fishing operations.

Cook Inlet.—The run of red salmon, the principal species in this area, was one of the largest on record. Excellent escapements were observed in the Kenai and Kasilof River systems, where streams tributary to Kenai Lake and Tustumena Lake were well seeded. The English Bay stream received the largest escapement in many years, as indicated by the weir count for this stream, and the Kalgin Island stream also was adequately seeded. In Chinik Creek, however, the run was poor; the weir counts for that stream in the past few years having shown a steady decline.

As nearly as could be determined the escapement of kings was below normal, particularly in the Kenai River. Pinks were present in only small numbers, as was expected of the odd-year run of this species. The showing of pink salmon in Kachemak Bay was poor; however, most of the pinks that did appear were able to reach the spawning

ground, as little effort was made to take them commercially. In the section between Point Gore and Seldovia the run and escapement were very light except in Port Dick, where an excellent run of pinks was observed.

Kodiak area.—The runs of red salmon were somewhat disappointing in the three red salmon sections of the Kodiak area, although the commercial take of this species was about average. The Red River run was very poor, and on July 22 this area was closed to commercial fishing for the remainder of the season to compensate for the lagging weir count. The escapement of red salmon was below normal in Karluk and Red Rivers but was generally satisfactory elsewhere.

The run of pink salmon did not appear in any volume during the first 6 weeks of the season but a very heavy late run appeared on the south shore of Kodiak Island near the end of the season. The escapement of this species was good in most streams, with the possible exception of certain sections of Afognak Island. The escapement of the three less important species, namely, chums, kings, and cohos, was at least of average proportions in most of the streams of the Kodiak area.

Chignik.—One of the best runs of red salmon in recent years occurred in the Chignik area in 1939, resulting in a near record pack and an excellent escapement of this species. A fair run and escapement of coho salmon was observed late in the season, while the showing of other species, as usual, was light.

Alaska Peninsula.—The red salmon which enter the commercial fishery of this area are for the most part migrating fish destined for spawning grounds in Bristol Bay. The escapement of local red salmon was light but probably of average proportions. Only fair escapements were reported in Bear and Sandy Rivers, on the north side of the Peninsula. The pink salmon did not appear in abundance until the last few days in July, but this run continued strong until after the close of the season. A survey of pink-salmon streams revealed excellent escapements in the streams between Isanotski Strait and Cape Swedania, while satisfactory escapements were reported also in the eastern section of the district, with the exception of streams in Stepovak Bay. The run and escapement of chum salmon also were satisfactory, although not so heavy as in other recent years.

Bristol Bay.—The red-salmon run in Bristol Bay as a whole was disappointing, with an especially weak showing in the important Kvichak-Naknek district. There was no concerted run except in the Nushagak district where a good early run of king salmon was followed by a strong sustained run of reds, lasting until about July 19. The Kvichak-Naknek run was light throughout the season, dropping off slowly after July 20. In the Egegik district the run was light, as it has been for the last few years, and in the relatively unimportant Ugashik district there was a better than average showing of red salmon.

Following the close of the fishing season extensive surveys of spawning grounds were made, partly by airplane. The Wood River lake system was very well seeded, but escapements in the Kvichak and Naknek watersheds were inadequate. Some streams in the Egegik watershed were fairly well seeded, especially those near the head of Becharof Lake, but as a whole the escapement in this district also was unsatisfactory. The escapement in the Ugashik district, while

inadequate, was at least as good as in other recent years. In general it may be said that with few exceptions the seeding of streams in Bristol Bay was not satisfactory in 1939.

GENERAL STATISTICS OF THE FISHERIES

The total number of persons engaged in the fisheries of Alaska in 1939 was 30,572, or 2,488 more than in 1938. Fishery products were valued at \$40,104,493, a decrease of \$2,765,233, or 6 percent, from the value in the preceding year. Of the total amount, 91 percent represented the value of salmon products; 5 percent, herring; 2 percent, halibut; and 2 percent, the value of all other fishery products.

Summary of persons engaged and products of the Alaska fisheries in 1939

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U. S. BUREAU OF FISHERIES

Item	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Number	Value	Number	Value	Number	Value	Number	Value
PERSONS ENGAGED								
Whites.....	7,452		5,254		5,340		18,046	
Natives.....	3,613		1,713		1,371		6,697	
Chinese.....	61		105		237		403	
Japanese.....	386		127		253		766	
Filipinos.....	1,371		1,068		1,270		3,709	
Mexicans.....	24		74		548		646	
Puerto Ricans.....	2		17		61		78	
Kanakas.....			7		35		44	
Negroes.....	7		26		86		119	
Miscellaneous.....			21		43		64	
Total.....	12,916		8,412		9,244		30,572	
PRODUCTS								
Salmon:								
Canned.....cases.....	2,035,497	\$11,214,287	2,011,910	\$12,736,950	1,215,746	\$10,489,845	5,263,153	\$34,441,082
Mild cured.....pounds.....	5,776,800	1,084,176			132,800	17,000	5,909,600	1,101,176
Pickled.....do.....	23,000	1,769	243,400	26,323	56,000	6,029	322,400	34,121
Fresh, for food.....do.....	3,911,868	284,095	1,050	38			3,912,918	284,133
Sharp-frozen for food.....do.....	4,043,953	303,219					4,043,953	303,219
Quick-frozen fillets and steaks.....do.....	122,135	21,984	186,626	14,930			308,761	36,914
Fresh, for bait.....do.....	24,603	200					24,603	200
Frozen, for bait and mink feed.....do.....	155,205	1,551					155,205	1,551
Dry-salted.....do.....			5,523	406	3,200	320	8,723	726
Dried.....do.....					456,000	36,500	456,000	36,500
Smoked and canned.....cases.....			179	1,441			179	1,441
Meal.....pounds.....	1,414,000	28,280	260,715	6,904			1,704,715	35,184
Oil.....gallons.....	58,040	17,412	10,675	4,270			68,715	21,682
Herring:								
Fresh, for bait.....pounds.....	2,135,010	28,227	5,000	50			2,140,010	28,277
Frozen, for bait.....do.....	3,138,660	23,874					3,138,660	23,874
Frozen, for fur farms.....do.....	15,700	97					15,700	97
Pickled, for food:								
Scotch cure.....do.....			2,233,563	153,413	624,300	31,678	2,857,863	185,091
Norwegian cure.....do.....			32,550	2,805			32,550	2,805
Roused, for food (bloater stock).....do.....			169,890	4,074	338,400	10,764	508,290	14,838
Dry-salted.....do.....			63,200	5,080			63,200	5,080
Meal.....do.....	6,484,688	141,136	26,766,409	549,721			33,251,097	690,857
Oil.....gallons.....	821,639	203,906	3,946,944	937,648			4,768,583	1,141,554
Halibut:								
Fresh.....pounds.....	7,082,658	513,611					7,082,658	513,611
Sharp-frozen.....do.....	6,344,678	375,191					6,344,678	375,191
Quick-frozen fillets.....do.....	27,135	4,884					27,135	4,884

Livers.....do.....	109,800	54,900				109,800	54,900
Viscera.....do.....	1,116	78				1,116	78
Cod:							
Dry-salted.....do.....			32,358	1,599	140,000	8,046	172,358
Pickled.....do.....			100,536	4,953	27,115	1,952	127,651
Stockfish.....do.....			5,800	741			5,800
Whale:							
Oil.....gallons.....					246,600	85,915	246,600
Sperm oil.....do.....					132,750	33,188	132,750
Meal.....pounds.....					1,002,000	17,428	1,002,000
Sperm jawbone.....do.....					8,200	410	8,200
Clam:							
Canned.....cases.....	49	196	34,141	240,285			34,190
Chowder.....do.....			5	30			5
Crab:							
Canned meat:							
Processed.....cases.....	1,489	12,070	8,276	80,444			9,765
Cold packed.....pounds.....	890	445					890
In bulk.....do.....			63	30			63
Whole in shell.....dozen.....	341	682	310	908			651
Shrimp:							
Meat:							
Canned.....cases.....			40	400			40
Cold packed.....pounds.....	429,923	162,159	3,700	1,494			433,623
Frozen.....do.....	3,263	1,305					3,263
Whole in shell.....do.....	827	124					827
Trout:							
Canned.....cases.....	8	40					8
Fresh.....pounds.....	25,611	2,208	4,400	396			30,011
Frozen.....do.....	15,966	1,168	8,800	792			24,766
Sablefish:							
Frozen.....do.....	1,461,627	55,820					1,461,627
Pickled.....do.....	164,801	7,656					164,801
Livers.....do.....	73,033	31,142					73,033
Viscera.....do.....	13,870	971					13,870
Rockfish:							
Sharp frozen.....do.....	32,239	757					32,239
Quick frozen filets.....do.....	37,574	6,763					37,574
Flounders:							
Sharp frozen.....do.....	8,400	504					8,400
Quick frozen filets.....do.....	21,923	3,936					21,923
"Lingcod":							
Fresh.....do.....	337	3					337
Livers.....do.....	753	301					753
Oysters.....gallons.....	52	166					52
Total.....		14,589,293		14,776,125		10,739,075	140,104,493

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 \$11,321,000. Of this amount, \$9,256,000 was the value of the salmon catch. The round weight of the salmon catch landed by the fishermen was approximately 452,166,000 pounds, and the corresponding figure for herring was approximately 185,462,000 pounds. The cod figures given above do not include the offshore catch from waters adjacent to Alaska, which amounted to 3,062,000 pounds of dry-salted cod and 15,300 pounds of tongues, having a total value of \$126,630, landed at ports of the Pacific Coast States.

SALMON

A marked decline in the abundance of salmon was apparent in the 1939 season for Alaska as a whole, and particularly for the southeastern and western districts. In southeast Alaska the catch of every species was lighter than it had been for several years, and the total catch was the smallest obtained there since 1929. The catch in western Alaska, which consists chiefly of red salmon from the important Bristol Bay runs, was at the lowest level since 1935, notwithstanding an increase in the intensity of fishing.

In central Alaska, also, the catch was the smallest since 1935, although the decline was not as great as in the other two major districts, nor did it apply to all fishing areas. The most noticeable shortage occurred on Prince William Sound, where the run of pink salmon was exceptionally light. The Kodiak and Chignik areas, on the other hand, had good runs of pinks and reds, respectively, and the production of canned salmon in these two areas exceeded that of the preceding year. The pack for the Ikatán-Shumagin area was on about the same level as that of 1938, although containing a greater proportion of red salmon than for that year. The red salmon run in the Cook Inlet area was well above average, but the total pack showed a decline from that of 1938, owing to the light run of pinks and cohos. The unexpectedly small catch in the Copper River region was attributed to the delay in settlement of a price dispute between packers and fishermen, with the result that operations were not begun until a large part of the early run had passed upstream.

The total catch of salmon decreased 23 percent from that for 1938. By districts the decrease was 20 percent in southeast Alaska, about 8 percent in central, and about 44 percent in western Alaska.

There was an increase of about 3 percent in the number of fathoms of seines, and about 6 percent in the number of fathoms of gill nets used in Alaska in 1939, compared with the previous year. The number of traps decreased about 3 percent.

CATCH AND APPARATUS

The total number of seines used in the salmon industry in 1939 was 773, of which 665 were purse seines and 108 beach seines. The purse seines aggregated 104,553 fathoms of webbing, and the beach seines 10,431 fathoms. The number of gill nets used was 4,920, having a total length of 346,572 fathoms. There were 149 driven and 294 floating traps—a total of 443. This number does not include 2 traps in southeast Alaska that were taken out by storms before catching any fish. It does include, however, 17 traps in various parts of central Alaska that may be termed "dummy" traps, the catches of which were negligible.

Southeastern Alaska was credited with 466 seines, or a total of 82,468 fathoms, an increase of 19 seines and 8,993 fathoms of webbing over the number used in 1938; also with 434 gill nets, aggregating 29,555 fathoms, an increase of 7 nets and 1,330 fathoms of webbing; and with 23 driven and 262 floating traps, a decrease of 6 driven traps and an increase of 5 floating traps, as compared with the number operated in 1938.



FIGURE 1.—Brailing salmon from a floating salmon trap into a tender, Alaska.



FIGURE 2.—Brailing salmon from a driven salmon trap into a scow, Alaska.



FIGURE 3.—Loading pickled herring at Unalaska, Alaska.

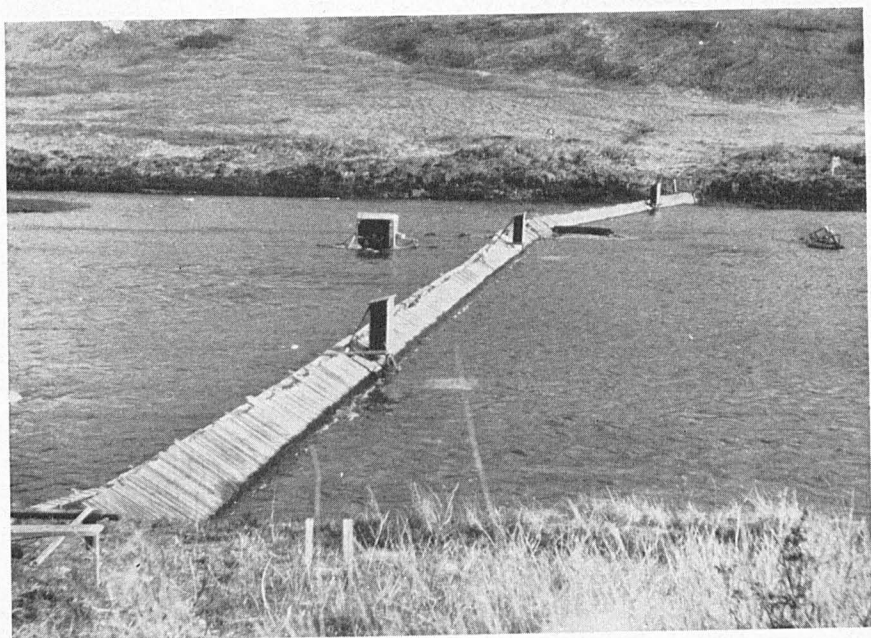


FIGURE 4.—Salmon-counting weir across the Karluk River, Alaska.

Corresponding figures for central Alaska show 304 seines, or 31,616 fathoms, as compared with 350 seines, or 37,054 fathoms, in 1938; 1,988 gill nets, or 121,578 fathoms, as compared with 2,072 gill nets, or 128,745 fathoms, in 1938; and 126 driven and 32 floating traps, as compared with 137 driven and 33 floating traps in 1938.

In western Alaska 3 seines, or 900 fathoms of webbing, were used, a decrease of 1 seine and 300 fathoms of webbing from the number operated in 1938. There were 2,498 gill nets used, or an aggregate of 195,439 fathoms, an increase of 286 nets and 24,760 fathoms of webbing. No traps were operated in this district.

Seines caught about 29 percent of the salmon taken in 1939, gill nets 23 percent, and traps 46 percent, while lines and wheels took the remaining 2 percent.

Salmon traps operated in Alaska in 1939

Licensee	Territorial License No.	Location
Southeast Alaska:		
Loveless & Sons, Inc.	39-003	Marsh Island.
Do.	39-004	Etolin Island.
Peril Straits Packing Co.	39-006	Basket Bay.
Do.	39-007	North of Fishery Point.
Do.	39-008	Tebenkof Bay.
Do.	39-009	Cosmos Cove.
Do.	39-010	Marble Bluff.
Do.	39-011	Peril Strait.
Do.	39-012	North of Point Turbot.
Peter A. Miller.	39-013	Kasaan Bay.
Independent Salmon Canneries, Inc.	39-016	Indian Point.
Capp & Taylor Trap Co.	39-024	Carroll Point.
Libby, McNeill & Libby.	39-034	Cape Fanshaw.
Do.	39-035	South of Limestone Inlet.
Do.	39-036	Spasskala Bay.
Do.	39-037	Do.
Do.	39-038	Do.
Do.	39-039	Marble Cove.
Do.	39-040	False Point Pybus.
Do.	39-041	Windham Bay.
Do.	39-042	Northeast of Point Pybus.
Do.	39-043	Do.
Do.	39-044	Cape Bendel.
Do.	39-045	Fanshaw Bay.
Do.	39-046	Wedge Island.
Do.	39-047	Cone Island.
Do.	39-048	Grindall Island.
Do.	39-049	Niblack Point.
Do.	39-050	Smugglers Cove.
Do.	39-051	Thorne Arm.
Do.	39-052	Sukkwon Island.
Do.	39-053	Cape Lynch.
Do.	39-054	Cap Island.
Do.	39-056	San Christoval Channel.
Do.	39-057	Suemez Island.
Do.	39-058	Fern Point.
Do.	39-059	Aruceas Point.
Do.	39-060	San Christoval Channel.
The Nakat Packing Corporation.	39-061	Tree Point.
Do.	39-071	Rip Point.
Do.	39-072	Scott Point.
Do.	39-075	Kanagunut Island.
Do.	39-076	Sitklan Island.
Do.	39-077	Cape Fox Island.
Do.	39-078	Trec Point South.
Do.	39-079	Brookwater South.
Do.	39-080	Brookwater North.
Do.	39-081	Niblack Point.
Do.	39-082	Tolstol Point.
Do.	39-083	Meyers Chuck.
Do.	39-084	Ernest Point.
Do.	39-085	Cape Ultka.
Do.	39-086	Eaton Point.

Salmon traps operated in Alaska in 1939—Continued

Licensee	Territorial License No.	Location
Southeast Alaska—Continued.		
The Nakat Packing Corporation	1 39-087	Gravina Island.
Do	39-088	Point Webster.
Do	39-089	Sukkwai Island.
Do	39-090	Point Providence.
Do	39-091	Tranquil Point.
Do	39-092	Blanquai Island.
Do	39-093	Steamboat Point.
Do	39-094	Point Desconocida.
Do	39-095	Derrumba Ridge.
Arthur Gamble Trap Co.	39-096	Tree Point.
Keller Trap Co.	39-097	Foggy Point.
Gravina Packing Co.	39-098	Boat Rock.
Dixon Entrance Fisheries Co.	39-099	Meyers Island.
August Buschmann	39-100	Warren Island.
Do	39-101	Cape Addington.
Ira W. Kelly	39-102	Caamano Point.
Fidalgo Island Packing Co.	39-103	Ship Island.
Do	39-104	Point Sykas.
Do	39-105	Slate Island.
Do	39-106	Onslow Island.
Do	39-107	Lucky Cove.
H. Bergman	39-108	North of Seal Cove.
Laura A. Houston	39-109	Point Higgins.
Fidalgo Island Packing Co.	39-110	South of Kingsmill Point.
Do	39-111	Do.
Do	39-112	Point Ellis.
Do	39-113	South of Kingsmill Point.
Do	39-114	Kingsmill Point.
The Nakat Packing Corporation	39-123	Union Point.
Astoria & Puget Sound Canning Co.	39-124	Pleasant Island.
Do	39-125	Big Porpoise Island.
Do	39-126	Point Adolphus.
Do	39-127	Do.
Do	39-128	Pleasant Island.
Pyramid Packing Co., Inc.	39-130	Bradshaw Cove.
Deep Sea Salmon Co.	1 39-133	Caamano Point.
Do	2 39-134	Bond Bay.
Do	1 39-135	Hidden Point.
Martin Kildall	39-150	Cape Decision.
Do	39-151	Northeast of Cape Decision.
Alaska Pacific Salmon Co.	39-159	East of Brownson Bay.
Do	39-160	Southeast of Point Webster.
Sebastian Stuart Fish Co.	39-162	South of Point Brightman.
Do	39-163	North of Point Windham.
Do	39-164	Point Napesan.
Do	39-165	South of Point Caution.
Do	39-166	South of Point League.
Do	39-167	East of Point Gardner.
F. H. Murphy & Co.	39-168	Cleveland Peninsula.
Mrs. Dick Anderson	39-175	South of Windy Point.
P. E. Harris & Co.	39-187	North of Hawk Inlet.
Do	39-188	Do.
Do	39-189	South of Point Marsden.
Do	39-190	North Shore of Icy Strait.
Do	39-191	South of Point Augusta.
Do	39-192	North of Hawk Inlet.
Do	39-193	North of Parker Point.
New England Fish Co.	39-195	Carlson Cove.
Do	39-196	South Wilson Cove.
Do	39-197	Cosmos Cove.
Do	39-198	Point Thatcher.
Do	39-199	Peninsula Point.
Do	39-201	St. Phillip Island.
Do	39-205	Turn Point, Tuxekan Island.
Do	39-206	San Fernando Island.
Do	39-207	Cape Lynch.
Do	39-208	San Christoval Channel.
Do	39-209	St. Ignace Island.
Do	39-210	Blank Point.
Do	39-211	Bronaugh Island.
Do	39-212	Nelson Cove.
Do	39-213	South Kendrick Bay.
Do	39-214	Point Adams.

¹ Licensee's interest in this trap was sold to C. D. Payne, and trap was jointly owned and operated by C. D. Payne and Pacific American Fisheries, Inc., in 1939 season.

² Trap sold to the Nakat Packing Corporation in spring of 1939 and operated by that organization during the season.

Salmon traps operated in Alaska in 1939—Continued

Licensee	Territorial License No.	Location
Southeast Alaska—Continued.		
J. H. Rolle & Co.	39-215	South Kendrick Bay.
Brindle Trap Co.	39-216	Flag Point.
Do	39-217	Duke Point.
Ward's Cove Packing Co.	39-218	Seal Cove.
Do	39-219	Cone Point.
Alaska Pacific Salmon Co.	39-220	Island Point.
E. R. Carlson	39-231	Sukkwam Island.
Eagle Trap Co.	39-244	Porey Islands.
Gravina Trap Co.	39-245	Gravina Island.
Superior Packing Co.	39-248	Northwest of North Passage Point.
Alaska Pacific Salmon Co.	39-247	Boulder Point.
Olaf A. Johnson	39-248	Warburton Island.
Peril Straits Packing Co.	39-249	Cuba Point.
Harry Sellig	39-250	Dall Head.
Wm. M. Fraser	39-251	Steamer Rock.
R. Lindenberger	39-252	Point Garcia.
Do	39-253	Baker Island.
Ketchikan Packing Co.	39-257	Southeast of South Vallenar Point.
Do	39-258	Do
D. O. Jenkins	39-262	Revillagigedo Channel.
E. Dobszinsky	39-265	Clover Passage.
Pacific American Fisheries, Inc.	39-278	Kah Shakes Cove.
Do	39-280	Do
Do	39-281	Point Sykes.
Do	39-282	Lucky Cove.
Do	39-283	Bottom Island.
Do	39-284	Escape Point.
Do	39-285	South Vallenar Point.
Do	39-286	Grindall Peninsula.
Do	39-287	Grindall Point.
Alaska Pacific Salmon Co.	39-288	Falso Island.
Do	39-289	Polk Island.
Do	39-290	Cleveland Peninsula.
Do	39-291	West of Point Nunez.
Do	39-292	Shipwreck Point.
Do	39-293	Kassa Inlet.
Pacific American Fisheries, Inc.	39-294	Kanagunut Island.
L. O. Gore and G. F. Jenkins	39-295	Brownson Bay.
Pacific American Fisheries, Inc.	39-296	Point Colpoys.
Do	39-297	East of Point Baker.
Do	39-298	Deepwater Point.
Do	39-299	Point Hobart.
Do	39-300	Point Brightman.
Do	39-301	Port Beauclerc.
Do	39-302	Totem Bay.
O. W. Granquist	39-303	East of Point Baker.
Pacific American Fisheries, Inc.	39-304	Rocky Point.
Do	39-305	Point Gustavus.
Do	39-306	Dundas Bay.
Do	39-307	Dundas Point.
Do	39-308	Lemesurier Island.
Do	39-309	Eagle Point.
Do	39-310	Mansfield Peninsula.
Do	39-311	Gull Cove.
Do	39-332	Point Alava.
Lynch Bros.	39-335	North of Bond Bay.
J. V. Davis	39-336	Cape Bendel.
Do	39-337	Naked Island.
Do	39-338	East Point.
Columbia River Packers Association	39-340	Narrow Point.
Do	39-341	Northwest of Ratz Point.
Alaska Pacific Salmon Co.	39-366	North of Cape Chacon.
Do	39-367	Do
Do	39-368	McLean Point.
Do	39-369	Dall Head.
Do	39-370	Nelson Cove.
Do	39-371	Gravina Island.
Do	39-372	Boat Harbor.
Do	39-373	Street Island.
Do	39-374	Ship Island.
Do	39-375	Gravina Island.
Do	39-376	Northeast Inian Island.
Do	39-377	Northwest of Point Augusta Light.
Do	39-378	Point Sophia.
Do	39-379	Northwest of Rocky Island Light.
Do	39-380	West of Three Hill Island.
Do	39-381	Northwest Inian Island.
Do	39-382	South Inian Pass.
Do	39-383	Pleasant Island.

Salmon traps operated in Alaska in 1939—Continued

Licensee	Territorial License No.	Location
Southeast Alaska—Continued.		
F. & W. Salmon Co.	39-387	Island Point.
Lincoln Fisheries, Inc.	39-388	Lucky Cove.
Do.	39-389	Point Alava.
Scow Bay Packing Co.	39-391	North of Labouchere Bay.
Do.	39-392	North of Halibut Harbor.
Do.	39-393	East of Point Baker.
Do.	39-394	West of Point Baker.
Pyramid Packing Co., Inc.	39-395	Distant Point.
Do.	39-396	South of Point Kakul.
Do.	39-397	Do.
Alaska Pacific Salmon Co.	39-398	South of Point Hepburn.
Do.	39-399	Point Hepburn.
Do.	39-400	Village Point.
Do.	39-401	Mansfield Peninsula.
Do.	39-402	South of Funter Bay.
Do.	39-403	North of Village Point.
Do.	39-404	Northwest of Rocky Island Light.
Do.	39-405	False Bay.
Do.	39-406	Cube Point.
Do.	39-407	Square Cove.
Do.	39-408	Hawk Inlet.
Do.	39-409	Deepwater Point.
Do.	39-410	Point Hobart.
Do.	39-411	Northeast of Point Pybus.
Do.	39-412	Canoe Point.
Do.	39-413	Point Macartney.
Do.	39-414	Cape Fanshaw.
Do.	39-415	Cornwallis Point.
Do.	39-416	Herring Bay.
Do.	39-417	Point Barrie.
Do.	39-418	Point Brightman.
Do.	39-422	McLeod Bay.
Do.	39-423	Nutkwa Inlet.
Do.	39-424	West of Point Nunez.
Do.	39-425	Northwest of Kaigani Point.
Do.	39-426	Cape Muzon.
Do.	39-427	Cordova Bay.
Do.	39-428	Bean Island.
C. D. Payne.	39-429	Chasina Point.
Grover C. Winn.	39-430	Point Brightman.
Otto Anderson.	39-431	Vallenar Point.
Brindle Trap Co.	39-432	Gravina Island.
Anderson & Peterson Trap Co.	39-433	Tongass Island.
James Taylor Trap Co.	39-434	Kendrick Bay.
Ward's Cove Packing Co.	39-435	Gravina Island.
Hugh Pinkerton.	39-442	Bond Bay.
W. S. Balcom.	39-443	Island Point.
Do.	39-444	Cape Chacon.
Pacific American Fisheries, Inc., and E. Schoenwald.	39-445	Point Nesbitt.
Superior Packing Co.	39-446	South Passage Point.
Do.	39-447	Marble Bluff.
Do.	39-448	False Bay.
Do.	39-449	North of Parker Point.
Otto Bindpage.	39-450	Kelp Island.
Beagle Packing Co.	39-451	South of Foggy Point.
Do.	39-452	Dall Head.
Do.	39-453	Cape Fox.
Do.	39-454	Black Island.
Ole Gunderson & Sons.	39-455	Screen Islands.
Do.	39-456	Etolin Island.
Hood Bay Canning Co.	39-458	Point Caution.
Do.	39-459	South of Distant Point.
Do.	39-460	South of Basket Bay.
Do.	39-461	Killsnoo Island.
MacKenzie Fish Co.	39-466	Casamano Point.
Farwest Fishermen, Inc.	39-468	Observation Island.
Do.	39-469	Steamer Point.
Do.	39-470	Olson Cove.
Do.	39-471	Point Amellus.
Wrangell Packing Co.	39-475	Northwest of Ratz Point.
Do.	39-476	East Island.
G. C. Foster.	39-477	Ratz Point.
Annetto Island Canning Co., 8 traps †.		Annetto Island Fishery Reserve.
Prince William Sound:		
Pacific American Fisheries, Inc.	39-141	Point Freemantle.
Do.	39-142	Point Woodcock.
Do.	39-143	Graveyard Point.

† Operated on behalf of the Metlakatla Indians who reside within the limits of the Annetto Island Fishery Reserve.

Salmon traps operated in Alaska in 1939—Continued

Licensee	Territorial License No.	Location
Prince William Sound—Continued.		
Pacific American Fisheries, Inc.	39-144	Bidarka Point.
Do.	39-145	Bligh Island.
Pioneer Canneries, Inc.	39-169	Makaka Point.
Do.	39-170	Bligh Island.
Do.	39-171	North of Point Freemantle.
Pioneer Sea Foods Co.	39-172	Eagle Point, Hinchinbrook Island.
Do.	39-173	Hinchinbrook Island.
Do.	39-174	Cedar Bay.
Premier Salmon Co.	39-176	Port Etches.
Do.	39-177	Fidalgo Bay.
Do.	39-178	Knowles Head.
New England Fish Co.	39-200	Johnstone Point.
Do.	39-201	Gravina Point.
Do.	39-202	Hawkins Cutoff.
Do.	39-203	Graveyard Point.
Shepard Point Packing Co.	39-223	Port Fidalgo.
Do.	39-224	Bainbridge Island.
Do.	39-225	Montague Island.
Do.	39-226	Do.
Do.	39-227	Do.
Do.	39-228	Knight Island.
Do.	39-229	Shelter Bay.
Do.	39-230	Red Head.
Copper River Packing Co.	39-232	Chenega Island.
Do.	39-233	Do.
Do.	39-234	Do.
Do.	39-235	Do.
Do.	39-236	Culross Island.
San Juan Fishing & Packing Co.	39-267	Knight Island.
Do.	39-268	Chenega Island.
Do.	39-269	Point Helen.
Do.	39-270	Do.
Do.	39-271	Port Chalmers.
Do.	39-272	Squire Island.
Do.	39-275	Rocky Point.
Do.	39-276	McLeod Harbor.
Do.	39-339	Montague Island.
Shepard Point Packing Co.	39-354	Granite Bay.
B. E. Lee	39-354	Granite Bay.
King & Crooker	39-457	Hinchinbrook Island.
Cook Inlet:		
Libby, McNeill & Libby	39-025	Corea Bend.
Do.	39-026	Ninlichik Point.
Do.	39-027	Porcupine.
Do.	39-028	Salamato.
Do.	39-029	Kalfonski.
Do.	39-030	Southwest of Cape Kaslof.
Do.	39-031	Moose.
Do.	39-033	Salamato.
Fidalgo Island Packing Co.	39-115	Bluff Point.
Do.	39-116	Salamato Beach.
Do.	39-117	Do.
Do.	39-119	South of Cape Kaslof.
Do.	39-120	Boulder Point.
Do.	39-121	Southwest of Point Naskowak.
Do.	39-122	Nubble Point.
Do.	39-129	Salamato Beach.
Anton Johnson & Harold Jonsson.	39-221	Kalfonski Beach.
Paul A. Shadura.	39-261	Moquawkie Reservation.
Tyonek Native Store Association.	39-277	South of Three Mile Creek.
General Fish Co., Inc.	39-278	North of Three Mile Creek.
Do.	39-316	East shore of Cook Inlet.
Pacific American Fisheries, Inc.	39-317	Do.
Do.	39-318	South of Salamato.
Do.	39-319	North of Kenai.
Snug Harbor Packing Co.	39-344	Kalgin Island.
Do.	39-345	Do.
Do.	39-346	East shore Cook Inlet.
E. J. Fribrock	39-347	Do.
Do.	39-349	Salamato.
Sig Lindgren	39-351	East shore Cook Inlet.
M. M. Everett.	39-352	Trading Bay.
Do.	39-353	Do.
Cook Inlet Packing Co.	39-355	North of Ninlichik River.
Do.	39-356	East shore Cook Inlet.
Do.	39-357	Do.
Do.	39-358	Do.
Do.	39-359	Do.
Do.	39-360	Do.
Do.	39-361	Do.

Salmon traps operated in Alaska in 1939—Continued

Licensee	Territorial License No.	Location
Cook Inlet—Continued.		
Kenai River Packing Co.	39-362	East shore Cook Inlet.
Do.	39-363	Do.
J. T. Hansen.	39-364	Nikishka Bay.
Oscar H. Vogel.	39-436	Point Possession.
Alaska Year Round Canneries Co.	39-462	Clam Gulch, Kenai Peninsula.
Do.	39-463	Kalgin Island.
Do.	39-464	Do.
Do.	39-465	Corsa Bend.
Ninilchik Packing Co.	39-472	Southwest of Anchor Point.
Do.	39-473	Southwest of Ninilchik.
Emard Packing Co.	39-479	Moose Point.
Do.	39-480	Southwest of Moose Point.
Do.	39-482	North of Moose Point.
Kodiak Area:		
San Juan Fishing & Packing Co.	39-017	Malina Point.
Alaska Packers Association.	39-062	Miller Island.
Do.	39-063	Altak Bay.
Do.	39-064	Deadman Bay.
Do.	39-068	Uyak Bay.
Do.	39-069	Do.
Do.	39-070	Do.
Kadiak Fisheries Co.	39-136	Raspberry Island.
Do.	39-137	Do.
Do.	39-138	Do.
Do.	39-139	Vlaskoda Bay.
Do.	39-140	Raspberry Island.
Pacific American Fisheries, Inc.	39-194	Altak Bay.
San Juan Fishing & Packing Co.	39-239	Malina Bay.
Pacific American Fisheries, Inc.	39-259	Deadman Bay.
Do.	39-260	Altak Bay.
Uganik Fisheries, Inc.	39-263	Uganik Island.
Do.	39-264	Do.
Do.	39-265	Raspberry Island.
San Juan Fishing & Packing Co.	39-273	South of Broken Point.
Do.	39-274	Uganik Island.
Pacific American Fisheries, Inc.	39-312	Chief Point.
Do.	39-313	South of Cape Kulluk.
Ottar Hofstad.	39-333	Cape Ugat.
Do.	39-334	Cape Uyak.
Chignik Area:		
Columbia River Packers Association.	39-020	Chignik Bay.
Do.	39-021	Aniakchak Bay.
Do.	39-022	Lake Bay.
Alaska Packers Association.	39-065	Main Island, Chignik Lagoon.
Do.	39-066	West end of Chignik Bay.
Do.	39-067	Cape Kumlik.
Pacific American Fisheries, Inc.	39-314	Humes Point.
Do.	39-315	Hook Bay.
Alaska Peninsula Area:		
Alaska Southern Packing Co.	39-131	Fox Cape.
Do.	39-132	Kupreanof Point.
Pacific American Fisheries, Inc.	39-146	Kelley Rock, Unga Island.
Do.	39-147	Pinnacle, Unga Island.
Do.	39-148	Swedaula Point.
Do.	39-149	Seal Cape.
P. E. Harris & Co.	39-179	Cape Horn.
Do.	39-180	East Anchor Cove.
Do.	39-181	Ikatan Bay.
Do.	39-182	Do.
Do.	39-183	Arch Point.
Do.	39-184	Pavlof Bay.
Do.	39-185	Do.
Do.	39-186	Moss Cape.
Pacific American Fisheries, Inc.	39-320	Ikatan Bay.
Do.	39-321	Do.
Do.	39-322	Do.
Do.	39-323	Do.
Do.	39-324	Morzhovoi Bay.
Do.	39-325	Vodapoini Point.
Do.	39-326	Nikolaski, Moss Cape.
Do.	39-327	Deer Island.
Do.	39-328	Lohn John, north of Arch Point.
Do.	39-329	Dolgoi Island.
Do.	39-330	Cape Tolstoi.
Do.	39-331	Bold Cape.
D. Hotovitzky.	39-384	Korovin Island.
Korovin Island Fishing & Canning Co.	39-385	Popof Island.
Alaska Pacific Salmon Co.	39-386	Do.
Mrs. Helene R. Mellick.	39-390	San Diego, west of Guillemot Island.
Aleutian Fishing & Packing Co.	39-390	Popof Island.
Blue Fox Fish Co.	39-437	Do.

Summary of traps operated in Alaska in 1939, by districts

District	Number	District	Number
Southeast Alaska.....	1 285	Central Alaska—Continued	
Central Alaska:		Alaska Peninsula Area.....	31
Prince William Sound.....	42	Total, Central Alaska.....	168
Cook Inlet.....	52	Grand total.....	443
Kodiak Area.....	26		
Chignik Area.....	8		

¹ Two additional traps in southeast Alaska were installed but were taken out by storm before any catch was obtained. These traps were No. 39-243 of the Security Fish Co. at Security Point, Dall Island, and No. 39-467 of Farwest Fishermen, Inc., at Kingsmill Point.

Percentage of salmon caught in each Alaska district, by principal forms of apparatus

Apparatus	Southeast Alaska		Central Alaska		Western Alaska	
	1938	1939	1938	1939	1938	1939
Seines.....	27	29	32	40	3	4
Gill nets.....	2	3	10	10	96	94
Traps.....	67	65	58	50		
Lines.....	4	3				
Wheels.....					1	2

The total catch of salmon in 1939 was 79,220,420, a decrease of 23,802,477, or 23 percent, from the number taken in 1938. There was a decrease of 8,964,683 in southeast, 2,707,895 in central, and 12,129,899 in western Alaska. By species, the catch of cohos decreased 1,457,081, chums 979,456, pinks 10,534,607, kings 110,099, and reds 10,721,234.

Salmon taken in 1939, by apparatus and species, in each geographic section of Alaska

Apparatus and species	Southeast Alaska	Central Alaska	Western Alaska	Total
Seines:				
Coho, or silver.....	128, 419	59, 612		188, 031
Chum, or keta.....	1, 734, 549	1, 156, 407	77, 942	2, 968, 898
Pink, or humpback.....	6, 691, 004	10, 784, 854	16	17, 475, 874
King, or spring.....	1, 575	2, 813	3, 270	7, 658
Red, or sockeye.....	692, 875	990, 038	610, 111	2, 293, 024
Total.....	9, 248, 422	12, 993, 724	691, 339	22, 933, 485
Gill nets:				
Coho, or silver.....	162, 255	112, 016	1, 028	275, 299
Chum, or keta.....	22, 100	118, 779	1, 069, 338	1, 210, 217
Pink, or humpback.....	82, 552	614, 354	48	696, 954
King, or spring.....	6, 708	46, 123	55, 039	107, 870
Red, or sockeye.....	521, 603	2, 159, 410	13, 484, 436	16, 165, 449
Total.....	795, 218	3, 050, 682	14, 609, 889	18, 455, 789
Traps:				
Coho, or silver.....	453, 005	278, 373		731, 378
Chum, or keta.....	1, 629, 801	1, 467, 262		3, 097, 063
Pink, or humpback.....	16, 947, 566	9, 542, 243		26, 489, 809
King, or spring.....	3, 560	36, 690		40, 250
Red, or sockeye.....	1, 272, 668	4, 883, 468		6, 156, 136
Total.....	20, 306, 900	16, 208, 036		36, 514, 936
Lines:				
Coho, or silver.....	378, 504			378, 504
Chum, or keta.....	2, 309			2, 309
Pink, or humpback.....	834			834
King, or spring.....	639, 923			639, 923
Total.....	1, 021, 570			1, 021, 570

Salmon taken in 1939, by apparatus and species, in each geographic section of Alaska—Continued

Apparatus and species	Southeast Alaska	Central Alaska	Western Alaska	Total
Wheels:				
Chum, or keta.....			272,060	272,060
King, or spring.....			21,590	21,590
Red, or sockeye.....			1,000	1,000
Total.....			294,640	294,640
Total:				
Coho, or silver.....	1,122,183	450,001	1,028	1,573,212
Chum, or keta.....	3,388,759	2,742,448	1,419,330	7,550,537
Pink, or humpback.....	23,721,956	20,941,451	64	44,663,471
King, or spring.....	652,066	85,626	79,899	817,591
Red, or sockeye.....	2,487,146	8,032,916	14,095,547	24,615,609
Grand total.....	31,372,110	32,252,442	15,596,868	79,220,420

CANNING

CHANGES IN CANNERIES

In southeast Alaska the Alaska Pacific Salmon Co. closed its Rose Inlet cannery and in lieu thereof leased and operated the Kasaan plant of Pacific American Fisheries, Inc., which had been used as a clam cannery in 1938. The Petersburg cannery of the Pacific American Fisheries, Inc., was leased and operated by the Petersburg Canning Co., a new organization headed by A. W. Brindle, of the Ward's Cove Packing Co. The cannery formerly owned by the Diamond K Packing Co. at Wrangell was operated under lease by the Farwest Fishermen, Inc. The latter subsequently purchased the plant after it had been acquired by the Pacific American Fisheries, Inc., at marshal's sale.

The plant of the Bayview Packing Co. at Klawak, which had been leased to the Ocean Packing Co. in 1933 and operated by that company for a number of years, was taken over and operated by R. J. Peratrovich & Son. Operations at the Excursion Inlet plant of the Astoria & Puget Sound Canning Co. were carried on under the company's own name, rather than as the Consolidated Fisheries, by which this plant had been designated since 1935. The plant of Dean C. Kayler at Petersburg, which had handled only crabs and shrimp in 1938, was used also as a salmon cannery in the 1939 season.

A modern 2-line cannery was built at Hydaburg to replace that of the Hydaburg Fisheries, Inc., which had been idle in the previous year. This construction was financed through a Government loan obtained under the Indian Reorganization Act by an association of Hydaburg natives. The association entered into a contract with W. A. Pries, head of the Annette Island Canning Co., for operation of the plant as the Hydaburg Canning Co. under a 5-year lease somewhat similar to that in effect with respect to the Annette Island Canning Co. at Metlakatla.

The plant heretofore known as that of L. Utness at Mountain Slough was operated during the season as the Crystal Falls Fish Co. A new organization, known as the Far North Packing & Shipping Co., leased the floating plant *Commander*, formerly owned by Suryan's Inc., and operated it at Moser Bay. The Red Mountain Packers,

Inc., took over and operated the plant of the Puget & Alaska Canning Co. at Seldovia.

The following canneries that had been idle in the previous year were reopened in 1939: Berg Packing Co., Ketchikan; Hood Bay Canning Co., Hood Bay; Pyramid Packing Co., Inc., Sitka; Kadiak Fisheries Co., Shearwater Bay; Pacific American Fisheries, Inc., King Cove; Alaska Packers Association, at Nushagak and Ugashik; Alaska Salmon Co., Wood River; and Pacific American Fisheries, Inc., at Nushagak and Port Moller.

NEW CANNERIES

The Salt Sea Fisheries, which put up a small pack of salmon at Tenakee Springs in 1938 in conjunction with the canning of crabs expanded its salmon canning operations in 1939 and is included for the first time in the list of salmon canneries. Similarly, the plant of the Alaskan Glacier Sea Food Co. at Bering River, established in 1938 for the canning of crabs, was engaged chiefly in salmon canning this season and is listed as a salmon cannery.

A new organization, the Intercoastal Packing Co., equipped the steamer *Ogontz* (3,127 tons net) with two high speed lines of salmon canning machinery and operated it both at Naknek and at Kupreanof Harbor during the 1939 season. Young & Trones operated a small hand cannery, consisting of a single half-pound line, aboard a scow on Eyak River.

A new 4-line cannery at Naknek, the construction of which was begun in the fall of 1938 by the Thompson Salmon Co., a subsidiary of the Columbia River Packers Association, was completed and operated under lease by the latter company.

In addition, there were small packs of salmon incidental to other fisheries products by the following companies which are not listed among the salmon canneries; Nickey Clam & Salmon Cannery, Ketchikan; Enterprise Sea Food Co., Ninilchik; King Crab Co., Kachemak Bay; Nunez Bros. Packing Corporation, Cordova; Sheep Bay Mill & Packing Co., Sheep Bay; and the Northern Commercial Co., Pastolik.

CANNERIES NOT OPERATED

The Scow Bay Packing Co. did not operate its plant at Scow Bay, and its trap-caught fish were canned by the Petersburg Canning Co. No salmon were packed by the Gulf Packing Co. at Cordova in 1939, the plant being used exclusively for the canning of crabs. The cannery of the Pioneer Sea Foods Co. at Orca was not operated, and the catch of the company's traps was canned by the New England Fish Co. at Cordova under a joint operating agreement. Other plants that had canned salmon in Alaska in the previous year but were not operated in 1939 were the floating plant of Lars Sagen, on Crescent River; the Anchor Line Packing Co., Kenai River; and the Great Northern Packing Co., Inc., Uyak Bay.

The old cannery of the Shelikof Packing Co. at Zachar Bay, which had been leased to the Kadiak Fisheries Co. in 1937 and which was idle in 1938, was purchased by the Chatham Strait Fish Co. and remodeled and used as a herring reduction plant.

The following plants have been dropped from the list of idle canneries, as they have been dismantled or abandoned and are not likely to be reopened: The cannery of Karl Thiele, at Lake Bay, which was last operated by the Columbia River Packers Association in 1930; the Aleutian Fishing and Packing Co. at Sand Point, which was last operated in 1936; the Pacific American Fisheries, Inc., plant at Nushagak River, which was last operated by Lowe Trading Co. in 1936; plants of Libby, McNeill & Libby at Nushagak and Lockanok, last operated in 1936, the latter of which was abandoned on account of the formation of a mud flat off its dock preventing access by scows and other boats; the old cannery of the Red Salmon Canning Co. at Naknek Village, which was last operated in 1930; and the floating cannery which was last operated in 1937 by the Western Pacific Packing Co. at Egegik and which has been taken over by the Pacific American Fisheries, Inc.

In the following list of canneries which were inactive in 1939 but which may be reopened there is shown after each plant the year in which it was last operated:

Southeast Alaska:

Alaska Pacific Salmon Co.....	{ Boca de Quadra (1928). Chomly (1930). Funter Bay (1930). Pybus Bay (1928). Rose Inlet (1938).
Deep Sea Salmon Co.....	Skowl Arm (1937).
Lane Bros.....	Moir Sound (1936).
New England Fish Co.....	Chatham (1937).
Red Salmon Packers Association.....	Yakutat (floating) (1937).
Scow Bay Packing Co.....	Scow Bay (1938).
Seaport Salmon Co.....	Ketchikan (1936).

Central Alaska:

Alaska Packers Association.....	Chignik (1931).
Anchor Line Packing Co.....	Kenai River (1938).
Glacier Sea Foods Co.....	Cordova (1936).
Great Northern Packing Co., Inc.....	Uyak Bay (1938).
Ninilchik Packing Co.....	Ninilchik (1936).
Pacific American Fisheries, Inc.....	Kenai (1931).
Phillips Canning Corporation.....	Valdez (1937).
Pioneer Sea Foods Co., The.....	Orca (1938).
Premier Salmon Co.....	Stevens Creek (1936).
Shepard Point Packing Co.....	Shepard Point (1937).

Western Alaska:

Alaska Packers Association.....	Naknek River (1929).
Herendeen Bay Consolidated Canneries..	Herendeen Bay (1932).

TOTAL CANNERIES OPERATED

One hundred and nine canneries were operated in Alaska in 1939—44 in southeastern, 41 in central, and 24 in western Alaska, which is an increase over the previous year of 5 for the southeastern and 6 for the western district, and no change in number for central Alaska. The floating canneries *La Merced* (1,938 tons), of the Alaska Southern Packing Co., Inc., *International* (1,760 tons), of the International Packing Co., *Memnon* (2,154 tons), of the Columbia River Packers Association, Inc., and *Ogontz* (3,127 tons), of the Intercoastal Packing Co., were operated in both central and western Alaska, but each is credited to only one district, the *La Merced* and *International* to central Alaska, and the others to western Alaska.

Companies that canned salmon in Alaska, number and location of canneries operated, and number of traps owned by each, 1939

[New canneries indicated by asterisk (*)]

Company	Canneries		Traps		
	Number	Location	Driven	Floating	Total
Southeast Alaska:					
Alaska Pacific Salmon Co.	4	Kake		11	11
		Kasaan			
		Ketchikan	5	16	21
		Port Althorp		19	19
Annette Island Canning Co.	1	Wrangell	1	7	8
A. R. B. Packing Co.	1	Metlakatla			
Astoria & Puget Sound Canning Co.	1	Excursion Inlet	3	10	13
Balcom-Payne Fisheries, Inc.	1	Ketchikan			
Beagle Packing Co.	1	do.		6	6
Berg Packing Co.	1	do.			
Burnett Inlet Salmon Co.	1	Burnett Inlet			
Douglas Fisheries Co., Inc.	1	Douglas			
Farwest Fishermen, Inc.	1	Wrangell		6	6
Fidalgo Island Packing Co.	2	Bay of Pillars	5		5
		Ketchikan	2	3	5
Haines Packing Co.	1	Letnikof Cove			
P. E. Harris & Co.	1	Hawk Inlet		7	7
Hood Bay Canning Co.	1	Hood Bay		4	4
Hydaburg Canning Co.	1	Hydaburg			
Icy Straits Salmon Co.	1	Hoonah			
Independent Salmon Canneries, Inc.	1	Ketchikan		1	1
Dean C. Kayler	1	Petersburg			
Ketchikan Packing Co.	1	Ketchikan		2	2
		Craig		8	8
Libby, McNeill & Libby	4	George Inlet		6	6
		Taku Harbor	2	10	12
		Yakutat			
Lindenborger Packing Co.	1	Craig			
Nakat Packing Corporation, The	3	Hidden Inlet		7	7
		Union Bay		11	11
		Waterfall		9	9
New England Fish Co.	2	Ketchikan		5	5
		Noyes Island		6	6
Northern Fisheries, Inc.	1	Ketchikan			
R. J. Peratrovich & Son	1	Klawak			
Peril Straits Packing Co.	1	Todd		7	7
Petersburg Canning Co.	1	Petersburg	3	4	7
Pyramid Packing Co., Inc.	1	Sitka		4	4
Salt Sea Fisheries	1	Tenakee Springs *			
Sebastian Stuart Fish Co.	1	Tyee		6	6
Spencer Packing Co.	1	Klawak			
Superior Packing Co.	1	Tenakee		5	5
Ward's Cove Packing Co.	1	Ward Cove		3	3
Wrangell Packing Co.	1	Wrangell		2	2
Central Alaska:					
Alaskan Glacier Sea Food Co.	1	Bering River *			
Alaska Native Consolidated Canning Co.	1	Sand Point			
Alaska Pacific Salmon Co.	1	do.	3		3
Alaska Packers Association	2	Chignik	3		3
		Larsen Bay	3		3
Alaska Red Salmon Packers, Inc.	1	Halibut Bay (Carmel)			
Alaska Southern Packing Co.	1	False Pass and Kupreanof Harbor (floating)			
Alaska Year-Round Canneries Co.	1	Seldovia	4		4
Chignik Packing Co.	1	Chignik			
Columbia River Packers Association, Inc.	1	Ikatan Bay (floating)			
Cook Inlet Packing Co.	1	Seldovia	7		7
Copper River Packing Co.	1	McClure Bay		5	5
Crystal Falls Fish Co.	1	Mountain Slough			
Emard Packing Co.	1	Anchorage	3		3
Far North Packing & Shipping Co., Inc.	1	Moser Bay (floating)			
Fidalgo Island Packing Co.	1	Port Graham	6		6
General Fish Co., Inc.	1	Anchorage	4		4
W. R. Gilbert Co., Inc.	1	Point Whitshead			
Grimes Packing Co.	1	Uzinkl			
Hagen & Co.	1	Seward			
P. E. Harris & Co.	1	False Pass	8		8
Interoceanic Packing Co.	1	Kupreanof Harbor (floating)*			
International Packing Co.	1	Ikatan, Unimak, Ivanof and Three Saints Bays (floating)			

Companies that canned salmon in Alaska, number and location of canneries operated, and number of traps owned by each, 1939—Continued

Company	Canneries		Traps		
	Number	Location	Driven	Floating	Total
Central Alaska—Continued.					
Kadiak Fisheries Co.....	2	{Port Balley	5		5
		{Shearwater Bay			
Libby, McNeill & Libby.....	1	{Kenai	8		8
Frank McConaghy Co., Inc.....	1	{Kodiak (floating)			
New England Fish Co.....	1	{Cordova	4		4
North Pacific Sea Foods Co.....	1	{Swanport			
		{Alitak	6		6
Pacific American Fisheries, Inc.....	3	{King Cove	11		11
		{Squaw Harbor	4		4
Pioneer Canneries, Inc.....	1	{Cordova	2	1	3
Red Mountain Packers, Inc.....	1	{Seldovia			
Sandvik Hand Cannery.....	1	{Uganik Village			
San Juan Fishing & Packing Co.....	2	{Port San Juan	2	6	8
		{Uganik Bay	4		4
Scott's Packing Co.....	1	{Mummy Island ¹			
Shepard Point Packing Co.....	1	{Port Ashton		9	9
Snug Harbor Packing Co.....	1	{Snug Harbor	7		7
Uganik Fisheries, Inc.....	1	{Uganik	3		3
Washington Fish & Oyster Co., Inc.....	1	{Port William			
Young and Trones.....	1	{Eyak River (floating)*			
Western Alaska:					
		{Egegik River			
		{Kvichak Bay (2)			
Alaska Packers Association.....	7	{Naknek River (2)			
		{Nushagak			
		{Ugashik			
Alaska Salmon Co.....	2	{Kvichak River			
Alaska Southern Packing Co., Inc.....	1	{Wood River			
		{Port Moller (floating)			
Columbia River Packers Association, Inc.....	3	{Naknek*			
		{Nushagak			
		{Port Moller (floating)			
Intercoastal Packing Co.....	1	{Naknek (floating)*			
International Packing Co.....	1	{Port Moller (floating)			
		{Egegik River			
Libby, McNeill & Libby.....	4	{Ekuk			
		{Koggiung			
		{Libbyville			
Nakat Packing Corporation, The....	1	{Nakcen			
		{Naknek River (2)			
Pacific American Fisheries, Inc.....	4	{Nushagak			
		{Port Moller			
Red Salmon Canning Co.....	2	{Naknek River			
		{Ugashik River			

¹ Primarily a clam cannery.

NOTE.—A list of all traps operated in Alaska in 1939 appears on pages 125 to 130 of this report.

LOSSES AND DISASTERS

Property losses reported by Alaska fishery operators amounted to \$94,409 in 1939 and consisted chiefly of boats and fishing apparatus. Some loss of fish was included also, as well as a comparatively small amount of damage to buildings by storms.

The total property losses reported for southeast Alaska amounted to \$55,258, of which the principal item was the tender *O. M. Arnold*, valued at \$25,000, which sank a few miles north of Noyes Island during a gale. Three of the crew lost their lives in this disaster. For central Alaska the losses totaled \$27,305; and for the western district, \$11,846.

Twenty-one lives were lost during the year—8 in southeast, 7 in central, and 6 in western Alaska. In the southeastern district, 1 fisherman was drowned and 1 was killed in an accident, 2 shoresmen and 1 transporter died of disease, and 3 transporters were drowned.

Two fishermen and 1 transporter in central Alaska were drowned, 1 shoresman and 1 transporter died of disease, and 1 shoresman and 1 transporter met death by accident. In western Alaska 1 fisherman and 4 shoresmen died of disease and 1 fisherman was drowned.

STATISTICS

One hundred and nine canneries were operated in Alaska in 1939, or 11 more than in the previous year. Employment was given to 24,921 persons, as compared with 22,280 in 1938, an increase of 2,641. White employees increased 1,254, natives 570, Chinese 31, Japanese 64, Filipinos 411, Mexicans 256, Kanakas 7, Negroes 35, and miscellaneous 22; while Puerto Ricans decreased 9.

The total pack of canned salmon was 5,263,153 cases, valued at \$34,441,082. This is a decrease of about 23 percent in quantity and about 6 percent in value from the production in 1938, when the pack was 6,806,998 cases, valued at \$36,636,897.

The output of canned salmon in southeast Alaska decreased from 2,713,948 cases in 1938 to 2,035,497 cases in 1939, or 25 percent; in central Alaska the decline was from 2,179,765 cases to 2,011,910 cases, or about 8 percent; and in western Alaska, from 1,913,285 cases to 1,215,746 cases, or 36 percent. By species, in Alaska as a whole, the pack of cohos decreased from 222,321 cases in 1938 to 104,122 cases in 1939, or 53 percent; chums, from 786,753 cases to 630,300 cases, or about 20 percent; pinks from 3,232,878 cases to 2,530,025 cases, or about 22 percent; kings from 43,813 cases to 32,458 cases, or about 26 percent; and reds from 2,521,233 cases to 1,966,248 cases, or 22 percent.

Details are included in the following tables to show comparison of the 1939 pack with the average for the 5 preceding years, 1934 to 1938, by cases of each species and by districts. Cohos declined 48 percent, chums 25 percent, pinks about 32 percent, kings 36 percent, and reds 7 percent from the 5-year average. By districts, the pack in 1939 decreased approximately 37 percent from the 5-year average in southeast Alaska, about 12 percent in the central district, and about 14 percent in western Alaska, making a net decrease of nearly 24 percent from the 5-year average for all of Alaska.

Persons engaged, wages paid, and operating units of Alaska salmon canning industry, 1939

Item	Southeast Alaska	Central Alaska	Western Alaska	Total
PERSONS ENGAGED				
Fishermen:				
Whites.....	1,383	1,472	2,429	5,284
Natives.....	1,203	791	378	2,432
Japanese.....		2	1	3
Filipinos.....	9	1	2	12
Mexicans.....	2			2
Kanakas.....		2		2
Negro.....	1			1
Total.....	2,658	2,268	2,810	7,736
Shoresmen:				
Whites.....	2,451	1,757	2,239	6,447
Natives.....	1,985	746	117	2,848
Chinese.....	61	105	237	403

Persons engaged, wages paid, and operating units of Alaska salmon canning industry, 1939—Continued

Item	Southeast Alaska	Central Alaska	Western Alaska	Total
Shoresmen—Continued.				
Japanese.....	308	123	252	743
Filipinos.....	1,356	1,049	1,267	3,672
Mexicans.....	19	74	548	641
Puerto Ricans.....		17	60	77
Kanakas.....	2	3	35	40
Negroes.....	6	26	82	114
Miscellaneous ¹		21	42	63
Total.....	6,248	3,921	4,879	15,048
Transporters:				
Whites.....	790	697	530	2,023
Natives.....	43	56	1	100
Japanese.....	2	1		3
Filipinos.....		3	1	4
Puerto Rican.....			1	1
Kanaka.....		1		1
Negroes.....			4	4
Miscellaneous ¹			1	1
Total.....	841	758	538	2,137
Total:				
Whites.....	4,630	3,926	5,198	13,754
Natives.....	3,291	1,593	496	5,380
Chinese.....	61	105	237	403
Japanese.....	370	126	253	749
Filipinos.....	1,366	1,053	1,270	3,688
Mexicans.....	21	74	548	643
Puerto Ricans.....		17	61	78
Kanakas.....	2	6	35	43
Negroes.....	7	26	86	119
Miscellaneous.....		21	43	64
Grand total.....	9,747	6,947	8,227	24,921
Wages paid shoresmen.....	\$1,614,677	\$1,659,772	\$2,160,778	\$5,435,227
Wages paid transporters.....	428,075	417,093	345,866	1,191,034
OPERATING UNITS				
Plants:				
Shore canneries.....	44	30	22	102
Floating canneries—				
Power vessels.....		3	2	5
Net tonnage.....		4,304	5,281	9,585
Scows.....				2
Total plants operated.....	44	41	24	109
Vessels:				
Power, over 5 tons.....	488	199	94	781
Net tonnage.....	9,197	5,428	28,690	43,315
Launches.....	133	194	22	349
Power dories.....	10	117	12	139
Gill-net boats, powered.....	26	300		326
Gill-net boats, unpowered.....	80	43	1,219	1,342
Seine skiffs.....	268	252	9	529
Other rowboats and skiffs.....	669	473	197	1,339
Lighters and scows.....	213	184	140	537
Houseboats.....	13	2	34	49
Pile drivers.....	24	31	16	71
Pile pullers.....	2			10
Rigging scows.....	31	12		43
Apparatus:				
Purse seines.....	449	211	3	663
Fathoms.....	81,263	22,200	900	104,363
Beach seines.....	17	77		94
Fathoms.....	1,205	8,228		9,433
Gill nets.....	424	1,965	1,924	4,313
Fathoms.....	29,095	120,490	181,010	330,595
Traps, driven.....	23	126		149
Traps, floating.....	262	32		294

¹ Koreans, Chileans, Peruvians, etc.

Output and value of canned salmon in Alaska in 1939¹

Product	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Cases	Value	Cases	Value	Cases	Value	Cases	Value
Coho, or silver:								
½-pound flat	2,718	\$27,017	1,125	\$8,583			3,843	\$35,600
1-pound flat	83	408	651	4,742			734	5,240
1-pound tall	63,435	429,967	31,879	209,411			95,314	639,378
4-pound			4,231	24,901			4,231	24,901
Total	66,236	457,482	37,896	247,637			104,122	705,119
Ohum, or keta:								
½-pound flat	3,041	18,937	2,525	15,800			5,566	34,643
1-pound flat	203,063	1,331,421	236,167	1,054,448	94,750	\$425,325	623,980	2,811,194
4-pound			754	2,639			754	2,639
Total	296,104	1,350,258	239,446	1,072,893	94,750	425,325	630,300	2,848,476
Pink, or humpback:								
½-pound flat	47,537	339,097	1,557	10,839			49,094	349,936
1-pound tall	1,427,821	7,082,025	1,038,633	5,039,667	2		2,466,458	12,121,702
4-pound			14,475	57,908			14,475	57,908
Total	1,475,368	7,421,122	1,054,665	5,108,414	2		2,530,025	12,529,546
King, or spring:								
½-pound flat	10	100	6,660	102,521	10	122	6,680	102,743
1-pound flat			775	9,552	152	1,368	927	10,920
1-pound tall	2,431	19,209	17,079	127,409	5,341	40,369	24,851	186,987
Total	2,441	19,309	24,514	239,482	5,503	41,859	32,458	300,650
Red, or sockeye:								
½-pound flat	64,937	834,140	84,263	1,092,744	88,368	502,880	187,568	2,429,764
1-pound flat	2,224	22,240	41,644	395,817	590	5,900	44,458	423,957
1-pound tall	128,197	1,109,736	520,568	4,508,718	1,076,533	9,513,871	1,725,298	15,130,325
4-pound			8,924	73,245			8,924	73,245
Total	195,358	1,966,116	655,399	6,068,524	1,115,491	10,022,651	1,966,248	18,057,291
Grand total	2,035,497	11,214,287	2,011,910	12,736,950	1,215,746	10,489,845	5,263,163	34,441,082

¹ For the purpose of affording fair comparison, all cases are put upon the common basis of 48 1-pound cans per case.

Output of canned salmon in Alaska, in cases, 1934 to 1939¹

BY SPECIES

Product	1934	1935	1936	1937	1938	Average for 6-year period, 1934-38	1939	Percentage increase or decrease in 1939, as compared with 5-year average
Coho, or silver:								
½-pound flat	5,785	6,822	7,309	9,625	12,022	8,312	3,843	-53.77
1-pound flat	8,283	2,833	1,335	1,204	2,845	3,300	734	-77.76
1-pound tall	222,049	180,522	213,650	123,610	202,331	188,434	95,314	-49.42
4-pound				2,878	5,123	1,600	4,231	+104.44
Total	236,117	190,177	222,300	137,317	222,321	201,646	104,122	-48.30
Ohum, or keta:								
½-pound flat	2,298	1,047	1,500	5,883	5,523	3,370	5,566	+65.16
1-pound flat				39		8		-100.00
1-pound tall	738,343	851,281	1,099,583	723,815	778,966	838,398	623,980	-25.57
4-pound				1,095	2,264	672	754	+12.20
Total	740,641	852,928	1,101,083	730,832	786,753	842,448	630,300	-25.18

¹ The number of cases has been put upon the common basis of 48 1-pound cans per case.

Output of canned salmon in Alaska, in cases, 1934 to 1939—Continued

BY SPECIES—Continued

Product	1934	1935	1936	1937	1938	Average for 5-year period, 1934-38	1939	Percentage increase or decrease in 1939, as compared with 5-year average
Pink, or humpback:								
½-pound flat	28,793	44,560	37,406	33,338	50,782	38,976	49,094	+25.96
1-pound flat	1,668	687		438	4,105	1,380		-100.00
1-pound tail	3,793,732	3,198,819	4,522,388	3,586,905	3,103,493	3,653,067	2,466,456	-32.48
4-pound				4,698	14,498	3,839	14,475	+277.05
Total	3,824,193	3,244,066	4,559,794	3,625,379	3,232,878	3,697,262	2,530,025	-31.57
King, or spring:								
½-pound flat	9,983	13,462	10,388	15,495	2,354	10,337	6,680	-35.38
1-pound flat	10,214	6,520	5,722	8,213	6,111	6,956	927	-89.67
1-pound tail	32,666	10,423	35,774	47,760	35,348	33,594	24,851	-26.03
Total	52,863	36,405	51,884	69,468	43,813	50,887	32,458	-36.22
Red, or sockeye:								
½-pound flat	88,051	87,498	137,219	149,424	122,642	116,067	187,568	+60.36
1-pound flat	73,430	57,693	118,090	87,654	51,008	77,695	44,458	-42.78
1-pound tail	2,466,535	664,356	2,247,233	1,860,176	2,338,414	1,916,542	1,725,298	-9.94
4-pound				3,415	8,569	2,307	8,024	+272.30
Total	2,628,016	809,546	2,502,542	2,100,669	2,521,233	2,113,601	1,906,248	-6.97
Grand total	7,481,830	5,133,122	8,437,603	6,669,665	6,806,998	6,905,844	5,263,153	-23.79

BY DISTRICTS AND SPECIES

Southeast Alaska:								
Coho, or silver	158,527	142,493	134,722	88,525	143,765	133,606	66,236	-50.42
Chum, or keta	394,212	540,948	778,339	503,766	474,453	538,343	290,104	-45.00
Pink, or humpback	2,622,362	2,200,060	2,925,144	2,143,168	1,886,769	2,355,501	1,475,358	-37.37
King, or spring	15,594	11,108	20,505	30,693	16,370	18,854	2,441	-87.05
Red, or sockeye	104,398	159,429	218,007	167,744	192,591	168,434	195,358	+16.98
Total	3,295,093	3,054,038	4,076,717	2,933,896	2,713,948	3,214,738	2,035,497	-36.68
Central Alaska:								
Coho, or silver	76,371	47,461	86,007	48,654	78,211	67,341	37,886	-43.74
Chum, or keta	313,233	302,123	296,188	191,610	252,686	271,108	239,446	-11.70
Pink, or humpback	1,189,872	1,044,002	1,603,584	1,482,210	1,340,109	1,335,155	1,054,665	-21.01
King, or spring	28,472	24,462	27,073	31,644	20,944	26,519	24,514	-7.56
Red, or sockeye	709,470	394,183	856,829	462,241	481,815	578,908	655,399	+13.21
Total	2,327,418	1,802,231	2,869,681	2,216,359	2,179,765	2,279,091	2,011,910	-11.72
Western Alaska:								
Coho, or silver	1,219	223	1,571	138	345	699		-100.00
Chum, or keta	33,196	9,857	26,556	35,466	59,014	32,936	94,750	+187.68
Pink, or humpback	1,959	4	31,066	1		6,600	2	-99.97
King, or spring	8,797	835	4,306	7,131	8,499	5,514	5,503	-20
Red, or sockeye	1,814,148	265,934	1,427,706	1,476,684	1,846,827	1,366,200	1,116,491	-18.35
Total	1,859,319	276,863	1,491,205	1,510,410	1,913,285	1,412,015	1,215,746	-13.90
Grand total	7,481,830	5,133,122	8,437,603	6,669,665	6,806,998	6,905,844	5,263,153	-23.79

Relative importance of each species of canned salmon within each district in 1939

District	Coho	Chum	Pink	King	Red	Total, all species
	Percent	Percent	Percent	Percent	Percent	Percent
Southeast Alaska	3.3	14.5	72.5	0.1	9.6	100.0
Central Alaska	1.9	11.9	52.4	1.2	32.6	100.0
Western Alaska	.0	7.8	.0	.4	91.8	100.0
All Alaska	2.0	12.0	48.1	.6	37.3	100.0

Relative importance of each district in the production of each species of salmon canned in 1939

District	Coho	Chum	Pink	King	Red	Total, all species
	Percent	Percent	Percent	Percent	Percent	Percent
Southeast Alaska.....	63.6	47.0	53.3	7.5	9.9	38.7
Central Alaska.....	36.4	38.0	41.7	75.5	33.3	38.2
Western Alaska.....	.0	15.0	.0	17.0	56.7	23.1
Total.....	100.0	100.0	100.0	100.0	100.0	100.0

Average annual price per case of 48 1-pound cans of salmon, 1929 to 1939

Product	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Coho, or silver.....	\$7.59	\$8.26	\$6.51	\$4.12	\$5.20	\$5.23	\$6.40	\$6.51	\$8.14	\$6.29	\$6.77
Chum, or keta.....	5.35	3.60	3.19	2.79	4.12	3.65	3.83	3.58	4.62	3.61	4.52
Pink, or humpback.....	6.06	4.17	3.46	3.14	4.52	4.10	4.14	3.94	4.95	3.86	4.95
King, or spring.....	11.92	13.32	9.40	5.46	7.51	6.85	8.70	7.95	9.94	7.50	9.26
Red, or sockeye.....	10.71	12.57	9.20	5.61	6.71	6.72	9.32	8.38	10.12	7.77	9.18

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 statistics for 1938. 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 packing fish caught both in Prince William Sound and in the Copper River area or at several plants in the Kodiak area which at times obtain a limited supply of fish from the Chignik or Cook Inlet runs, due segregation has been made in order to credit each district with the pack from salmon caught therein.

Insofar as the southeastern Alaska area is concerned, a change is being made to eliminate certain subdivisions. Except in the Yakutat region, the packs for the several districts did not represent the output of any clearly defined or independent runs, and it would seem that the use made of the data does not warrant a continuation of the work involved in their preparation, in view of the increasing practice of transferring fish from one district to another for canning. The pack figures for southeast Alaska, therefore, are shown for only 2 subdivisions, instead of 5 as heretofore.

The various 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.—Mainland shore from Castle Cape to Cape Kunmik.

Kodiak-Afognak Islands.—Kodiak, Spruce, and Raspberry Islands.

Cook Inlet.—The shores of Cook Inlet.

Prince William Sound.—Resurrection Bay to Point Whittshed.

Copper and Bering Rivers.—Point Whittshed to Bering River.

SOUTHEASTERN ALASKA

Yakutat and Dry Bay.—Yakutat Bay to and including Dry Bay.
Cape Fairweather-Dixon Entrance.—All waters of southeastern Alaska south of Cape Fairweather.

Pack of canned salmon in Alaska in 1939, by districts ¹

District	Coho	Chum	Pink	King	Red	Total	Percentage increase or decrease from 1938
	<i>Cases</i>	<i>Cases</i>	<i>Cases</i>	<i>Cases</i>	<i>Cases</i>	<i>Cases</i>	
Bristol Bay.....	88,272	88,272	2	5,038	1,059,181	1,162,491	-37.13
Port Moller and Herendeen Bay.....	6,478	6,478	2	465	56,310	63,255	-20.99
Ikatan-Shumagin Islands.....	9,835	120,901	292,203	4,483	149,046	576,468	-.12
Chignik.....	728	6,874	13,744	377	142,770	164,493	+191.59
Kodiak-Afognak Islands.....	9,442	62,185	603,492	651	115,604	791,374	+16.89
Cook Inlet.....	13,076	20,726	15,570	16,554	183,304	249,230	-14.26
Prince William Sound.....	3,858	28,750	129,491	257	12,390	174,752	-65.74
Copper and Bering Rivers.....	947	4	165	2,192	52,285	55,593	-18.78
Yakutat and Dry Bay.....	9,301	47	2,237	1,029	25,463	38,677	-38.93
Cape Fairweather-Dixon Entrance.....	56,935	296,057	1,473,121	812	169,895	1,996,820	-24.67
Total.....	104,122	630,300	2,530,025	32,458	1,966,249	5,263,153	-22.68

¹ Pack reduced to the basis of 48 1-pound cans per case.

Canneries operated in Alaska in 1939, by districts

District	Canneries located in district	Canneries handling salmon taken in district	District	Canneries located in district	Canneries handling salmon taken in district
	<i>Number</i>	<i>Number</i>		<i>Number</i>	<i>Number</i>
Bristol Bay.....	22	22	Prince William Sound.....	9	7
Port Moller and Herendeen Bay.....	4	4	Copper and Bering Rivers.....	3	7
Ikatan-Shumagin Islands.....	9	9	Yakutat and Dry Bay.....	1	1
Chignik.....	2	5	Cape Fairweather-Dixon Entrance.....	43	43
Kodiak-Afognak Islands.....	13	13	Total (without duplication).....	109	-----
Cook Inlet.....	8	9			

¹ Includes 1 floating plant that was operated in more than 1 district.

² Includes 3 floating plants that were operated in more than 1 district.

³ Includes 4 floating plants that were operated in more than 1 district.

EMPLOYMENT AND WAGES

In cooperation with the Alaska Planning Council certain detailed statistics were collected for the first time with regard to labor employed and wages paid by the salmon-canning industry in Alaska in 1939. These statistics have to do with the labor and wages by racial distribution; the number of residents and nonresidents, whether citizens or aliens, and the wages paid these groups in and outside Alaska; and the number of salmon packed that were caught by resi-

dents and non-residents by the various types of gear. The data thus collected are summarized in the following tables:

Labor and wages, by racial distribution, Alaska salmon canning industry, 1939

Item	Southeast Alaska				Central Alaska			
	Fisher- men	Shores- men	Trans- porters	Total	Fisher- men	Shores- men	Trans- porters	Total
Whites.....	835	2,046	702	3,583	1,282	1,432	622	3,336
Wages paid:								
In Alaska.....	\$188,176	\$534,206	\$237,065	\$959,447	\$578,598	\$471,503	\$182,193	\$1,232,294
Outside Alaska.....	\$95,436	\$290,435	\$146,524	\$532,395	\$243,753	\$429,241	\$191,859	\$864,853
Natives.....	1,026	1,804	31	2,861	687	680	52	1,419
Wages paid:								
In Alaska.....	\$289,919	\$215,107	\$9,719	\$514,745	\$343,240	\$147,364	\$27,286	\$517,890
Outside Alaska.....	.....	\$217	.....	\$217	.....	\$503	\$1,352	\$1,855
Other nationalities.....	12	1,681	2	1,695	.....	1,331	5	1,336
Wages paid:								
In Alaska.....	\$2,188	\$235,153	\$574	\$237,915	.....	\$202,429	.....	\$202,429
Outside Alaska.....	.....	\$168,237	.....	\$168,237	.....	\$316,463	\$2,104	\$318,567
Employees for whom seg- regation of wages could not be furnished: ¹								
Whites.....	548	405	94	1,047	190	325	75	590
Natives.....	237	181	12	430	104	66	4	174
Other nationalities.....	.....	131	.....	131	5	87	.....	92
Wages paid:								
In Alaska.....	\$64,786	\$142,339	.....	\$207,125	\$117,288	\$37,602	\$630	\$165,520
Outside Alaska.....	.....	.....	.....	.....	.....	\$1,780	\$7,544	\$9,324
Unallocated ².....	.....	\$28,983	\$34,193	\$63,176	\$29,983	\$52,887	\$4,725	\$87,595
Summary:								
Persons engaged:								
Whites.....	1,383	2,451	790	4,630	1,472	1,757	697	3,926
Natives.....	1,263	1,985	43	3,291	791	746	56	1,593
Other nationalities.....	12	1,812	2	1,826	5	1,418	5	1,428
Total.....	2,658	6,248	841	9,747	2,268	3,921	758	6,947
Wages paid:								
In Alaska.....	\$545,069	\$1,126,805	\$247,358	\$1,919,232	\$1,039,128	\$858,898	\$210,109	\$2,108,133
Outside Alaska.....	95,436	458,889	146,524	700,849	243,753	747,987	202,859	1,194,599
Unallocated ².....	.....	28,983	34,193	63,176	29,983	52,887	4,725	87,595
Total ³	640,505	1,614,677	428,076	2,683,257	1,312,864	1,659,772	417,693	3,390,327

Item	Western Alaska				Total			
	Fisher- men	Shores- men	Trans- porters	Total	Fisher- men	Shores- men	Trans- porters	Total
Whites.....	2,335	2,198	530	5,063	4,452	5,676	1,854	11,982
Wages paid:								
In Alaska.....	\$908,920	\$252,393	\$68,135	\$1,229,448	\$1,675,094	\$1,258,102	\$487,393	\$3,421,189
Outside Alaska.....	\$1,240,863	\$987,772	\$272,218	\$2,500,853	\$1,630,072	\$1,707,448	\$610,601	\$3,948,121
Natives.....	378	117	1	496	2,091	2,601	84	4,776
Wages paid:								
In Alaska.....	\$303,784	\$43,835	\$207	\$347,826	\$936,943	\$406,306	\$37,272	\$1,380,521
Outside Alaska.....	.....	.....	.....	.....	.....	\$720	\$1,352	\$2,072
Other nationalities.....	3	2,323	7	2,533	16	5,535	14	5,565
Wages paid:								
In Alaska.....	\$2,537	\$144,815	.....	\$147,352	\$4,725	\$582,397	\$574	\$587,696
Outside Alaska.....	.....	\$685,312	\$5,240	\$690,558	.....	\$1,170,012	\$7,350	\$1,177,362
Employees for whom seg- regation of wages could not be furnished: ¹								
Whites.....	94	41	.....	135	832	771	169	1,772
Natives.....	.....	.....	.....	.....	341	247	16	604
Other nationalities.....	.....	.....	.....	.....	5	218	.....	223
Wages paid:								
In Alaska.....	.....	.....	.....	.....	\$182,074	\$179,941	\$630	\$362,645
Outside Alaska.....	.....	\$45,711	.....	\$45,711	.....	\$47,491	\$7,544	\$55,035
Unallo- cated ².....	.....	\$940	.....	\$940	\$29,983	\$82,810	\$38,918	\$151,711

¹ Includes independent fishermen credited to the salmon canning industry.

² Incomplete, inasmuch as information is not available regarding amounts paid independent fishermen.

Labor and wages, by racial distribution, Alaska salmon canning industry, 1939—Con.

Item	Western Alaska				Total			
	Fisher- men	Shores- men	Trans- porters	Total	Fisher- men	Shores- men	Trans- porters	Total
Summary:								
Persons engaged:								
Whites.....	2,429	2,239	530	5,198	5,284	6,447	2,023	13,754
Natives.....	378	117	1	496	2,432	2,848	100	5,380
Other national- ities.....	3	2,523	7	2,533	20	5,753	14	5,787
Total.....	2,810	4,879	538	8,227	7,736	15,048	2,137	24,021
Wages paid:								
In Alaska.....	\$1,215,241	\$441,043	\$68,402	\$1,724,686	\$2,799,436	\$2,426,746	\$525,869	\$5,752,051
Outside Alaska.....	1,200,883	1,718,795	277,464	3,287,142	1,630,072	2,925,671	626,847	5,182,590
Unallocated ¹		940		940	29,983	82,810	38,918	161,711
Total ²	2,506,124	2,160,778	345,866	5,012,768	4,459,491	5,435,227	1,191,634	11,086,352

Labor and wages of residents and nonresidents, Alaska salmon canning industry, 1939

Item	Southeast Alaska				Central Alaska			
	Fisher- men	Shores- men	Trans- porters	Total	Fisher- men	Shores- men	Trans- porters	Total
Residents:								
Citizens.....	1,625	3,725	311	5,661	1,629	1,451	152	3,132
Wages paid:								
In Alaska.....	\$439,119	\$603,939	\$112,118	\$1,155,176	\$822,936	\$319,744	\$68,751	\$1,211,431
Outside Alaska.....	\$991	\$7,789	\$11,502	\$20,282	\$3,989	\$839		\$4,828
Aliens.....	9	131	2	142	3	59	2	64
Wages paid:								
In Alaska.....	\$2,835	\$29,279	\$574	\$32,688	\$793	\$26,670	\$1,469	\$28,932
Outside Alaska.....		\$1,164		\$1,164				
Nonresidents:								
Citizens.....	488	1,044	415	1,947	569	1,294	352	2,215
Wages paid:								
In Alaska.....	\$99,639	\$323,034	\$132,530	\$555,203	\$208,924	\$364,509	\$129,853	\$703,286
Outside Alaska.....	\$90,476	\$304,382	\$132,764	\$527,612	\$241,438	\$372,259	\$138,457	\$752,154
Aliens.....	14	1,082	7	1,103	9	418	5	432
Wages paid:								
In Alaska.....	\$3,476	\$156,359	\$2,136	\$161,971	\$6,473	\$100,205	\$3,432	\$110,110
Outside Alaska.....	\$3,969	\$145,564	\$2,268	\$161,791	\$2,315	\$60,964		\$63,279
Additional items for which complete segregation could not be furnished:								
Residents.....		71		71		95	8	103
Wages paid, in Alaska.....		\$14,194		\$14,194		\$47,770	\$6,604	\$54,374
Nonresidents.....						392	186	578
Wages paid, outside Alaska.....						\$320,775	\$63,563	\$384,338
Unallocated:								
Persons engaged ¹	622	195	106	923	158	212	53	423
Wages paid ²		\$28,983	\$34,193	\$63,176	\$29,983	\$62,887	\$4,725	\$87,595
Summary:								
Persons engaged:								
Residents.....	1,534	3,927	313	5,774	1,532	1,605	162	3,299
Nonresidents.....	502	2,120	422	3,050	578	2,104	543	3,225
Unallocated.....	622	195	106	923	158	212	53	423
Total.....	2,658	6,248	841	9,747	2,268	3,921	758	6,947
Wages paid:								
In Alaska.....	\$645,069	\$1,126,805	\$247,358	\$1,919,232	\$1,030,126	\$858,898	\$210,109	\$2,108,133
Outside Alaska.....	95,436	458,889	146,524	700,849	243,753	747,087	202,859	1,194,699
Unallocated ²		28,983	34,193	63,176	20,983	52,887	4,725	87,595
Total ²	640,505	1,614,677	428,075	2,683,257	1,312,862	1,650,772	417,693	3,390,327

¹ Includes independent fishermen credited to the salmon canning industry.² Incomplete, inasmuch as information is not available regarding amounts paid independent fishermen.

Labor and wages of residents and nonresidents, Alaska salmon canning industry, 1939—Continued

Item	Western Alaska				Total			
	Fisher- men	Shores- men	Trans- porters	Total	Fisher- men	Shores- men	Trans- porters	Total
Residents:								
Citizens.....	1,262	431	32	1,725	4,316	5,607	495	10,418
Wages paid:								
In Alaska.....	\$962,305	\$140,466	\$14,609	\$1,117,380	\$2,224,360	\$1,064,149	\$195,478	\$3,483,987
Outside Alaska.....					\$991	\$11,778	\$12,341	\$25,110
Allens.....	23	19	1	43	35	209	5	249
Wages paid:								
In Alaska.....	\$21,156	\$8,816	\$182	\$30,154	\$24,784	\$64,765	\$2,225	\$91,774
Outside Alaska.....						\$1,164		\$1,164
Nonresidents:								
Citizens.....	1,335	1,413	349	3,097	2,392	3,751	1,116	7,259
Wages paid:								
In Alaska.....	\$228,106	\$133,665	\$52,995	\$414,766	\$536,669	\$821,208	\$315,378	\$1,673,255
Outside Alaska.....	\$1,190,271	\$609,612	\$181,668	\$1,981,551	\$1,531,185	\$1,286,253	\$452,869	\$3,270,307
Allens.....	96	1,302	8	1,406	119	2,802	20	2,941
Wages paid:								
In Alaska.....	\$3,674	\$100,522		\$104,196	\$13,623	\$357,086	\$5,568	\$376,277
Outside Alaska.....	\$91,612	\$292,713	\$4,015	\$388,240	\$97,896	\$489,231	\$7,183	\$594,310
Additional items for which complete segregation could not be furnished:								
Residents.....		114	1	115		280	9	289
Wages paid, in Alaska.....		\$57,674	\$616	\$58,190		\$119,538	\$7,220	\$126,758
Nonresidents.....		1,550	147	1,707		1,951	333	2,284
Wages paid, outside Alaska.....		\$816,470	\$90,891	\$907,361		\$1,137,245	\$154,454	\$1,291,699
Unallocated:								
Persons engaged ¹	94	41		135	874	448	159	1,481
Wages paid ²		\$940		\$940	\$20,983	\$82,810	\$38,918	\$151,711
Summary:								
Persons engaged:								
Residents.....	1,285	564	34	1,883	4,351	6,096	500	10,956
Nonresidents.....	1,431	4,274	504	6,209	2,511	8,504	1,409	12,484
Unallocated.....	94	41		135	874	448	159	1,481
Total.....	2,810	4,879	538	8,227	7,736	15,048	2,137	24,921
Wages paid:								
In Alaska.....	\$1,215,241	\$441,043	\$68,402	\$1,724,686	\$2,799,436	\$2,426,740	\$525,860	\$5,752,051
Outside Alaska.....	1,290,983	1,718,785	277,484	3,287,142	1,030,072	2,925,671	626,847	5,182,590
Unallocated ²		940		940	29,983	82,810	38,918	151,711
Total ²	2,506,124	2,160,778	345,886	5,012,708	4,459,491	5,435,227	1,191,634	11,086,352

¹ Includes independent fishermen credited to the salmon canning industry.² Incomplete, inasmuch as information is not available regarding amounts paid independent fishermen.

Source of supply of salmon packed by Alaska canneries in 1939

Apparatus	Catch, by districts and by resident and nonresident fishermen							
	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Residents	Nonresidents	Residents	Nonresidents	Residents	Nonresidents	Residents	Nonresidents
	Number	Number	Number	Number	Number	Number	Number	Number
Seines.....	8,441,732	750,660	9,146,622	3,790,614		691,339	17,588,354	5,232,613
Gill nets.....	760,672	24,064	2,205,357	768,401	4,009,069	10,487,004	7,034,998	11,280,369
Traps.....	5,338,597	14,146,072	1,543,073	14,380,609			0,881,670	28,526,681
Lines.....	114,820						114,820	
Total.....	14,655,721	14,921,696	12,955,052	18,939,624	4,009,069	11,178,343	31,619,842	45,039,663

MILD CURING

The output of mild-cured coho salmon in 1939 showed a sharp decline from that of the previous year, but there was a slight gain in the production of kings, with the result that the season's total mild-cured product was above the average, although somewhat short of that for 1938. One hundred and sixty-six tierces of kings were prepared at or near the mouth of the Yukon River for the outside market, and the remainder came from southeast Alaska.

Sixteen plants were in operation, as compared with 21 in the preceding year, and several additional concerns again prepared mild-cured salmon in connection with canning and other operations. The number of persons employed increased from 1,753 in 1938 to 1,849 in 1939. It is thought that the difference may be accounted for largely by the more thorough collection of statistical data, owing to the new general regulation which requires that the name and number of each trolling boat be furnished in writing each season to the local representative of the Bureau, prior to the commencement of commercial fishing.

The total output of mild-cured salmon was 5,909,600 pounds, valued at \$1,101,176, a decrease of 609,600 pounds in quantity and \$177,755 in value from the production in 1938.

Persons engaged, wages paid, and operating units, Alaska salmon mild-curing industry, 1939

Item	Southeast Alaska	Western Alaska	Total
PERSONS ENGAGED			
Fishermen:			
Whites	1,301	1	1,302
Natives	148	20	168
Filipinos	3		3
Total	1,452	21	1,473
Shoresmen:			
Whites	307		307
Natives	24	31	55
Total	331	31	362
Transporters:			
Whites	12		12
Natives		2	2
Total	12	2	14
Grand total	1,795	54	1,849
Wages paid shoresmen	\$171,823	\$3,150	\$174,973
Wages paid transporters	\$8,273	\$300	\$8,573
OPERATING UNITS			
Plants:			
Shore	11	2	13
Floating:			
Barges	2		2
Net tonnage	300		300
Scow		1	1
Total plants operated	13	3	16
Vessels:			
Power, over 5 tons	369	3	372
Net tonnage	3,013	43	3,056
Launches	563	1	564
Power dory		1	1
Gill-net boats		9	9
Rowboats and skiffs	99		99
Apparatus:			
Gill nets		22	22
Fathoms		534	534
Lines	3,687		3,687
Wheels		4	4

Products of Alaska salmon mild-curing industry in 1939

Products	Southeast Alaska		Western Alaska		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
Coho, or silver.....	¹ 119,200	\$17,163			119,200	\$17,163
King, or spring.....	² 5,657,600	1,067,013	³ 132,800	\$17,000	⁴ 5,790,400	1,084,013
Total.....	5,776,800	1,084,176	132,800	17,000	5,909,600	1,101,176

¹ 149 tierces.² 7,072 tierces.³ 166 tierces.⁴ 7,238 tierces.

PICKLING

A very light production of pickled salmon was reported for the 1939 season in Alaska, the amount being the smallest for any year since 1932. Nearly 76 percent of the season's output was prepared in central Alaska, chiefly in the Ikatan-Shumagin region, 17 percent came from western Alaska, and 7 percent from the southeastern district. The bulk of the pack consisted of reds and cohos.

There were 36 persons employed, or 181 less than the number reported for 1938. The total output was 322,400 pounds, valued at \$34,121, as compared with 1,177,685 pounds valued at \$122,421 in the previous year.

Persons engaged, wages paid, and operating units, Alaska salmon-pickling industry, 1939

Item	Southeast Alaska	Central Alaska	Western Alaska	Total
PERSONS ENGAGED				
Fishermen:				
Whites.....	3	20	5	28
Natives.....	2	3		5
Total.....	5	23	5	33
Shoresmen: Whites.....		3		3
Grand total.....	5	26	5	36
Wages paid shoresmen.....		\$528		\$528
OPERATING UNITS				
Plants: Shore.....	2	13	4	19
Vessels:				
Power, over 5 tons.....		4		4
Net tonnage.....		40		40
Launches.....	5	7		12
Power doros.....		9		9
Gill-net boats.....	2	2		4
Seine skiffs.....	1	14		15
Other rowboats and skiffs.....		8	2	10
Scow.....		1		1
Apparatus:				
Purse seine.....		1		1
Fathoms.....		100		100
Beach seines.....		14		14
Fathoms.....		998		998
Gill nets.....	10	17	7	34
Fathoms.....	460	913	185	1,558

Products of Alaska salmon-pickling industry in 1939

Products	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Coho, or silver.....	17,300	\$1,213	86,500	\$6,949	3,100	\$327	106,900	\$8,489
Chum, or keta.....	2,800	196					2,800	196
King, or spring.....			1,000	235	8,900	774	10,500	1,009
Red, or sockeye.....	2,900	360	155,300	10,139	44,000	4,928	202,200	24,427
Total.....	23,000	1,769	243,400	26,323	56,000	6,029	322,400	34,121

FRESH SALMON

Operations in the fresh-salmon business were on about the same scale as in the previous year and were carried on chiefly in connection with other branches of the fisheries. Except for a small output incidental to trout operations at Seward, in the central district, the entire production was from southeast Alaska. Four dealers whose principal output was fresh salmon gave employment to 14 white shoresmen and 5 transporters.

The total products amounted to 3,912,918 pounds, valued at \$284,133, as compared with 3,817,042 pounds valued at \$291,335 in 1938—an increase of about 3 percent in quantity, but a decrease of 2 percent in value.

The foregoing figures do not include fresh salmon sold to halibut boats for bait, but they do include fish exported to canneries in British Columbia.

Products of Alaska fresh-salmon industry in 1939

Species	Pounds	Value	Species	Pounds	Value
Coho, or silver.....	1,527,438	\$80,690	Red, or sockeye.....	610,323	\$33,997
Chum, or keta.....	8,749	317			
Pink, or humpback.....	500	10	Total.....	3,912,918	284,133
King, or spring.....	1,765,908	169,219			

FREEZING

The freezing of salmon in Alaska is largely incidental to mild curing and other branches of the fisheries. One hundred and three white shoresmen, not elsewhere recorded, were identified with this industry. An outstanding feature of the industry in 1939 was the quick-freezing of a substantial quantity of salmon steaks and fillets by the Alaska Pacific Salmon Co. at Ketchikan and Sand Point. At the former plant, the production consisted of coho salmon and a small quantity of kings, while at the latter pink salmon were frozen.

The total output of frozen salmon in 1939 was 4,352,714 pounds, valued at \$340,133, as compared with 7,185,046 pounds valued at \$530,951 in 1938—a decrease of 39 percent in quantity and about 36 percent in value. The foregoing products for 1939 include 308,761 pounds of frozen steaks and fillets, valued at \$36,914. Except for 186,626 pounds of pink salmon steaks and fillets from Sand Point, in central Alaska, the entire production of frozen salmon was from the southeastern district.

Frozen salmon used as bait in the halibut fishery or as animal feed on fur farms are not included in the above figures but are shown under miscellaneous salmon products.

Products of Alaska frozen-salmon industry in 1939

Species	Pounds	Value	Species	Pounds	Value
Coho, or silver.....	1 2, 142, 008	\$170, 940	King, or spring.....	1 1, 510, 727	\$134, 699
Chum, or keta.....	497, 897	18, 778			
Pink, or humpback.....	2 202, 082	15, 716	Total.....	4, 352, 714	340, 133

¹ Includes 117,110 pounds of quick-frozen steaks and filets, valued at \$21,078.

² Includes 186,626 pounds of quick-frozen steaks and filets, valued at \$14,930.

³ Includes 5,035 pounds of quick-frozen salmon, valued at \$906.

DRY-SALTED, DRIED, AND OTHER MISCELLANEOUS SALMON PRODUCTS

Miscellaneous salmon products reported for southeast Alaska in 1939 consisted of 24,603 pounds of fresh salmon sold to halibut fishermen for bait, valued at \$200, and 155,205 pounds of frozen salmon for bait and mink feed, valued at \$1,551.

Three outfits in central Alaska prepared a small pack of canned smoked salmon, the total production amounting to 141 cases of cohos packed in one-half-pound cans, 48 to the case, valued at \$927; 31 cases of cohos, 48 1-pound cans to the case, valued at \$465; and 7 cases of red salmon, 48 half-pound cans to the case, valued at \$49. In this district, also, there were produced 5,523 pounds of dry-salted salmon, valued at \$406.

Products of the Yukon, Tanana, and Kuskokwim Rivers included 3,200 pounds of dry-salted salmon, valued at \$320, and 456,000 pounds of dried salmon, valued at \$36,500. Sixteen whites and 767 natives engaged in the fishery, and the apparatus used consisted of 247 wheels, 545 gill nets of 13,710 fathoms, 2 dories, and 50 rowboats and skiffs.

Production of dry-salted, dried, and other miscellaneous salmon products in Alaska in 1939

Products	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Dry-salted:								
Coho, or silver.....			4, 461	\$319			4, 461	\$319
King, or spring.....					3, 200	\$320	3, 200	\$320
Red, or sockeye.....			1, 062	87			1, 062	87
Total.....			5, 523	406	3, 200	320	8, 723	726
Dried:								
Chum, or keta.....					402, 000	32, 000	402, 000	32, 000
King, or spring.....					42, 000	3, 600	42, 000	3, 600
Red, or sockeye.....					12, 000	900	12, 000	900
Total.....					456, 000	36, 500	456, 000	36, 500
Smoked and canned:								
Coho, or silver.....			4, 872	1, 392			4, 872	1, 392
Red, or sockeye.....			168	49			168	49
Total.....			5, 040	1, 441			5, 040	1, 441
Fresh for bait:								
Coho, or silver.....	270	\$3					270	3
Chum, or keta.....	24, 333	197					24, 333	197
Total.....	24, 603	200					24, 603	200
Frozen for bait and mink feed:								
Coho, or silver.....	2, 650	26					2, 650	26
Chum, or keta.....	72, 535	725					72, 535	725
Pink, or humpback.....	80, 020	800					80, 020	800
Total.....	155, 205	1, 551					155, 205	1, 551
Grand total.....	179, 808	1, 751	10, 563	1, 847	459, 200	36, 820	649, 671	40, 418

BYPRODUCTS

In southeast Alaska one plant was engaged in the manufacture of salmon meal and oil, its operations being on virtually the same scale as in the previous year. A salmon cannery on Larsen Bay, in the central district, again produced a limited quantity of salmon by-products in connection with its canning operations. Employees credited to the industry numbered 24 white shoresmen and 2 white transporters.

Products in 1939 consisted of 1,704,715 pounds of meal, valued at \$35,184, and 68,715 gallons of oil, valued at \$21,682, as compared with 2,074,000 pounds of meal, valued at \$31,413, and 67,988 gallons of oil, valued at \$15,757, in 1938—a decrease of about 18 percent in the output of meal and an increase of 1 percent in the output of oil.

HERRING

Although the output of Scotch-cured herring increased somewhat from that of the previous year, the bulk of the herring catch again went into the manufacture of meal and oil. In southeastern Alaska no salteries were operated, and the only herring products other than those of the reduction plants were bait for the halibut fishermen and a small quantity used for feed on fur farms. All the other important producing centers showed some gain over the previous year in the amount of cured herring, the chief increase being in the Kodiak area. Nearly 45 percent of the total output of Scotch-cured herring for the season came from that area, 33 percent from Prince William Sound, and 22 percent from western Alaska. Each of these areas also produced limited quantities of other cured herring, principally bloater stock. Operators on Cook Inlet prepared 18,300 pounds of pickled herring, most of which was Norwegian cured.

A further shift of operations from southeastern to central Alaska was noticeable. In the former district only 4 herring reduction plants were operated, the fewest since 1922, while in the central district the number rose to 12, or 2 more than had ever before been engaged in the industry there. Of these 2 additional plants, 1 was operated by the Northwestern Herring Co. on Drier Bay, in the Prince William Sound area, and the other was operated by the Chatham Strait Fish Co. on Zachar Bay, in the Kodiak area. Both these companies had formerly owned herring plants in southeastern Alaska. Their operations in the central district were carried on in buildings which had at one time been used as salmon canneries. In all, 7 plants on Prince William Sound and 5 in the Kodiak area were engaged in the manufacture of herring meal and oil.

In view of the proposed expansion of herring-reduction operations in the Kodiak and Prince William Sound areas, and in order to prevent a repetition there of the disastrous results of overfishing which had occurred in the Cook Inlet area and in parts of southeastern Alaska, the Department announced under date of March 24, 1939, that any such expansion which might threaten depletion of the herring resources would necessitate further restriction on fishing. Upon the basis of the average catches in recent years, production limits of 200,000 barrels of herring for the Kodiak area and 350,000 barrels for the Prince William Sound area were tentatively established.

As the season advanced, however, it became apparent that the herring stocks in these two areas were well above the average, and

the quotas were accordingly revised to permit an additional catch of 100,000 barrels in each area. This limit was reached in the Kodiak area, and commercial fishing there, except by gill nets or for bait purposes, was closed at 6 o'clock postmeridian August 22. In the Prince William Sound area the rate of production declined toward the end of the season, and the catch amounted to about 422,000 barrels when commercial fishing other than for bait was prohibited at the close of September 25.

There was evidence of severe depletion of herring in southeastern Alaska, and the regulations at the beginning of the year prohibited all commercial fishing for herring, except for bait purposes, in the vicinity of Cape Ommaney. Subsequent large catches of herring from the Cape Ommaney population in the Sitka region necessitated further drastic curtailment, and commercial fishing for herring other than for bait purposes was prohibited after August 2. The small production of herring in southeastern Alaska, therefore, was owing both to the depleted condition of the herring population and to the drastic restrictions applied there.

Notwithstanding the curtailment in southeastern Alaska, the production of herring meal and oil in the Territory as a whole was the second largest in the history of the industry, exceeded only by that of 1937. There were 15,737,769 pounds of meal and 2,220,979 gallons of oil produced in the Prince William Sound area, or 47 percent of the total output of each. The production in the Kodiak area amounted to 11,028,640 pounds of meal and 1,725,965 gallons of oil, or 33 percent and 36 percent of the total, respectively; while southeast Alaska produced the remaining 6,484,688 pounds of meal and 821,639 gallons of oil, representing 20 percent and 17 percent of these respective products.

As in the previous year, a supply of frozen herring for bait was imported from Prince Rupert, owing to a shortage in the southeastern Alaska area during part of the season.

Eighteen concerns handled herring in southeast Alaska, including 6 cold-storage plants that froze herring for bait and 8 outfits engaged solely in the production of bait herring. The 4 reduction plants which operated in the district were as follows:

Arentsen & Co.....	Big Port Walter.
Atlas Packing Corporation.....	Deep Cove.
Buchan & Heinen Packing Co.....	Port Armstrong.
Storfold & Grondahl Packing Co.....	Washington Bay.

Of the 12 plants in central Alaska which manufactured herring oil and meal, 5 packed Scotch-cured herring also, 1 packed Norwegian-cured herring, and 2 others produced some bloater stock. The principal herring operators in central Alaska were as follows:

Saltery and reduction plants—

Apex Fish Co.....	Port Wakefield.
Chatham Strait Fish Co.....	Crab Bay.
W. J. Imlach.....	Port Benny.
Oceanic Fisheries Co., Inc.....	Port Oceanic and Port Vita.
Perfection Fisheries, Inc.....	Thumb Bay.
San Juan Fishing & Packing Co.....	Port San Juan.
Shepard Point Packing Co.....	Port Ashton.

Reduction plants—

Chatham Strait Fish Co.....	Zachar Bay.
George Hogg & Co.....	Blue Fox Bay.
Northwestern Herring Co.....	Drier Bay.
Southwestern Herring, Inc.....	Iron Creek.

In western Alaska five plants produced pickled herring, consisting of the Scotch-cured product and bloater stock. One of these plants was engaged primarily in the cod fishery. The following were the principal operators in the western district:

Alaska Commercial Co.....	Unalaska.
Jordan Colombos Lambides.....	Dutch Harbor.
Golovin Bay Packing Co.....	Golovin.
Hovland & Nesskaug.....	Dutch Harbor.

Studies of the life history and fluctuations in the abundance of the herring populations in southeastern Alaska and in the Prince William Sound and Kodiak areas were continued by Edwin H. Dahlgren, Associate Aquatic Biologist, and one assistant.

STATISTICAL SUMMARY

There were 1,060 persons engaged in the herring industry in 1939, as compared with 940 in 1938. The number of plants increased from 17 to 21. Products of the fishery were valued at \$2,090,473, an increase of \$37,389, or about 2 percent over 1938, when the total value was \$2,053,084. Scotch-cured herring increased from 2,186,150 pounds, valued at \$130,424, to 2,857,863 pounds, valued at \$185,091, or about 31 percent in quantity and about 42 percent in value. Herring for bait decreased from 6,143,768 pounds, valued at \$61,802, to 5,278,670 pounds, valued at \$50,151, or 14 percent in quantity and about 19 percent in value. Meal increased 3 percent in quantity and about 26 percent in value, and oil increased 5 percent in quantity but decreased nearly 12 percent in value.

Persons engaged, wages paid, and operating units, Alaska herring industry, 1939

Item	Southeast Alaska	Central Alaska	Western Alaska	Total
PERSONS ENGAGED				
Fishermen:				
Whites.....	207	363	5	575
Natives.....	15		4	19
Total.....	222	363	9	594
Shoresmen:				
Whites.....	83	358	7	448
Natives.....			18	18
Total.....	83	358	25	466
Grand total.....	305	721	34	1,060
Wages paid shoresmen.....	\$50,154	\$218,812	\$6,457	\$275,423
OPERATING UNITS				
Plants; shore.....	4	13	4	21
Vessels:				
Power, over 5 tons.....	32	48		80
Net tonnage.....	1,009	2,244		3,253
Launch.....			1	1
Gill net boats.....			3	3
Power dories.....	1		1	2
Seine skiffs.....	13	16	1	30
Other rowboats and skiffs.....	10	4	1	15
Lighters and scows.....	2			2
Pile driver.....		1		1
Apparatus:				
Purse seines.....	31	48		79
Fathoms.....	5,152	8,225		13,377
Beach seines.....		2		2
Fathoms.....		190		190
Gill nets.....			40	40
Fathoms.....			870	870
Pound seines.....	9			9
Pounds.....	4			4

Products of Alaska herring industry in 1939

Item	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Fresh, for bait.....	2, 135, 010	\$26, 227	5, 000	\$50	-----	-----	2, 140, 010	\$26, 277
Frozen, for bait.....	3, 138, 860	23, 874	-----	-----	-----	-----	3, 138, 860	23, 874
Frozen, for fur farms.....	15, 700	97	-----	-----	-----	-----	15, 700	97
Pickled, for food:	-----	-----	-----	-----	-----	-----	-----	-----
Scotch cure.....	-----	-----	2, 233, 563	153, 413	624, 300	\$31, 678	2, 857, 863	185, 091
Norwegian cure.....	-----	-----	32, 550	2, 805	-----	-----	32, 550	2, 805
Roused for food (bloaters stock).....	-----	-----	169, 890	4, 074	338, 400	10, 764	508, 290	14, 838
Dry salted.....	-----	-----	63, 200	5, 080	-----	-----	63, 200	5, 080
Meal.....	6, 484, 688	141, 136	26, 766, 409	549, 721	-----	-----	33, 251, 097	690, 857
Oil.....	6, 162, 293	203, 906	29, 602, 080	937, 648	-----	-----	35, 764, 373	1, 141, 554
Total.....	17, 938, 351	395, 240	58, 872, 692	1, 652, 791	962, 700	42, 442	77, 771, 743	2, 090, 473

1 821,639 gallons.

2 3,946,944 gallons.

3 4,768,583 gallons.

HALIBUT

A program of voluntary control of production by the halibut fleet was again in effect throughout the season. Under this program departure of vessels for specific areas was made at prescribed intervals, catch limits per man per trip were observed, and the vessels were laid up at port for definite periods between trips. These measures were adopted to prevent concentration of landings with ensuing depression of prices.

Operations in the halibut industry were controlled also by regulations of the International Fisheries Commission, among the more important provisions of which was the establishment of quotas for the various areas. The season opened on April 1; in Area 2 it closed on July 29 and in Area 3 on October 28. The closing dates set for Areas 2 and 3 apply to Areas 1 and 4, respectively.

Halibut livers, from which medicinal oil is extracted, were again sold under contract at 50 cents per pound, and there was likewise some sale of viscera, although in much smaller quantity than that reported for the previous year.

Biological studies of the Pacific halibut were continued by the International Fisheries Commission. The work was under the direction of Dr. W. F. Thompson until July, when he was detailed to investigations of sockeye salmon problems, after which H. A. Dunlop served as acting director. The schooner *Eagle* was chartered for a cruise off Queen Charlotte Islands for studies of halibut eggs and ocean currents in the 1938-39 season.

STATISTICAL SUMMARY

Seven hundred and ten persons were employed in the Alaska halibut fishery in 1939—a decrease of 15 from the number reported for the preceding year; and products, exclusive of livers and viscera, amounted to 13,454,471 pounds, valued at \$893,686. This production 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, exclusive of livers and viscera, in Alaska totaled 6,994,639 pounds, valued at \$412,963, which include 15,000 pounds valued at

\$1,000 landed by Canadian vessels. In 1938 the landings of the Alaska fleet were 13,556,355 pounds, valued at \$890,301, and landings in Alaska amounted to 8,296,907 pounds, valued at \$499,472. Fares of the Alaska fleet in 1939, therefore, decreased about 1 percent in quantity but increased about one-half of 1 percent in value from 1938. The landings in Alaska ports in 1939 decreased about 16 percent in quantity and 17 percent in value from the preceding year.

The amount of halibut livers landed by the Alaska fleet was not reported, but it was stated that there were altogether about 878,000 pounds of halibut, sablefish, "lingcod," rockfish, and soupfin-shark livers, valued at about \$407,000, landed at Alaska and Pacific coast ports during 1939 by American vessels, as compared with 866,000 pounds, valued at \$405,000, landed by American vessels in 1938. The estimated amount of halibut livers landed in Alaska was 109,800 pounds, valued at \$54,900.

Halibut and sablefish viscera landed by the American fleet amounted to 149,000 pounds, valued at about \$15,000. The amount of halibut viscera reported as landed in Alaska was 1,116 pounds, valued at \$78.

These statistics were compiled from data collected by the International Fisheries Commission and by agents of the Bureau.

Persons engaged, wages paid, and operating units, Alaska halibut industry, 1939

Item	Total	Item	Total
PERSONS ENGAGED		OPERATING UNITS	
Fishermen: Whites.....	642	Vessels:	
Shoreshmen:		Power, over 5 tons.....	118
Whites.....	62	Net tonnage.....	1,718
Natives.....	0	Launches.....	32
Total.....	68	Skates of lines.....	3,100
Grand total.....	710		
Wages paid shoreshmen.....	\$17,907		

Products of the Alaska halibut fishery in 1939

Products	Pounds	Value
Fresh (including local).....	7,082,658	\$513,611
Frozen.....	6,344,678	375,191
Filets, quick frozen.....	27,135	4,884
Livers ¹	109,800	54,900
Viscera.....	1,116	78
Total.....	13,565,387	948,664

¹ The amount landed by the Alaska fleet was not segregated; the quantity shown herein is the estimated amount landed in Alaska.

COD

Cod fishing from shore stations in Alaska was carried on chiefly, as for a number of years past, by various independent fishermen in the Shumagin, Sanak, and Aleutian Islands, partly in connection with salmon and herring pickling. Twenty-four whites and 20 natives were engaged in the industry, including men aboard the power schooner *Dorothea*, which was leased for one trip to the westward during the season. Products amounted to 172,358 pounds of dry-salted cod,

valued at \$9,645; 127,651 pounds of pickled cod, valued at \$6,905; and 5,800 pounds of stockfish, valued at \$741—a total of 305,809 pounds, valued at \$17,291, as compared with 288,541 pounds valued at \$16,181 in 1938.

Three sailing vessels comprised the Bering Sea 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., and the *Azalea* (363 tons) and the *Wawona* (413 tons) were operated by the Robinson Fisheries Co.

Products of the offshore fishery were 3,062,000 pounds of dry-salted cod, valued at \$125,000, and 15,300 pounds of tongues, valued at \$1,530—a total of 3,077,300 pounds, valued at \$126,530, as compared with 3,079,775 pounds, valued at \$130,912, in 1938. The offshore fishery employed 106 persons, or 2 more than in the previous year.

WHALES

The Akutan station of the American Pacific Whaling Co. was the only whaling plant operated in Alaska in 1939. This plant employed 109 persons, of whom 95 were whites and 14 were natives. Three steam whalers were operated, or 2 less than the number used in the preceding year, and 171 whales were taken, consisting of 91 finback, 26 humpback, 5 sulphur bottom, and 49 sperm whales.

No changes were made during 1939 in the regulations governing operations in the whaling industry in Alaska. An officer of the Coast Guard was on duty at the Akutan station during the season to enforce the provisions of the Whaling Treaty Act and the regulations issued thereunder. Statistical and biological data were collected by the Bureau for forwarding through the State Department to the International Bureau for Whaling Statistics, Oslo, Norway.

Whale products in 1939 amounted to 246,600 gallons of body oil, valued at \$85,915; 132,750 gallons of sperm oil, valued at \$33,188; 321 tons of meal from meat, valued at \$12,469; 180 tons of bone meal, valued at \$4,959; and 8,200 pounds of sperm jawbone, valued at \$410—a total value of \$136,941, as compared with \$179,641 in 1938.

CLAMS

Operations in the clam-canning industry were on about the same scale as in other recent years and were carried on primarily in the vicinity of Cordova, which produced nearly 99 percent of the season's total output of clams in Alaska.

The clam fishery regulations for 1939 permitted an increased take of clams in the Prince William Sound-Copper River region, the limitation on the catch for the first half year being placed at 1,600,000 pounds of razor clams, including shells, instead of 1,200,000 pounds as in the previous year. In order to prevent depletion and to assure that this increase might be effected only through extension of digging operations to outlying beaches, it was provided that in the section bounded on the west by Strawberry Point Channel, on the north by a line from the southern extremity of Mummy Island to Wireless Point, and on the east by a line from Government Rock to the west end of First Egg Island, the commercial taking of razor clams would be prohibited

for the remainder of the calendar year after a combined total of 800,000 pounds, including shells, had been taken in the Prince William Sound and Copper River areas.

The limitation for the more accessible section was reached on May 22, but the quota for the district as a whole was not attained, notwithstanding favorable weather and the good condition of the clam beds. Owing to price disagreements with the Clam Diggers Union, the larger plants did not start packing clams until after May 1, and before the end of the month such operations were curtailed or entirely suspended for a number of weeks in order that the facilities might be devoted to the canning of Copper River red salmon. Many of the clam diggers were placed on limit, both by the packers and by the union. Despite these drawbacks, the season's output in this region was somewhat larger than in the previous year.

An analysis of catch samples in the Cordova district indicated that 44 percent of the total catch was made up of clams from 9 to 14 years of age, compared with 35 percent in 1938. The predominant age group was 8-year-olds, which comprised 24 percent of the season's total, as against about 32 percent in the previous year. Approximately 68 percent of the pack this year was put up during May.

The canning of razor clams in the Prince William Sound-Copper River region in 1939 was carried on at 13 plants, some of which were engaged also in the salmon-canning industry, as follows: Arctic Sanitary Packing Co.; Blue Sea Packing Co.; Buck Canning Co.; Christian Bros.; W. R. Gilbert Co., Inc.; E. A. Haltness & Co.; Hawkins Island Packing Co.; M. O. Marcus; Nunez Bros. Packing Corporation; Pioneer Canneries, Inc.; Scotty's Packing Co.; S. E. Smith Packing Co.; and Young & Trones. Several of the small establishments were operated by diggers who were unable to market their catch to the larger plants.

Other producers of canned clams during the season were the Enterprise Sea Food Co., at Ninilchik; the Sandvik Hand Cannery, at Uganik Village; and Nickey Clam & Salmon Cannery, at Ketchikan. The two last-named plants packed butter clams.

There were 528 persons employed, of whom 436 were whites, 83 natives, 7 Filipinos, 1 Japanese, and 1 Kanaka. The total production amounted to 34,195 cases containing 425,205 pounds, valued at \$240,511. This represents the "cut-out" or "drained" weight of can contents for whole and minced clams and the gross weight for clam chowder, in accordance with the practice followed in reporting statistics of the clam production in the States. Prior to 1939 the gross weight of canned clams was shown in the annual report of the Alaska fisheries.

Of the total clam production in Alaska—which consisted of 423,165 pounds of razor clams, including 150 pounds of chowder, and 4,080 pounds of butter clams—1,176 pounds of butter clams, valued at \$196, were prepared in southeast Alaska and the remainder came from the central district. The season's output represents a decrease of 17 percent in quantity and about 5 percent in value from the output for 1938, when the total included 115,380 pounds (net weight) packed in Alaska from clams obtained from Massett, B. C.

Products of Alaska clam industry in 1939

Item	Cases	Pounds ¹	Value
RAZOR CLAMS			
Minced:			
½-pound cans (48 to case).....	30, 879	364, 548	\$212, 422
10-ounce cans (48 to case).....	2, 622	37, 840	17, 012
1-pound cans (48 to case).....	5	120	45
20-ounce cans (24 to case).....	221	3, 316	1, 571
Whole:			
½-pound cans (48 to case).....	65	780	455
10-ounce cans (48 to case).....	404	6, 060	3, 557
1-pound cans (48 to case).....	363	8, 712	4, 106
20-ounce cans (24 to case).....	110	1, 650	829
Chowder:			
20-ounce cans (24 to case).....	5	150	30
Total, razor clams.....	34, 074	423, 165	240, 027
BUTTER CLAMS			
Minced:			
½-pound cans (48 to case).....	72	864	286
Whole:			
1-pound cans (48 to case).....	49	1, 176	196
Total, butter clams.....	121	2, 040	484
Grand total.....	34, 195	425, 205	240, 511

¹ "Cut-out" or "drained" weights of can contents are shown for whole and minced clams, and gross weight for other clam products.

SHRIMP

Three plants in southeast Alaska were engaged primarily in the shrimp business—Alaskan Glacier Sea Food Co. at Petersburg, and Reliance Shrimp Co. and Wrangell Shrimp Packing Co. at Wrangell. Some cold-packed shrimp was produced also at the salmon and crab cannery of Dean C. Kayler at Petersburg. In the central district there was a small production of shrimp at Cordova and Kachemak Bay, chiefly in conjunction with crab-canning operations.

There were 169 persons engaged in the industry, of whom 34 were whites, 114 natives, 16 Japanese, 3 Filipinos, and 2 Mexicans. Products consisted of 433,623 pounds of cold-packed shrimp meat, valued at \$163,653; 3,263 pounds of frozen shrimp meat, valued at \$1,305; 827 pounds of fresh shrimp in shell, valued at \$124; and 40 cases (480 pounds net) of canned shrimp meat, valued at \$400—a total of 438,193 pounds, valued at \$165,482. Comparable figures for 1938 show a production of 435,801 pounds, valued at \$168,474.

CRABS

Crab canning in Alaska was not active in 1939, owing to low market levels. The industry again centered in the Cordova region where seven plants packed crab meat during the year, in some instances in conjunction with the canning of clams. The principal operators in this district were the Alaskan Glacier Sea Food Co., Gulf Packing Co., Scotty's Packing Co., and Sheep Bay Mill & Packing Co.

One plant, that of the King Crab Co., operated at Halibut Cove, on Cook Inlet, and three plants handled crabs in southeast Alaska, namely the A R B Packing Co. at Wrangell, Dean C. Kayler at Petersburg, and O. H. Wood at Hoonah.

Although the bulk of the catch was used for canning, some crabs were sold fresh in each district. Except for a limited production of king crab in southeast Alaska and on Cook Inlet, the output consisted of Dungeness crab.

The number of employees credited to the crab industry in 1939 was 209, of whom 154 were whites, 46 natives, 8 Filipinos, and 1 Mexican. Products consisted of 287,500 pounds of canned crab meat, valued at \$92,514; 890 pounds of cold-packed meat, valued at \$445; 63 pounds of crab meat in bulk, sold locally, valued at \$30; and 651 dozen whole crabs in the shell, valued at \$1,590. The total output of crab products was 305,498 pounds, valued at \$94,579, as compared with 483,276 pounds valued at \$172,638 in 1938, a decrease of 37 percent in quantity and 45 percent in value.

Products of the Alaska crab industry in 1939

Product	Southeast Alaska			Central Alaska			Total		
	Number	Pounds	Value	Number	Pounds	Value	Number	Pounds	Value
DUNGENESS CRABS									
Canned:									
½-pound cans (48 to case) cases	1,080	25,920	\$8,284	6,801	163,224	\$51,709	7,881	189,144	\$59,993
1-pound cans (24 to case) do	321	7,704	3,082				321	7,704	3,082
1-pound cans (48 to case) do				635	30,480	10,297	635	30,480	10,297
20-ounce cans (24 to case) do				284	8,520	2,407	284	8,520	2,407
20-ounce cans (90 to case) do				409	46,012	14,717	409	46,012	14,717
Cold-packed meat, 5-pound cans	178	890	445				178	890	445
Crab meat in bulk pounds				63	63	30	63	63	30
Whole in shell dozen	341	7,000	682	272	7,995	578	613	14,995	1,260
Total, Dungeness crabs		41,514	12,403		255,294	79,738		297,808	92,231
KING CRABS									
Canned, ½-pound cans (48 to case) cases	88	2,112	704	147	3,528	1,314	235	5,640	2,018
Whole in shell dozen				38	2,050	330	38	2,050	330
Total, King crabs	88	2,112	704		5,578	1,644		7,690	2,348
Grand total		43,626	13,197		261,872	81,382		305,498	94,579

NOTE.—The weights of the pack shown are based upon the size of the cans, rather than on the net contents. Half-pound cans contain 6½ ounces of meat; 1-pound cans contain 13 ounces; and No. 2, or 20-ounce cans, contain 16 ounces.

OYSTERS

An output of 52 gallons (455 pounds) of oysters, valued at \$166, was produced in the Ketchikan district in the fall of 1939. This is the first reported commercial production of oysters in Alaska waters, although the experimental cultivation of the species was begun in 1931 and has been carried on from time to time by various growers.

Under the Act of August 2, 1937, for the protection of oyster culture in Alaska, leases of oyster bottoms may be obtained at nominal cost for the bona fide cultivation of oysters for commercial purposes. An application was received in 1939 from Jabine R. Smith, and a 6-year lease was subsequently executed by the Acting Secretary of the Interior in his favor, effective January 1, 1940, for 100 acres of bottoms in Admiralty Cove, Admiralty Island. This is the third lease of the kind for the fostering of oyster growing in Alaska.

MISCELLANEOUS FISHERY PRODUCTS

As in the previous year, 2 white fishermen in central Alaska caught Dolly Varden trout for commercial purposes, and in southeast Alaska there was an output of this species and of steelheads, for the most part incidental to salmon-canning operations. The entire commercial production of trout, however, was small. The total products reported were as follows: Dolly Vardens, 30,011 pounds fresh, valued at \$2,604, and 22,295 pounds frozen, valued at \$1,746; steelheads, 2,471 pounds frozen, valued at \$214, and 8 cases canned, 48 1-pound cans to the case, valued at \$40.

Several other species of minor importance commercially are taken in limited quantities, principally in connection with the halibut fishery, and are landed in ports of Alaska and British Columbia and at Seattle. Such products landed in Alaska in 1939 were as follows: Sablefish, 1,461,627 pounds frozen, valued at \$55,820; 164,801 pounds pickled, valued at \$7,656; 73,033 pounds of livers, valued at \$31,142; and 13,870 pounds of viscera, valued at \$971; rockfish, 32,239 pounds frozen, valued at \$757; and 37,574 pounds of quick-frozen fillets, valued at \$6,763; flounders, 8,400 pounds frozen, valued at \$504; and 21,923 pounds of quick-frozen fillets, valued at \$3,936; "lingcod," 337 pounds fresh, valued at \$3; and 753 pounds of livers, valued at \$301.

FUR-SEAL INDUSTRY**PRIBILOF ISLANDS****GENERAL ADMINISTRATIVE WORK**

In 1939 there were taken on the Pribilof Island 60,473 fur-seal skins, of which 47,646 were from St. Paul Island and 12,827 from St. George Island. This was the largest take since 1889. Of these skins, 45,506 on St. Paul Island and 100 on St. George Island were taken by stripping and were blubbered before salting; the remainder were taken by the skinning process.

The season's take of sealskins was shipped to St. Louis, Mo., for processing and sale at public auction by the Fouke Fur Co. for the account of the Government under provisions of the contract of June 9, 1939. The share due Canada, as well as that due Japan, will be apportioned from the net proceeds of sale, the former Government having suspended the previous arrangement for taking delivery of the skins in kind, owing to the outbreak of war in Europe.

The byproducts plant on St. Paul Island was again operated, and the output of meal and oil showed a substantial increase over that of the previous year. Sales of meal and oil that were surplus to the needs of the Bureau brought a gross return of \$15,567.43.

Attention was given to the feeding and management of foxes on the islands, and the take of fox pelts in the 1939-40 season numbered 1,246 blue and 12 white pelts, a total of 1,258.

Sealing and foxing operations were carried on by Pribilof natives under the direction of the Bureau's staff. Approximately 80 additional natives from the mainland and Aleutian Islands were employed during the summer to assist with fur-seal activities.

The substation which was established on Amchitka Island in 1937 for sea-otter investigations and patrol, and which had been in oper

ation each summer since that time, was maintained on a year-round basis during 1939-40.

Important service was rendered by the Coast Guard in providing a patrol for the protection of fur seals and sea otters along the Pacific coast and in Bering Sea, as well as in giving other assistance in the Bureau's work. The Navy Department detailed the U. S. S. *Capella* to carry the annual shipment of supplies from Seattle to the Pribilof Islands and to bring out the season's take of sealskins.

The administration of the fur-seal service suffered a distinct loss in the death of Superintendent Harry J. Christoffers at Seattle on September 8, 1939, after a brief illness. Mr. Christoffers had been identified with the Alaska work of the Bureau since 1911, and for the last 16 years had been in direct charge of fur-seal operations centering at the Pribilof Islands. To his constructive and untiring efforts, more than to those of any other single person, may be attributed the excellent results achieved in the management of the fur-seal industry and the improvements in housing and other conditions for the welfare of the natives.

TRANSPORTATION OF SUPPLIES

The U. S. S. *Capella* sailed from Seattle on August 2 for the Pribilof Islands with the annual shipment of supplies, which aggregated 2,274 tons of general freight and 455,791 board feet of lumber. Of this total, 1,525 tons of cargo and 323,175 board feet of lumber were for St. Paul Island and 749 tons of cargo and 132,616 board feet of lumber were for St. George Island. The vessel arrived at the islands on August 12.

On the return trip to Seattle, covering the period from August 24 to September 1, the vessel brought out 60,470 fur-seal skins, 489,174 pounds of seal meal, 25 barrels of blubber, and miscellaneous freight. Five passengers for the Bureau returned to Seattle on this trip.

Additional supplies for the Pribilof Islands were shipped during the year on the *Penguin*.

POWER VESSEL "PENGUIN"

Five round trips between Seattle and the Pribilof Islands were made in 1939 by the *Penguin*, carrying passengers and supplies. In addition the vessel performed interisland service and made trips to Indian settlements along the Alaska Peninsula and the Aleutian Islands to transport native laborers hired for fur-seal work at the Pribilofs during the summer. One trip was made to Amchitka Island in July in connection with the sea-otter patrol.

A full cargo of freight, chiefly perishable foodstuffs, was carried on each trip from Seattle, and outgoing shipments from the Islands included the 1938-39 take of fox skins, transported to Seattle in March, and the fur-seal oil produced at the byproducts plant on St. Paul Island, which was brought out in August and November. A shipment of live white foxes was transported from the Pribilofs to Petersburg, Alaska, in November, and delivered to the Alaska Game Commission to be used at the Petersburg Experimental Fur Farm for experimentation in crossbreeding.

The north-bound voyages of the *Penguin* were as follows: February 16-March 3, May 1-13, June 10-22, September 6-19, and October

21–November 6. South-bound voyages covered the following periods: March 18–31, May 22–June 2, July 30–August 11, September 22–October 5, and November 12–26. On these voyages transportation was furnished to 76 passengers for the Bureau, including 25 employees of the Fouke Fur Co. who assisted with the season's sealing activities at the Islands and 3 connected with the Bureau's salmon investigations in the Kodiak area. The vessel also transported 13 passengers for the Navy, 8 for the Office of Indian Affairs, 3 for the Department of Justice, 2 for the Coast Guard, 11 for the Coast and Geodetic Survey, and 8 unofficial travelers.

The *Penguin* cruised 29,210 nautical miles during the year.

ROADS

St. Paul Island.—No road work was done at St. Paul Island other than the upkeep and improvement of roads already in use. The Northeast Point Road was widened and straightened, and the plank section extending the entire length of Big Lake was covered with scoria, the low spots being filled to a more uniform grade. The section of Northeast Point Road which crosses the big sand dune was elevated by a scoria fill to 12 inches above the level of drifting sand, in order that the wind might keep the surface of the road swept clear.

St. George Island.—Soon after the completion of sealing operations repairs and improvements were begun on the village roads, the upkeep of which had received little attention in the past few years. The main road from the center of the village to the landing was widened several feet and fills were made in low places. Additional surfacing and grading were done on other village roads, large rocks were removed, and ditches and culverts were constructed at various points. Lateral branches were made from the village road to the new native bunkhouse and to the canteen, and the road in the rear of the cottages of white employees was widened and repaired. Repairs and resurfacing of parts of Zapadni Road included the replacement of several hundred feet of planking with scoria fill.

BUILDINGS

St. Paul Island.—Construction of four new frame houses for natives on St. Paul Island was begun in the fall of 1939. One of these has five rooms and each of the others has three. All have the same floor plan as the three-room native houses built in former years, but the pitch of the roof has been raised to permit the addition of two rooms on the second floor. Three frame houses built for natives in 1918 were moved a short distance to bring them in line with other native dwellings and were placed upon new concrete foundations. In order to make the living quarters more habitable, nine outside laundry houses for natives were built and partial basements for laundry purposes were constructed beneath several houses, under the direction of the Bureau foreman.

The new machine shop was virtually completed. Other permanent improvements included an addition to the boatways, the erection of a small pump house, and the building of a reindeer corral.

St. George Island.—The bunkhouse for natives on St. George Island was completed. Fences and cement sidewalks were placed around the

cottages for white employees, and a stock fence to keep out animals was built around the upper lake which is the source of the village water supply. A small building was constructed to house the tractor hoist at the village landing.

BYPRODUCTS PLANT

The byproducts plant on St. Paul Island was in operation from June 19 to July 27, rendering oil and meal from seal carcasses and blubber. The direct cost of operation during the season was \$10,316.60. The total production amounted to 514 barrels, or 28,020.23 gallons, of fur-seal blubber oil, 4,789 gallons of oil from seal carcasses, and 502,914 pounds of seal meal. As a result of processing the blubber and carcasses separately this season, the bulk of the oil produced was of a very high grade.

The entire production of oil from carcasses and one barrel of blubber oil were retained at the Islands for use in fox feed and for other purposes. The remainder of the blubber oil, amounting to 27,965.73 gallons, was shipped to Seattle on the *Penguin* and sold by competitive bidding for 31½ cents per gallon, or a total of \$8,704.33.

The U. S. S. *Capella* brought 489,174 pounds of seal meal to Seattle in August. About 75 tons of this meal was delivered to the Division of Fish Culture for use in Federal fish hatcheries, and the remainder was sold through competitive bidding. In all, 338,421 pounds of meal were sold for a gross sum of \$6,863.10. About 5 tons were sold at \$50 per ton to the Division of Fish and Game of the State of Montana, and about 164 tons were sold at \$40.25 to Wilbur-Ellis Co., Seattle. This is the first time since 1921 that any of the seal meal produced at the Pribilof Islands has been sold for the account of the Government. Thirteen thousand pounds of meal were retained at the Islands for use in fox feed and 740 pounds were transferred for use of natives along the coast of northwest Alaska.

The total sales of seal oil and meal in 1939 aggregated \$15,567.43. In addition, the Fouke Fur Co. paid \$44.91 for the 25 barrels of blubber which it obtained from the Islands, in accordance with provisions of the 1939 contract, the value being based upon the value of the oil which might have been derived therefrom at the Bureau's byproducts plant, less the estimated cost of its production. The total sales of all byproducts, therefore, amounted to \$15,612.34.

NATIVES

CENSUS

On December 31, 1939, the total native population of St. Paul Island was 274, including 8 persons who were temporarily absent from the Island. There were 10 births and 3 deaths during the year. Three natives, as follows, from the Alaska Peninsula became residents of St. Paul Island during the year: one, a 2-year-old boy, who was legally adopted into a native family; another, a girl who had been listed among the permanent departures in 1938 and who returned to live on St. Paul Island; and the third, the wife of a St. Paul Island native married at Unalaska in October 1938. One native left the Island to become a permanent resident of St. George Island.



FIGURE 5.—Fur-seal byproducts plant, St. Paul Island, Alaska.

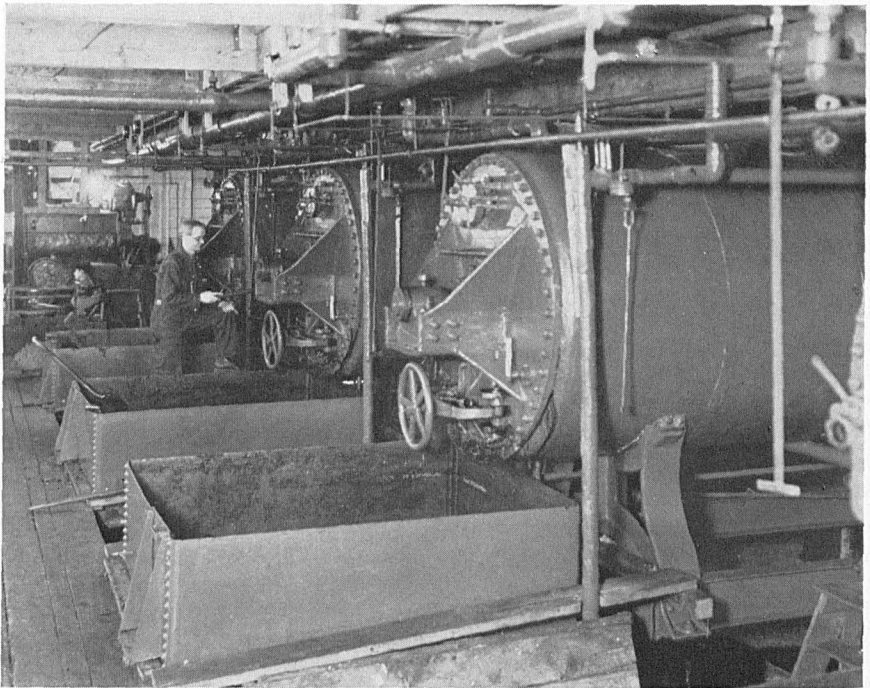


FIGURE 6.—Interior view, fur-seal byproducts plant, St. Paul Island, Alaska.



FIGURE 7.—Removing blubber from fur-seal skins, St. Paul Island, Alaska.

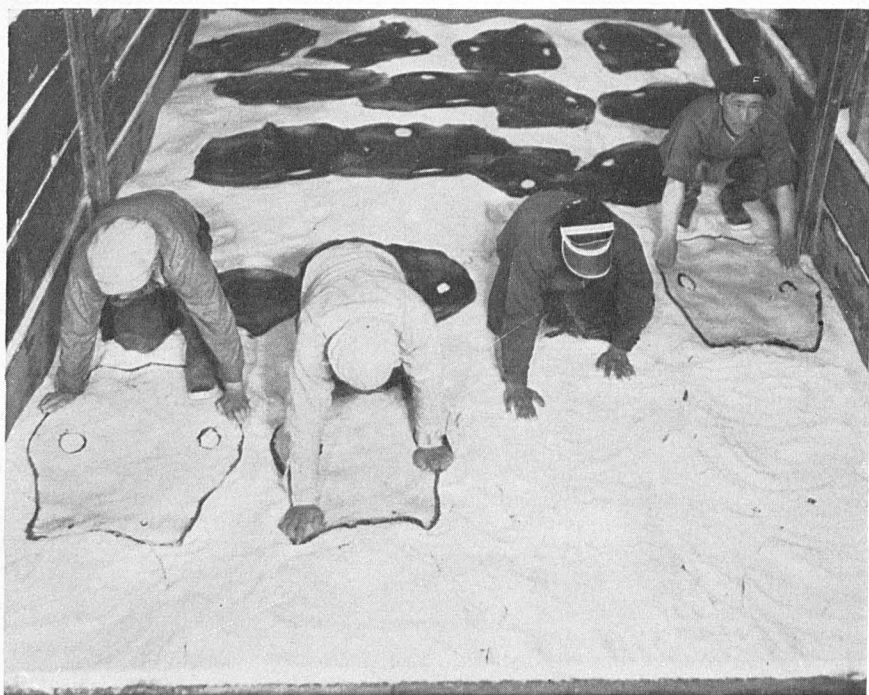


FIGURE 8.—Kenching (salting) fur-seal skins, St. Paul Island, Alaska.

The census on St. George Island on December 31, 1939, showed a population of 176 natives, including 1 who moved there from St. Paul Island, and an orphan child from Unalaska who was adopted into her married sister's family under authorization by the Commissioner of Fisheries, upon recommendation of the superintendent of the Pribilof Islands. The child is the daughter of a native woman born on St. George Island who moved to Unalaska following her marriage to a native of that village. There were 7 births and 2 deaths during the year.

The total native population of both Islands at the end of 1939 was 450.

MEDICAL SERVICE

Two physicians at the Pribilof Islands rendered medical aid to the natives and the Government employees residing there. Health conditions in general were satisfactory, and there were no epidemics of a serious nature.

A summary of the medical services rendered on St. Paul Island for the year ending March 31, 1940, showed, in addition to the periodic examinations of school children and routine health inspections in the village, 1,890 calls made upon the doctor in the dispensary during the year, 151 house calls, and 52 patients admitted to the hospital for a total of 979 days of care. This hospitalization included 12 obstetrical cases, the mothers and babies receiving care for 336 days; 17 surgery cases covering 207 days of care, and 11 medical cases totaling 436 days. Thirty X-ray studies, of one film or more each, were made during the year.

At St. Paul Island on July 1, 1939, a seaman aboard the *Penguin* was found to have contracted measles. A 2 weeks' quarantine was accordingly ordered for all passengers, both white and native, arriving on the vessel, and no other cases of measles developed on the Island.

In January 1940 Carl Loy, employed on sea-otter patrol at Amchitka Island, was stricken with acute appendicitis. Advice and orders for treatment were given by the St. Paul Island physician by radiophone. The patient was removed by special trip of the Coast Guard cutter *Haida* to Unalaska, where a successful appendectomy was performed in February.

On St. George Island, which is provided with a dispensary but no hospital, the physician extended medical service to the natives in 2,652 cases, including office and home calls, during the year ending March 31, 1940. A native woman was sent to Seattle on the *Penguin* in November for diagnosis and treatment in the hospital of the Office of Indian Affairs at Tacoma, Wash., and a native man made the trip to the States on the March sailing of the vessel for an operation at the same hospital.

In order to benefit the medical service on St. George Island, it is planned that a hospital will be established there similar to the one which has been in use on St. Paul Island since 1931.

A dentist was on duty at the Islands throughout the year. During the absence of a physician on St. Paul Island from March 18 to May 15 the dentist was in charge of the dispensary and hospital there. The dental work completed in the fiscal year ending March 31, 1940, included 92 dentures, 408 fillings, 250 extractions, 4 bridges, 4 inlays, and 15 plate and bridge repairs.

SCHOOLS

Schools for the natives are maintained by the Bureau on St. Paul and St. George Islands, and all natives between the ages of 6 and 16 are required to attend unless excused on account of illness. Two teachers are employed on each Island. Instruction is confined to the elementary branches, manual arts, and home economics.

The 1938-39 school year began on September 12 on both Islands. It closed on May 12 on St. Paul Island and on May 2 on St. George Island. For 7 days during the year the junior school on St. Paul Island was not in session, owing to the illness of the teacher. The teacher of the senior school on St. George Island left for Seattle on March 6 because of illness, and during the remainder of the term the two schools were taught in rotation by the junior school teacher, each being in half-day session.

On St. Paul Island there were 13 girls and 26 boys in the junior school and 18 girls and 17 boys in the senior school; a total of 74. Two pupils of school age were not enrolled, as they were sick in the hospital for the entire term. On St. George Island 12 girls and 13 boys were enrolled in the junior school and 15 girls and 10 boys in the senior school; a total enrollment of 50.

SAVINGS ACCOUNTS

Several natives of the Pribilof Islands have savings accounts in the bank of the Washington Loan & Trust Co., Washington, D. C., on which they receive interest compounded semiannually at the rate of 2 percent. The Commissioner of Fisheries, as trustee, has custody of these funds. The trust account for the year 1939 is summarized as follows:

On hand Jan. 1, 1939.....	\$3, 850. 56
Interest earned from Jan. 1 to Dec. 31, 1939.....	71. 92
Total.....	3, 922. 48
Withdrawn by natives.....	870. 00
On hand Dec. 31, 1939.....	3, 052. 48

The following is an itemized statement of the funds, setting forth the individual accounts:

Funds of the Pribilof Islands natives in the custody of the United States Commissioner of Fisheries, as trustee, December 31, 1939

Kochutin, Alexandra.....	\$1, 017. 05	Mercurief, Elizabeth.....	\$76. 33
Kozloff, Marina.....	142. 65	Mercurief, Erena.....	472. 13
Lekanof, Tatiana (Mercurief).....	470. 72	Mercurief, George.....	15. 86
Lestenkof, Michael.....	251. 39	Pankoff, Agrippina.....	218. 83
Mercurief, Alexandra.....	51. 05	Total.....	3, 052. 48
Mercurief, Daniel.....	336. 47		

PAYMENTS FOR TAKING FUR-SEAL SKINS

Natives of the Pribilof Islands are paid for their work in taking sealskins at specified rates per skin. The sealers on each island are divided into classes according to their skill and ability, and the collective earnings are apportioned among them, each worker in a given

class receiving an equal share. Small bonuses are paid for special services.

On St. Paul Island the payments to natives in 1939 were at the rate of 60 cents per skin for the 47,646 sealskins taken, or a total of \$28,587.60, and in addition \$180 was paid to 2 foremen and 4 mess attendants.

Natives on St. George Island were paid at the rate of 75 cents per skin, the total in 1939 amounting to \$9,620.25 for the 12,827 sealskins taken, and an additional \$120 was paid to 2 native foremen and 1 mess attendant.

Details of these payments are shown in the following table:

Payments to Pribilof Islands natives for taking fur-seal skins, calendar year 1939

Classification	St. Paul Island			St. George Island		
	Number of men	Share of each	Total	Number of men	Share of each	Total
First class.....	36	\$486.60	\$17,517.60	33	\$220.50	\$7,276.50
Second class.....	10	393.00	3,930.00	8	165.00	1,320.00
Third class.....	16	297.00	4,752.00	5	114.75	573.75
Fourth class.....	10	199.80	1,998.00	3	86.25	258.75
Fifth class.....	3	88.80	266.40	3	63.75	191.25
Boys' class.....	2	37.80	75.60			
Special boys' class.....	4	12.00	48.00			
Foreman (additional compensation).....			60.00			55.00
Do.....			40.00			45.00
Mess attendants (\$20 each).....			80.00			20.00
Total.....	81		28,767.60	52		9,740.25

PAYMENTS FOR TAKING FOX SKINS

For taking fox skins on the Pribilof Islands in the 1938-39 season the natives were paid at the rate of \$5 per skin. The payments amounted to \$1,120 for the 224 fox skins taken on St. Paul Island and \$4,025 for the 805 skins taken on St. George Island, a total of \$5,145.

FUR SEALS

KILLINGS

In 1939, 60,473 fur seals were killed, of which 47,646 were taken on St. Paul Island and 12,827 on St. George Island. Details with regard to the killings are shown in the following tabulations:

Seal killings on Pribilof Islands in 1939

ST. PAUL ISLAND

Date	Serial Number of drive	Hauling ground	Skins secured
June 12	1	Vostochni and Morjovi.....	164
18	2	Tolstoi and Lukanin.....	69
19	3	Zapadni.....	105
20	4	Reef and Gorbatoh.....	970
21	5	Polovina and Polovina Cliffs.....	101
22	6	Vostochni and Morjovi.....	665
23	7	Zapadni and Little Zapadni.....	298
24	8	Tolstoi, Lukanin, and Kitovi.....	79
25	9	Reef and Gorbatoh.....	1,069

Seal killings on Pribilof Islands in 1939—Continued

ST. PAUL ISLAND—Continued

Date	Serial Number of drive	Hauling ground	Skins secured
June 26	10	Polovina and Polovina Cliffs.....	94
27	11	Vostochni and Morjovi.....	846
28	12	Zapadni and Little Zapadni.....	508
29	13	Tolstoi, Lukanin, and Kitovi.....	150
30	14	Reef and Gorbach.....	1,933
July 1	15	Polovina, Polovina Cliffs, and Little Polovina.....	230
2	16	Vostochni and Morjovi.....	1,630
3	17	Zapadni and Little Zapadni.....	1,313
4	18	Tolstoi, Lukanin, and Kitovi.....	625
5	19	Reef and Gorbach.....	1,941
6	20	Polovina, Polovina Cliffs, and Little Polovina.....	830
7	21	Vostochni and Morjovi.....	1,684
8	22	Zapadni and Little Zapadni.....	1,590
9	23	Tolstoi, Lukanin, and Kitovi.....	616
10	24	Reef and Gorbach.....	2,367
11	25	Polovina, Polovina Cliffs, and Little Polovina.....	653
12	26	Vostochni and Morjovi.....	2,700
13	27	Zapadni and Little Zapadni.....	2,345
14	28	Tolstoi, Lukanin, and Kitovi.....	1,081
15	29	Reef and Gorbach.....	2,566
16	30	Polovina, Polovina Cliffs, and Little Polovina.....	916
17	31	Vostochni and Morjovi.....	2,217
18	32	Zapadni and Little Zapadni.....	1,894
19	33	Tolstoi, Lukanin, and Kitovi.....	1,323
20	34	Reef and Gorbach.....	2,233
21	35	Polovina, Polovina Cliffs, and Little Polovina.....	838
22	36	Vostochni and Morjovi.....	2,465
23	37	Zapadni and Little Zapadni.....	1,509
24	38	Tolstoi, Lukanin, and Kitovi.....	1,268
25	39	Reef and Gorbach.....	1,562
26	40	Vostochni, Morjovi, and Polovina Cliffs.....	2,153
		Total.....	47,040

ST. GEORGE ISLAND

June 5	1	North.....	37
8	2	Zapadni.....	21
12	3	North and Staraya Artil.....	62
14	4	East.....	40
17	5	North and Staraya Artil.....	30
19	6	East.....	86
20	7	Zapadni.....	71
21	8	North and Staraya Artil.....	159
23	9	East.....	136
24	10	Zapadni.....	75
25	11	North and Staraya Artil.....	157
27	12	East.....	131
28	13	Zapadni.....	155
29	14	North and Staraya Artil.....	196
July 1	15	East.....	303
2	16	Zapadni.....	209
3	17	North and Staraya Artil.....	765
5	18	East.....	819
6	19	Zapadni.....	242
7	20	North and Staraya Artil.....	422
9	21	East.....	516
10	22	Zapadni.....	210
11	23	North and Staraya Artil.....	801
13	24	East.....	665
14	25	Zapadni.....	237
15	26	North and Staraya Artil.....	1,203
17	27	East.....	517
18	28	Zapadni.....	311
19	29	North and Staraya Artil.....	903
21	30	East.....	806
22	31	Zapadni.....	341
23	32	North and Staraya Artil.....	1,455
25	33	East.....	1,019
26	34	Zapadni.....	227
		Total.....	12,827

AGE CLASSES

The age class of a male seal of the Pribilof Islands herd is determined from the length of its body. The classification was derived from measurements of a large number of pups branded in 1912 and killed in subsequent years. The limits of the various age classes are shown in the following table:

Age classes of male seals, Pribilof Islands

Age	Length	Age	Length
	<i>Inches</i>		<i>Inches</i>
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 1939

[On basis of classification shown in preceding table]

Age	St. Paul Island	St. George Island	Total
Yearling males.....	3		3
2-year-old males.....	893	324	1,217
3-year-old males.....	44,614	11,876	56,520
4-year-old males.....	1,999	665	2,664
5-year-old males.....	8		8
Cows ¹	99	62	161
Total.....	47,646	12,827	60,473

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, however, the killings in 1939 were confined to 3-year-old males.

COMPUTATION OF FUR-SEAL HERD

The computation of the fur-seal herd in 1939 was made by Supt. H. J. Christoffers, assisted by Edward C. Johnston. As of August 10 the total of all classes was 2,020,774—a numerical increase of 148,336 over the figures for the preceding year. The detailed report will be found on pages 177 to 184 of this document. Following is a compara-

tive statement of the numerical strength of the various elements of the fur-seal herd in the years 1928 to 1939, inclusive:

General comparison of computations of the seal herd on the Pribilof Islands, 1928 to 1939

Classes	1928	1929	1930	1931	1932	1933
Harem bulls.....	6,060	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	2,893	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	7,010	8,191	10,193	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	69,074	74,828	81,101	87,662
Yearling males.....	65,861	86,381	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	86,417	92,247	99,626	107,693	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	1,219,961	1,318,568

Classes	1934	1935	1936	1937	1938	1939
Harem bulls.....	10,770	11,547	12,321	13,100	13,180	10,980
Breeding cows.....	461,761	487,883	526,848	508,982	614,499	663,634
Surplus bulls.....	6,494	6,139	7,994	9,140	7,277	7,823
Idle bulls.....	2,282	2,535	2,733	3,031	2,125	2,973
6-year-old males.....	8,173	11,117	11,421	15,188	17,269	14,561
5-year-old males.....	13,897	14,278	18,985	21,586	18,201	21,839
4-year-old males.....	16,862	21,096	23,991	33,815	24,275	26,486
3-year-old males.....	24,770	28,165	40,170	45,991	32,278	37,107
2-year-old males.....	94,920	102,555	110,505	118,889	107,003	116,124
Yearling males.....	125,490	135,525	146,365	168,051	142,232	153,621
2-year-old cows.....	98,768	106,068	115,197	124,410	123,150	132,999
Yearling cows.....	125,490	135,526	146,365	168,054	156,470	168,988
Pups.....	461,761	487,883	526,848	508,982	614,499	663,634
Total.....	1,430,418	1,550,913	1,689,743	1,839,119	1,872,438	2,020,774

FOXES

A noteworthy activity, incidental to and alternating advantageously with the more important sealing operations on the Pribilof Islands, is the care and management of blue foxes which roam at large on the Islands and supply approximately 1,000 pelts annually for market. In the summer the animals subsist chiefly on birds, birds' eggs, and the abundant marine life along the beaches, but in winter, when their natural food is scarce, they are fed prepared rations of cereals and seal meal and oil.

Trapping of the foxes is begun when the pelts reach their prime, about the first of December, and is discontinued at the beginning of the mating season, usually near the end of January, or earlier if necessary for breeding requirements. Box traps are used, and a number of the animals captured are marked and released for the breeding reserve. About 1 percent of each season's catch consists of white foxes, a color phase of the species found at the Islands.

Five live white foxes from St. George Island and one from St. Paul Island, which had been taken at the request of the Alaska Game Commission for cross breeding with blue foxes on the Experimental Fur Farm at Petersburg, were shipped from the Islands on the *Penguin*

in November 1939. One of these animals died en route, and the remaining five were delivered to a representative of the Game Commission at Petersburg. This transfer was made with the understanding that the Pribilof foxes would be replaced with others in due time and thus improve the stock at the Islands.

TRAPPING SEASON OF 1939-40

In the 1939-40 season there were taken 1,258 fox pelts, of which 1,246 were blue and 12 white. Three hundred and seventy-seven blue and 8 white pelts were taken on St. Paul Island and 869 blue and 4 white pelts on St. George Island.

There were trapped, marked, and released for breeding stock 47 male and 44 female foxes on St. Paul Island and 24 males and 32 females 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.—Upon the basis of observations made during three drives of the entire herd it was estimated that the total number of reindeer on St. Paul Island as of October 14 was 1,800, of which 450 were the young of the season. During the year, 105 animals had been killed, of which 4 were found to be unfit for food. The remaining 101 deer were used for food in white, native, and Aleut messes.

It is believed that the estimate of the size of the herd this year is more accurate than heretofore. Two natives were detailed to the work of herding the reindeer during most of the period from April 1 to November 18, and for a time a third man was so employed.

In the early part of September a reindeer corral was constructed in accordance with specifications prepared in 1937 by a unit manager of the reindeer service of the Office of Indian Affairs. Upon completion of this enclosure, successive roundups and drives were made on September 16, September 30, October 14, and November 14. As a result of the first of these, 36 bucks and 111 does entered the corral. They were held for three days and accepted both water and food. On the next two drives no deer could be induced to enter the compound.

Because of the increasing wariness of the deer, the corral's wings were extended, and additional enclosures were added, doubling its holding capacity from an original 2,500 to 5,000. Long strips of burlap were prepared, to be carried by the drivers, thus effecting a continuous, moving and conspicuous barrier behind the deer. A large crew made the final drive, using the long burlap strips, and almost the entire herd was brought around the north and east sides of Little Polovina Mountain, but when near the corral the deer stampeded, bands of varying sizes charging in different directions, and only 6 bucks and 3 does were herded into the corral.

St. George Island.—A count of the reindeer on St. George Island on September 30 showed 42 animals, of which 9 were this year's fawns. The herd appeared to be in good condition.

FUR-SEAL SKINS

SHIPMENTS

Seven hundred and eighty-six barrels containing 60,470 fur-seal skins taken on the Pribilof Islands in 1939 were shipped on the U. S. S. *Capella* and arrived at Seattle on September 1. Of these skins, 47,643, packed in 497 barrels, were from St. Paul Island, and 12,827, packed in 289 barrels, were from St. George Island. All were forwarded by freight to the Fouke Fur Co., at St. Louis, Mo.

The foregoing figures include 9,071 sealskins, or 15 percent of the season's take, packed in 118 barrels, allotted to the Canadian Government in accordance with provisions of the fur-seal treaty. Owing to war conditions in Europe, however, Canadian authorities decided to have the shipment consigned to the Fouke Fur Co., and arrangements were made subsequently to have the skins handled with those of the United States, as was the practice prior to 1933.

Twenty-five barrels of salted blubber, having a gross weight of 10,593 pounds, also were brought out on the *Capella* and delivered to the Fouke Fur Co., f. o. b. Seattle, for use in the tanning of sealskins.

Three sealskins, parchment dried for experimental purposes, were brought to Seattle on the *Penguin* in August and were turned over to a representative of the Fouke Fur Co. for transporting to St. Louis.

SALES

Two public auction sales of fur-seal skins taken on the Pribilof Islands were held in St. Louis in 1939, on May 22 and October 2, respectively, at which there were sold a total of 42,284 skins for a gross sum of \$807,677. During the year, also, 787 sealskins taken on the Pribilof Islands were disposed of at private sales, under special authorization of the Secretary, for a total of \$16,208.90. In the following detailed statements the sales of other sealskins by the Department for the account of the Government are included, in order that the records may be complete.

May 22, 1939.—On May 22, 1939, 20,520 Pribilof Islands fur-seal skins, dressed, dyed, and machined, were sold for \$344,338.75. These skins consisted of 7,800 dyed black and 12,720 dyed safari brown. In addition, 210 fur-seal skins taken by the Japanese Government on Robben Island in 1937 and allotted to the United States as its share of such skins under provisions of the fur-seal treaty, were sold for \$3,495.50. Of these, 196 finished skins, dyed safari brown, brought \$3,492, and the remaining 14 skins, unhaired and dressed, brought \$3.50.

October 2, 1939.—At the sale on October 2, 21,764 Pribilof Islands fur-seal skins were sold for \$463,338.25. Of these, 21,646 dressed, dyed, and machined brought \$463,297.75, and 118 raw and partly processed skins brought \$40.50. The processed skins consisted of 8,030 dyed black, 8,516 dyed safari brown, and 5,100 dyed matara brown, a recently developed shade which was offered at this sale for the first time.

Special sales.—During the year, 787 Pribilof Islands fur-seal skins were sold under special authorization by the Department for advertising and promotional purposes, the gross sales amounting to \$16,208.90. Of these skins, 323 dyed black brought \$6,312.60; 254 dyed safari brown, \$5,117.40; 115 dyed matara brown, \$3,759.55; and 95 raw, \$1,019.35.

Further details with regard to the sales of sealskins by the Department for the account of the Government in 1939 are given in the following tables:

Comparative values, by sizes and grades, with percentages each size, of Pribilof sealskins sold at public auction in 1939

Classes and sales	Grade	Number	High	Low	Average	Total	Total number	Average price	Total amount	Percentage
DYED BLACK										
Extra large:										
Oct. 2	I and II	75	\$23.50	\$22.50	\$23.30	\$1,747.50	146	\$21.71	\$3,170.00	1.82
	Scarred, faulty, etc.	71	21.50	17.50	20.04	1,422.50				
Large:										
May 22	I and II	770	23.50	21.00	22.09	17,010.00	1,500	20.10	30,142.50	19.23
	Scarred, faulty, etc.	670	19.50	18.50	19.13	12,817.50				
	III	60	5.50	5.00	5.25	315.00				
Oct. 2	I and II	1,416	23.00	21.00	22.02	31,177.50	2,356	20.43	48,236.50	29.34
	Scarred, faulty, etc.	906	19.50	17.50	18.42	16,685.00				
	III	34	11.00	11.00	11.00	374.00				
Medium:										
May 22	I and II	3,000	18.50	16.50	17.39	52,160.00	5,220	15.62	81,515.00	66.92
	Scarred, faulty, etc.	2,080	15.00	12.50	13.76	28,620.00				
	III	140	5.50	5.00	5.25	735.00				
Oct. 2	I and II	3,061	19.75	18.50	19.21	58,814.75	4,919	18.19	89,465.25	61.26
	Scarred, faulty, etc.	1,830	17.25	15.50	16.68	30,342.50				
	III	28	11.00	11.00	11.00	308.00				
Small medium:										
May 22	I and II	630	14.50	13.50	14.13	8,898.75	1,080	13.09	14,141.25	13.85
	Scarred, faulty, etc.	450	12.00	11.50	11.65	5,242.50				
	I and II	275	16.50	14.00	15.03	4,132.50				
Oct. 2	Scarred, faulty, etc.	320	13.75	13.00	13.43	4,297.50	609	14.10	8,584.00	7.58
	III	14	11.00	11.00	11.00	154.00				
All classes:										
May 22							7,800	16.13	125,798.75	100.00
Oct. 2							8,030	18.61	149,455.75	100.00
DYED SAFARI BROWN										
Wig:										
Oct. 2	II	1	22.50	22.50	22.50	22.50	1	22.50	22.50	.01
Extra extra large:										
Oct. 2	I and II	3	25.00	22.50	23.33	70.00	7	20.36	142.50	.08
	Scarred, faulty, etc.	4	18.50	18.00	18.13	72.50				
Extra large:										
May 22	I and II	95	25.00	25.00	25.00	2,375.00	170	22.26	3,785.00	1.34
	Scarred, faulty, etc.	75	19.00	18.50	18.80	1,410.00				
	I and II	68	26.00	22.50	25.74	1,760.00				
Oct. 2	Scarred, faulty, etc.	80	18.50	18.00	18.45	1,476.00	151	21.46	3,241.00	1.77
	III	3	5.00	5.00	5.00	15.00				

Large:	I and II	1,715	25.00	19.50	22.02	37,765.00	2,932	20.15	59,089.50	23.05
May 22	Scarred, faulty, etc	1,195	18.50	17.50	17.75	21,220.00				
	III	22	4.75	4.75	4.75	101.50				
Oct. 2	I and II	1,197	25.00	21.50	23.44	29,059.50	2,115	21.34	45,128.00	24.84
	Scarred, faulty, etc	853	19.75	18.00	19.01	16,783.50				
	III	35	10.00	5.00	8.14	285.00				
Medium:	I and II	4,630	20.25	17.00	18.12	83,877.50	8,007	16.68	133,575.75	62.95
May 22	Scarred, faulty, etc	3,320	16.50	14.00	14.89	49,427.50				
	III	57	4.75	4.75	4.75	270.75				
Oct. 2	I and II	3,093	23.50	21.00	22.10	68,356.00	5,492	19.98	109,737.00	64.49
	Scarred, faulty, etc	2,316	18.25	17.00	17.61	40,776.00				
	III	83	10.00	5.00	7.29	605.00				
Small medium:	I and II	830	17.00	14.50	15.16	12,589.00	1,611	13.71	22,089.75	12.66
May 22	Scarred, faulty, etc	760	12.75	12.00	12.38	9,410.00				
	III	21	4.75	4.75	4.75	99.75				
Oct. 2	I and II	391	18.50	17.00	17.60	6,882.50	750	15.70	11,778.50	8.81
	Scarred, faulty, etc	328	14.50	14.00	14.23	4,666.00				
	III	31	10.00	5.00	7.42	230.00				
All classes:										
May 22							12,720	17.18	218,540.00	100.00
Oct. 2							8,516	19.97	170,049.50	100.00
DYED MATARA BROWN										
Large:	I and II	585	43.00	31.75	35.85	20,972.50	870	32.74	28,483.75	17.06
Oct. 2	Scarred, faulty, etc	285	28.25	25.50	26.36	7,511.25				
Medium:	I and II	2,380	35.00	27.50	31.31	74,522.50	3,565	28.48	101,535.00	69.90
Oct. 2	Scarred, faulty, etc	1,185	24.50	21.00	22.80	27,012.50				
Small medium:	I and II	400	25.50	22.00	23.39	9,357.50	655	20.71	13,773.75	13.04
Oct. 2	Scarred, faulty, etc	265	18.50	14.50	16.67	4,416.25				
All classes:										
Oct. 2							5,100	28.19	143,792.50	100.00
MISCELLANEOUS										
Oct. 2	Unhaired and dressed	44	.50	.50	.50	22.00	118	.34	40.50	100.00
	Raw	74	.25	.25	.25	18.50				

Special sales of Pribilof Islands fur-seal skins in 1939

Date	Number of skins	Description	Price per skin	Total
Jan. 30	20	Dyed black, medium	\$22.18	\$443.60
Feb. 28	20	do.	22.18	443.60
	40	Dyed safari brown, medium	21.63	865.20
Mar. 30	2	Dyed safari brown, large	25.57	51.14
	2	Dyed safari brown, medium	21.63	43.26
	1	Dyed black, medium	22.18	22.18
Apr. 30	12	Dyed black, large	25.51	306.12
May 17	50	Raw	10.73	536.50
June 19	35	Dyed black, large	22.09	773.15
	35	Dyed safari brown, large	22.02	770.70
	40	Dyed black, medium	17.39	695.60
	80	Dyed safari brown, medium	18.12	1,449.60
June 26	23	Raw	10.73	246.79
July 11	80	Dyed black, medium	17.39	1,391.20
Aug. 15	35	Dyed black, large	22.09	773.15
	40	Dyed black, medium	17.39	695.60
	40	Dyed safari brown, medium	18.12	724.80
Aug. 30	22	Raw	10.73	236.06
Sept. 30	35	Dyed safari brown, large	22.02	770.70
Oct. 30	40	Dyed matara brown, medium	31.31	1,252.40
	35	Dyed matara brown, large	35.85	1,254.75
	40	Dyed black, medium	19.21	768.40
Nov. 30	40	Dyed matara brown, medium	31.31	1,252.40
Dec. 30	20	Dyed safari brown, medium	22.10	442.00
	787			16,208.90

DISPOSITION OF FUR-SEAL SKINS TAKEN ON PRIBILOF ISLANDS

On January 1, 1939, there were on hand 72,876 fur-seal skins taken on the Pribilof Islands. Of these, 72,858 were at St. Louis, Mo., and 18 at Washington. In 1939, 60,473 fur-seal skins were taken on the Pribilof Islands and shipped to St. Louis. Of the skins on hand at the beginning of the year, 43,086 were disposed of, leaving 29,790 unsold, which, with the 60,473 taken in 1939, make a total of 90,263 on hand on December 31, 1939. The following tables show further details with regard to fur-seal skins taken on the Pribilof Islands, as well as details concerning other fur-seal skins under the control of the Department of the Interior:

Summary of all Government-owned fur-seal skins under control of Department of the Interior, calendar year 1939

Source	On hand Jan. 1			Re-ceipts in 1939	Sales in 1939	Used for tests	On hand Dec. 31		
	Fouke Fur Co.	Wash-ington office	Total				Fouke Fur Co.	Wash-ington 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 1936	5		5		5				
Calendar year 1937	23,244		23,244		23,234		10		10
Calendar year 1938	49,609		49,609		19,832	15	29,743	119	29,762
Calendar year 1939				60,473			60,473		60,473
Miscellaneous skins held for reference purposes		4	4					4	4
United States' share of Japanese sealskins:									
Season of 1937	210		210		210				
Season of 1938				210			210		210
Total	73,068	22	73,090	60,683	43,281	15	90,436	41	90,477

¹ Being held as standard samples in custody of the U. S. Bureau of Standards.

² Includes the Canadian share of sealskins which were in custody of the Fouke Fur Co. and which the Canadian Government subsequently authorized to be handled with skins of the United States.

Summary of Government-owned fur-seal skins in the custody of Fouke Fur Co., at St. Louis, Mo., calendar year 1939

Source	On hand Jan. 1	Receipts in 1939	Disposed of in 1939	On hand Dec. 31
Taken on Pribilof Islands:				
Calendar year 1936	5		5	
Calendar year 1937	23, 244		23, 234	10
Calendar year 1938	49, 609		19, 866	29, 743
Calendar year 1939		60, 473		60, 473
United States' share of Japanese fur-seal skins:				
Season of 1937	210		210	
Season of 1938		210		210
Total	73, 068	60, 683	43, 315	90, 436

¹ Of these 19,832 were sold; 15 were used by the U. S. Bureau of Standards in making tests; 19 were shipped to Washington.

² Includes the Canadian share of sealskins which were in custody of the Fouke Fur Co. and which the Canadian Government subsequently authorized to be handled with skins of the United States, appropriate distribution to be made of the net proceeds of sales.

SHIPMENT AND SALE OF FOX SKINS

The 219 blue and 5 white fox skins taken on St. Paul Island and the 799 blue and 6 white fox skins taken on St. George Island in the season of 1938-39 were shipped from the islands on the *Penguin*, sailing on March 18. The vessel reached Seattle on March 31, and the fox skins were forwarded by express to the Department's selling agents at St. Louis, Mo.

At the public auction sale in St. Louis on May 22, 1939, 424 blue fox skins of the 1937-38 season's take were sold for \$6,157.50, an average of \$14.52 per skin. The maximum price was \$46, obtained for one fine silvery pelt sold singly, and for each of 2 No. 1 light silvery pelts sold in another lot.

On October 2, 1939, there were sold at public auction at St. Louis 512 blue and 11 white fox skins taken on the Pribilof Islands in the 1938-39 season. The blue pelts brought \$8,546, an average price of \$16.69; and the white pelts brought \$143, or \$13 each. The maximum price per skin was \$62, obtained for 2 No. 1 silvery pelts.

FUR-SEAL PATROL

UNITED STATES COAST GUARD

Vessels of the Coast Guard were again assigned by the Treasury Department to patrol waters along the route of the Alaska fur seals during their northward migration to the Pribilof Islands. Ten cutters and patrol vessels were instrumental in enforcing the laws and regulations for the protection of fur seals and sea otters in the North Pacific and Bering Sea.

On March 15 the cutter *Onondaga* began the regular seal patrol of the Oregon and Washington coasts from Yaquina Head northward to the Strait of Juan de Fuca. A preliminary cruise had been made by this vessel off Columbia River prior to March 15, during which 5 seals were sighted. Many small boats were boarded at sea during the patrol but no evidence of pelagic sealing was found. The seal patrol activities of the *Onondaga* were continued until its return to Astoria on April 1. During the same period the patrol boat *Atalanta* operated out of Neah Bay, patrolling the Strait of Juan de Fuca and western

coast of Washington and Vancouver Island from Destruction Island northward to Nootka Sound. The foregoing vessels cruised 1,820 miles and 1,981 miles, respectively, during this patrol.

The cutter *Ingham* departed from the Puget Sound Navy Yard on April 4 to patrol the Strait of Juan de Fuca and waters off the west coasts of Vancouver Island and British Columbia to Dixon Entrance, and returned to the Navy Yard on April 20, having cruised 3,889 miles. The cutter *Haida* made a round trip from Juneau to Kodiak Island in the fur-seal patrol from April 20-29, during which it cruised 1,985 miles.

Seven vessels of the Coast Guard which were assigned to the regular Bering Sea patrol participated in the seal patrol in that region, as well as during their journey north as occasion arose. These included the *Atalanta*, which had engaged in the seal patrol in the spring off the Northwest Coast, and which sailed from Seattle on June 20 for Unalaska for patrol in Bristol Bay waters until September 13. The patrol boat *Hermes* left San Pedro on April 14 for a cruise northward into Bristol Bay, via the Inside Passage, and returned to San Pedro on July 7. The cutter *Duane* sailed from Oakland on April 17 and patrolled North Pacific waters and Bristol Bay until it was relieved at Dutch Harbor on July 20. The patrol boat *Morris* was on this special patrol from the time of its departure from Seattle on May 20 for Unalaska, via the Inside Passage, until its return to Seward on June 22. The cutter *Itasca* sailed from San Diego on May 25 direct for Unalaska, and patrolled in Bering Sea, Norton Sound, and westward to Attu, calling also at Nome and St. Lawrence Island, until it was relieved at Dutch Harbor on September 14. The patrol boat *Alert* left Ketchikan on July 1 for Port Moller and Bering Sea and was relieved at Unalaska on September 9. Superseding the *Northland*, the cutter *Spencer* made the annual cruise to the Arctic Ocean, sailing from Seattle on July 25 and patrolling in Bering Sea and adjacent waters until it was relieved at Dutch Harbor on September 5.

BUREAU OF FISHERIES

The Bureau of Fisheries vessel *Scoter* was assigned to patrol the waters off the coast of Washington, principally in the vicinity of Neah Bay, during the period of sealing operations by the native Indians. The *Scoter* left Seattle for this duty on April 5 and returned there on April 30.

Warden J. Steele Culbertson was detailed for a short time in April to make a general investigation of sealing operations carried on by various Indian tribes on the Olympic Peninsula. Particular attention was given to the matter of assuring compliance with treaty provisions and the law giving effect thereto concerning the prohibition of the use of firearms or motorboats in the taking of fur seals by the aborigines.

SEALING PRIVILEGES ACCORDED ABORIGINES

Under the terms of the pelagic sealing treaty of July 7, 1911, Indians and other aborigines dwelling on the coasts of North America are privileged to hunt fur seals by primitive methods. In 1939 there were taken and duly authenticated, by officials of the respective Governments, 637 fur-seal skins, of which 61 were taken by Indians under

the jurisdiction of the United States and 576 by Indians of Canada. The details are as follows:

Washington.—Thirty sealskins, all from female seals, were taken off the coast of Washington by Indians of Neah Bay and La Push during the months of February to May, inclusive. The skins were authenticated by N. O. Nicholson, superintendent of the Taholah Indian Agency at Hoquiam, Wash., and by Warden J. Steele Culbertson, who was detailed to assist in the fur-seal patrol for a short time during April.

Alaska.—Thirty-one sealskins were taken by the natives of Sitka during April and May, and were authenticated by Bureau employees. Of these skins, 1 was from a male and 30 were from female seals.

British Columbia.—Indians along the British Columbia coast took 576 fur-seal skins in 1939, according to an official report.

JAPANESE SEALSKINS DELIVERED TO THE UNITED STATES

In accordance with provisions of the fur-seal treaty of 1911, there were allotted to the United States 210 Japanese fur-seal skins, or 10 percent of the number taken by Japan on Robben Island in 1939. These skins were received by the Department's selling agents at St. Louis, Mo., on May 3, 1940.

SUBSTATION FOR SEA-OTTER PATROL

Two wardens were employed to carry on sea-otter investigations and patrol at the Amchitka substation in the summer of 1939, and for the first time the work was continued throughout the winter. The men and supplies were transported by the *Penguin*, sailing from St. Paul Island on July 2 and arriving at Amchitka Island on July 10. Before the vessel's departure on the return trip on July 12, the crew of the *Penguin* assisted in getting the station in readiness, the work performed consisting of repairs to electric wiring, rigging radio antennae, installing radio-telephone transmitter, and checking over the Diesel power plant.

Careful surveys were made of sea otters in the vicinity of the island, and the number counted showed a fair increase over the preceding year. No evidence of poaching was observed. Special attention was given to verifying statements of Atka natives that many sea otters had been found washed up on the beach during the winter of 1938-39, but only 3 sea-otter skeletons were discovered, indicating that the mortality had not been abnormally high.

COMPUTATION OF FUR SEALS, PRIBILOF ISLANDS, 1939

By HARRY J. CHRISTOFFERS

The commercial killing of 3-year-old male seals at the Pribilof Islands in 1939 showed a considerable increase, indicating that sufficient males had been reserved in the past for breeding requirements.

In all, 56,520 3-year-old males were killed in 1939, as compared with 54,140 in 1938 and 54,890 in 1935. Not only was this season's take the largest since the treaty of 1911, but operations were confined to a shorter period than in some years, commercial sealing having been discontinued on July 26, as against August 1 in 1938 and July 31 in

1935. Considering the rate at which 3-year-old seals were arriving when killings were discontinued in 1939, it is believed that more than 5,000 additional seals could have been taken if killings had been continued through the month of July. The larger reserve of 3-year-old males should help considerably in reducing the average harem when these animals are able to take their stations on the rookeries as harem bulls.

Peculiar conditions prevailed throughout the entire sealing season. In spite of the large average harem, large numbers of capable harem bulls continued to remain on the hauling grounds throughout the entire killing period and there were numerous strong bulls at the end of the season which had no doubt taken their positions after the earlier-arriving harem bulls had retired.

Though harems were pretty well broken up for a number of days before sealing was discontinued, there were comparatively few cows and very few 2-year-olds or yearlings in the drives.

For comparative purposes preliminary harem counts were made on the various rookeries throughout the season, and some very interesting results are shown. On June 27 Mr. Johnston counted 125 harems on East rookery, St. George Island, but on July 21 he found only 102 harems there. Under normal circumstances it would be safe to predict an increase in harem bulls of at least 75 percent during the period stated. On July 8 Mr. Johnston counted 78 harems on Zapadni Reef, St. Paul Island, but on July 18 there were only 76 harems.

No branded bulls were observed on any rookery this season. The albino bull first noted in 1935 was seen in two of the earlier Reef drives this season and then disappeared. Mr. Johnston observed an albino pup on Zapadni rookery, St. George Island.

BULLS

As in previous years, a census was taken of harem and idle bulls. The census on St. Paul Island was taken jointly by the Superintendent and by Edward C. Johnston, who conducted the census each year from 1921 to 1927, inclusive. The census on St. George Island was taken by Mr. Johnston alone.

The published census of harem and idle bulls for 1938 stated that "there is a possibility of a shortage of bulls within the next few years," and also that "it would be advisable each year to make an additional reserve of males."

The census of harem bulls for 1939 showed a much larger average harem than usual, a condition which cannot be entirely accounted for, as there were numerous capable harem-size bulls in the drives and among the idle-bull class throughout the entire season. It is hard to understand why all these bulls did not take up permanent positions and secure harems.

The sharp reduction in the total number of harem bulls may possibly be due in part to the fact that in recent years killings were continued until the close of July, with no additional reserve of 3-year-olds being made throughout the killing season. This, however, should not have any particular bearing on the present situation, for in 1931 a total of 5,226 seals were reserved before August 1, and in 1932 2,244 were reserved before that date. The seals reserved in 1931 and 1932 would

be 11 and 10 years old, respectively, this year, and should have been in their prime.

It should also be noted that from 1930 to 1934 there was an average harem ranging from 38.39 to 41.95, the lowest average harems known for any period since special additional reserves of seals were made in 1923. In spite of these low average harems there was no marked increase in the number of 3-year-olds available for killing in succeeding years. Theoretically, when the average harems were smallest, as in 1931 and 1932, a greater percentage of females should have been bred than when there was a larger average harem. However, when the progeny of the low-average harems became of killable age, no proportionately greater increase was noticeable in the number of 3-year-olds available. There has been a gradual increase in the average harem from 38.39 in 1933 to 46.69 in 1938 and 60.44 in 1939. Nevertheless, it is still believed that there should be a considerable surplus of breeding males and that under normal conditions the larger the surplus of breeding males the faster the herd will increase.

In 1938 there was a conspicuous shortage of idle bulls on the rookeries and hauling grounds. In 1939 this condition was reversed. There was an abundance of large, vigorous bulls on the hauling grounds. Why they remained there throughout the season when the harem areas contained considerably less than the usual number of bulls is not known.

Because of this sharp reduction in the number of harem bulls, it appeared advisable to start creating a much larger reserve of 3-year-old males. Commercial sealing, therefore, was discontinued on July 26. This provision for an additional reserve should be continued for a number of years and, if conditions warrant, it would be desirable to make an even larger reserve than was made this year.

The desirability of having the harem and idle bull count made by the same persons in the same way each year was clearly shown this season. Counts of the larger rookeries cannot be made accurately, but if the same enumerators use the same methods each season the possibility of any wide variation in estimates will be reduced to a minimum. With plenty of idle bulls on the hauling grounds this season, it would normally have been expected that killings could safely be continued until the end of July, but the sharp increase in the size of the average harem appeared as a warning to leave a larger male reserve.

Too close killing for a year or two should not result in any considerable harm, as mature males should be capable of doing harem duty from 6 to 8 years.

No harem count was made on Sivutch rookery, but on account of the reduced number of harems on most of the other rookeries a reduction was applied also to this rookery.

Owing to lack of suitable space, some of the rookeries are incapable of continuous enlargement. As the 8 percent increase of cows must still be applied in order to determine the total increase of the herd, the resulting average harem for these rookeries is shown as considerably larger than it should be. Only the average harem for the entire herd, therefore, should receive consideration.

Except when the Polovina count was made, unusually good weather for counting prevailed during the entire period in which harem counts and estimates were made. Presumably it is generally understood that

only the smaller rookeries can be accurately counted. Estimates are essential for portions of all large rookeries.

Estimated number of harem and idle bulls, approximate ratio of idle bulls to harem bulls, and average harem, 1939

Rookery	Date	Harem bulls	Idle bulls	Total	Approximate ratio of idle bulls to harem bulls	Average harem
St. Paul Island:						
Kitovi.....	July 16	458	79	537	1:6	47.94
Lukanin.....	do.	166	38	204	1:4	63.95
Gorbach.....	July 16	900	550	1,450	1:2	61.94
Ardiguen.....	do.	103	20	123	1:5	51.20
Reef.....	do.	1,600	485	2,085	1:3	69.99
Sivutch.....	do.	400	65	465	1:6	85.67
Lagoon.....	July 18	1		1		32.00
Tolstoi.....	July 15	975	192	1,167	1:5	67.61
Zapadni.....	July 19	786	250	1,036	1:3	80.60
Little Zapadni.....	do.	482	118	600	1:4	67.00
Zapadni Reef.....	do.	76	19	95	1:4	14.74
Polovina.....	July 16	420	151	571	1:3	54.21
Polovina Cliffs.....	do.	355	141	496	1:3	35.12
Little Polovina.....	do.	165	66	231	1:3	27.51
Morjovi.....	July 17	435	181	616	1:2	18.76
Vostochni.....	do.	1,800	261	2,061	1:7	50.47
Total.....		9,122	2,616	11,738	1:3	59.34
St. George Island:						
North.....	July 21	640	77	717	1:8	69.03
Staraya Artil.....	July 20	534	68	602	1:9	62.34
Zapadni.....	July 22	212	72	284	1:3	22.16
South.....	do.	139	10	149	1:14	7.94
East Reef.....	July 21	102	50	152	1:2	99.24
East Cliffs.....	do.	231	80	311	1:3	125.13
Total.....		1,858	357	2,215	1:5	65.82
Total (both Islands).....		10,980	2,973	13,953	1:4	60.44

AVERAGE HAREM

The average harem computed for 1939 was 60.44, compared with 46.69 in 1938. This estimate is based on an average increase for cows of 8 percent. It has been felt for a number of years that an 8 percent increase may be somewhat too high, and, if this is true, the actual average harem would be somewhat smaller than computed.

The great increase in the average harem this year might indicate, if there is no change another season, that killings have been rather close. This may not necessarily be true, however, as the proportion of 3-year-olds remaining during the years from which present harem and idle bulls were recruited should have been more than sufficient, under normal circumstances, to provide enough bulls for a smaller average harem. Sometime during the life cycle of these animals there must have been a larger percentage of deaths than normal. It may be that as the herd increases, some unknown factor causes an increased death rate of all animals. These unknown factors will tend to make it considerably harder, as the herd increases, to figure what percentage of males it will be necessary to leave for breeding purposes.

Computation of breeding cows, based on annual increase of 8 percent, and of average harem, in 1939

Rookery	Breeding cows		Harem bulls, 1939	Average harem		
	1938	1939		1938	1939	Increase (+) or decrease (-) in 1939 from 1938
St. Paul Island:						
Kitovi.....	20,330	21,956	458	49.11	47.94	-1.17
Lukanin.....	9,829	10,616	186	53.71	63.95	+10.24
Gorbatch.....	51,620	55,750	900	49.16	61.94	+12.78
Ardiguen.....	4,883	5,274	103	50.86	61.20	+10.34
Reef.....	103,688	111,983	1,600	49.38	60.99	+20.61
Sivutch.....	31,729	34,267	400	66.80	85.67	+18.87
Lagoon (actual count pups).....	53	32	1	26.60	32.00	+5.50
Tolstol.....	61,037	65,920	975	50.86	67.61	+16.75
Zapadni.....	58,659	63,352	788	58.86	80.60	+21.94
Little Zapadni.....	29,901	32,293	482	51.91	67.00	+15.09
Zapadni Reef.....	1,037	1,120	76	15.03	14.74	-.29
Polovina.....	21,082	22,769	420	45.44	54.21	+8.77
Polovina Cliffs.....	11,543	12,466	355	31.28	35.12	+3.84
Little Polovina.....	4,203	4,539	165	35.03	27.51	-7.52
Morjovi.....	7,556	8,160	435	25.02	18.78	-6.26
Vostochni.....	84,114	90,843	1,800	36.57	50.47	+13.90
Total.....	501,264	541,339	9,122	46.76	59.34	+12.58
St. George Island:						
North.....	40,907	44,180	640	51.13	69.03	+17.90
Staraya Artil.....	30,822	33,288	534	47.42	62.34	+14.92
Zapadni.....	4,349	4,697	212	18.91	22.16	+3.25
South.....	1,021	1,103	139	6.81	7.94	+1.13
East Reef.....	9,373	10,123	102	50.66	99.24	+48.58
East Cliffs.....	26,763	28,904	231	62.97	125.13	+62.16
Total.....	113,235	122,295	1,858	46.41	65.82	+19.41
Total (both islands).....	614,499	663,634	10,980	46.69	60.44	+13.75

PUPS AND COWS

The estimated number of pups and cows is determined by applying an increase of 8 percent to the number computed for the previous season.

It is now believed that the estimated rate of increase is slightly too high. The killings of 3-year-old males during the past few years have indicated that the applied percentage of increase was somewhat too high, but, on the other hand, it may be that a larger death rate should be applied for a portion or all of the first 3 years of the life cycle. The final results would be the same. One hesitates about making changes until observations make it entirely essential. The increase in killable animals this season might indicate the beginning of another cycle wherein there may be a smaller mortality rate than has been apparent for the past few years.

There did not appear to be any increase in the percentage of dead pups, and the percentage determined in 1922 has therefore been applied to each rookery. The estimated number of dead pups has been included, as usual, in the total number of pups for comparative purposes. Inasmuch as the estimated number of dead pups has now reached a grand total of 11,333, and has been around the 10,000 mark for several years, it is quite evident that total census figures are somewhat higher than they should be, even though the discrepancy is proportionately no greater than it has been in the past.

Distribution of pups on the Pribilof Islands, Aug. 10, 1939, and comparison with distribution in 1938

Rookery	1939				Total pups, 1938	Increase, 1939
	Living pups	Dead pups	Total pups	Percent dead pups		
St. Paul Island:						
Kitovi.....	21,633	323	21,956	1.47	20,330	1,626
Lukanin.....	10,385	230	10,615	2.17	9,829	786
Gorbatch.....	55,271	479	55,750	.86	51,620	4,130
Ardiguen.....	5,148	126	5,274	2.39	4,883	391
Reef.....	110,348	1,635	111,983	1.46	103,688	8,295
Sivutach.....	33,431	836	34,267	2.44	31,729	2,538
Lagoon (actual count).....	32		32		63	31
Tolstoi.....	65,004	916	65,920	1.39	61,037	4,883
Zapadni.....	62,262	1,090	63,352	1.72	58,659	4,693
Little Zapadni.....	31,486	807	32,293	2.50	29,901	2,392
Zapadni Reef.....	1,111	9	1,120	.80	1,037	83
Polovina.....	22,421	348	22,769	1.53	21,032	1,637
Polovina Cliffs.....	12,235	231	12,466	1.85	11,543	923
Little Polovina.....	4,425	114	4,539	2.51	4,208	336
Morjovi.....	7,995	165	8,160	2.02	7,556	604
Vostochni.....	88,963	1,890	90,843	2.08	84,114	6,729
Total.....	532,140	9,199	541,339	1.70	501,264	40,075
St. George Island:						
North.....	43,561	619	44,180	1.40	40,907	3,273
Staraya Artil.....	32,429	859	33,288	2.58	30,829	2,459
Zapadni.....	4,644	63	4,707	1.12	4,349	348
South.....	1,084	19	1,103	1.72	1,021	82
East Reef.....	9,970	163	10,133	1.61	9,373	760
East Cliffs.....	28,473	431	28,904	1.49	26,763	2,141
Total.....	120,161	2,134	122,295	1.74	113,235	9,060
Total (both islands).....	652,301	11,333	663,634	1.71	614,499	49,135

MORTALITY OF SEALS AT SEA

The number of killable 3-year-old male seals arriving at the islands this season indicated that it would not be desirable this year to change the mortality rates for any of the age classes. The sharp decrease in the number of harem bulls makes it appear that possibly there was a considerably greater mortality among the seals during one or several years of the life cycle of the males which should now be in the breeding bull classes. This increased death rate, if such there were, may now be leveled off by a correspondingly smaller death rate for the present and following 3-year-old classes.

Continually changing conditions at sea, causing a considerable increase or decrease in the death rate from year to year, make it entirely impossible to establish a constant mortality rate. Continuous abnormal conditions make it possible to know only after a number of years have elapsed whether mortality rates have been incorrect for a given period.

COMPLETE COMPUTATION

The following summary shows the methods used in computing the number of animals in the fur-seal herd of the Pribilof Islands in 1939. The total number of seals of all classes as of August 10, 1939, was 2,020,774, or 148,336 more than in 1938. This gives an increase for the herd of 7.92 percent.

Complete computation of fur seals, Pribilof Islands, as of August 10, 1939.

Class	St. Paul Island	St. George Island	Total
Pups, estimated.....	541,339	122,295	663,634
Breeding cows, 3 years old and over, by inference.....	541,339	122,295	663,634
Harem bulls, estimated.....	9,122	1,858	10,980
Idle bulls, estimated.....	2,616	357	2,973
Yearlings, male and female, estimated:			
Females born in 1938.....	250,632	56,618	307,250
Natural mortality, 45 percent.....	112,784	25,478	138,262
Yearling females, Aug. 10, 1939.....	137,848	31,140	168,988
Males born in 1938.....	250,632	56,617	307,249
Natural mortality, 50 percent.....	125,316	28,309	153,625
Yearling males beginning 1939.....	125,316	28,306	153,624
Yearling males killed in 1939.....	8		8
Yearling males, Aug. 10, 1939.....	125,313	28,308	153,621
2-year olds, male and female, estimated:			
Yearling females, Aug. 10, 1938.....	127,637	28,833	156,470
Natural mortality, 15 percent.....	19,146	4,326	23,471
2-year-old females, Aug. 10, 1939.....	108,491	24,508	132,999
Yearling males, Aug. 10, 1938.....	116,020	26,212	142,232
Natural mortality, 17.5 percent.....	20,304	4,587	24,891
2-year-old males beginning 1939.....	95,716	21,625	117,341
2-year-old males killed in 1939.....	898	324	1,217
2-year-old males, Aug. 10, 1939.....	94,823	21,301	116,124
3-year-old males, estimated:			
2-year-old males, Aug. 10, 1938.....	87,205	19,798	107,003
Natural mortality 12.5 percent.....	10,901	2,475	13,376
3-year-old males beginning 1939.....	76,304	17,323	93,627
3-year-old males killed in 1939.....	44,644	11,876	56,520
3-year-old males, Aug. 10, 1939.....	31,660	5,447	37,107
4-year-old males, estimated:			
3-year-old males, Aug. 10, 1938.....	27,707	4,571	32,278
Natural mortality 10 percent.....	2,771	457	3,228
4-year-old males beginning 1939.....	24,936	4,114	29,050
4-year-old males killed in 1939.....	1,099	565	1,664
4-year-old males, Aug. 10, 1939.....	22,937	3,549	26,486
5-year-old males, estimated:			
4-year-old males, Aug. 10, 1938.....	20,637	3,638	24,275
Natural mortality, 10 percent.....	2,064	364	2,428
5-year-old males beginning 1939.....	18,573	3,274	21,847
5-year-old males killed in 1939.....	8		8
5-year-old males, Aug. 10, 1939.....	18,565	3,274	21,839
6-year-old males, estimated:			
5-year-old males, Aug. 10, 1938.....	14,317	3,884	18,201
Natural mortality, 20 percent.....	2,863	777	3,640
6-year-old-males, Aug. 10, 1939.....	11,454	3,107	14,561
Surplus bulls, 7 years old and over, estimated:			
6-year-old males, Aug. 10, 1938.....	14,854	2,415	17,269
Natural mortality, 20 percent.....	2,971	483	3,454
7-year-old males, Aug. 10, 1939.....	11,883	1,932	13,815
Surplus bulls, Aug. 10, 1938.....	(1)	(1)	7,277
Natural mortality, 30 percent.....			2,188
Remaining surplus for 1939.....			5,094

¹ Estimates have been worked out, insofar as possible, to show approximately the number of seals of each class which should be credited to each island. The seals, however, do not haul out in accordance with figures given. Those born on one island frequent the other island. They travel promiscuously between the two islands and haul out on either one. The total for both islands, however, is approximately correct.

Complete computation of fur seals, Pribilof Islands, as of August 10, 1939—Continued

Class	St. Paul Island	St. George Island	Total
Surplus bulls, 7 years old and over, estimated—Continued.			
Breeding bulls of 1938.....	12,507	2,778	15,285
Natural mortality, 30 percent.....	3,752	883	4,635
1938 bulls remaining in 1939.....	8,755	1,945	10,700
Breeding bulls of 1939.....	11,738	2,215	13,953
1938 bulls remaining deducted.....	8,755	1,945	10,700
Increment of new bulls in 1939.....	2,988	270	3,253
7-year-old males computed for 1939.....	11,883	1,932	13,815
Surplus bulls computed for 1939.....			5,094
Total theoretical bull stock for 1939.....			18,909
New increment of breeding bulls deducted.....			3,253
Surplus bulls in 1939.....			15,656
50 percent deducted for losses due to natural causes, and errors in loss percentages in previous years.....			7,828
Surplus bulls, Aug. 10, 1939.....			7,828

Recapitulation

Class	Total	Class	Total
Pups.....	663,634	5-year-old males.....	21,839
Cows.....	663,634	6-year-old males.....	14,661
Harem bulls.....	10,980	Surplus bulls.....	7,828
Idle bulls.....	2,973		
Yearling females.....	168,988	Total, 1939.....	2,020,774
Yearling males.....	153,621	Total, 1938.....	1,872,438
2-year-old females.....	132,999		
2-year-old males.....	116,124	Numerical increase, 1939.....	148,336
3-year-old males.....	37,107	Percent increase, 1939.....	7.92
4-year-old males.....	26,486		

UNITED STATES DEPARTMENT OF THE INTERIOR
HAROLD L. ICKES, Secretary
BUREAU OF FISHERIES
CHARLES E. JACKSON, Acting Commissioner

Administrative Report No. 41

**FISHERY INDUSTRIES
OF THE UNITED STATES
1939**

By R. H. FIEDLER

APPENDIX III TO REPORT OF COMMISSIONER OF FISHERIES
FOR THE FISCAL YEAR 1940



UNITED STATES
GOVERNMENT PRINTING OFFICE
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ADMINISTRATIVE REPORT SERIES

Since the advent of the Administrative Report Series, considerable confusion has arisen concerning its system of numbering the separates composing it. Inasmuch as the Reports of the Divisions vary in order from year to year, many have found their designations as "Appendix No. I, II, III, or IV" very confusing. To relieve this, it has been decided to number them as "Administrative Report No. —." Inasmuch as 20 separates had already been printed in this series before starting the numbers, it was deemed advisable to begin the numbering with Administrative Report No. 21. Of course, numbers cannot be printed on those already off the press, but for the information of those who wish to know what the first 20 were, they are numbered for filing purposes as follows:

- No. 1. Report, Commissioner of Fisheries, 1931.
- No. 2. Alaska Fishery and Fur-Seal Industries, 1930.
- No. 3. Fishery Industries of the United States, 1930.
- No. 4. Progress in Biological Inquiries, 1930.
- No. 5. Propagation and Distribution of Food Fishes, 1931.
- No. 6. Report, Commissioner of Fisheries, 1932.
- No. 7. Alaska Fishery and Fur-Seal Industries, 1931.
- No. 8. Fishery Industries of the United States, 1931.
- No. 9. Progress in Biological Inquiries, 1931.
- No. 10. Propagation and Distribution of Food Fishes, 1932.
- No. 11. Alaska Fishery and Fur-Seal Industries, 1932.
- No. 12. Progress in Biological Inquiries, 1932.
- No. 13. Fishery Industries of the United States, 1932.
- No. 14. Propagation and Distribution of Food Fishes, 1933.
- No. 15. Fishery Industries of the United States, 1933.
- No. 16. Alaska Fishery and Fur-Seal Industries, 1933.
- No. 17. Progress in Biological Inquiries, 1933.
- No. 18. Propagation and Distribution of Food Fishes, 1934.
- No. 19. Alaska Fishery and Fur-Seal Industries, 1934.
- No. 20. Fishery Industries of the United States, 1934.

Note that the last Commissioner's Report was for 1932. Since then its place has been taken by a reprint from the Report of the Secretary of Commerce under the title "Bureau of Fisheries." Inasmuch as it is no longer a Bureau publication, it is not numbered; but it will be supplied to any who request the Report of the Commissioner for any year since 1932.

FISHERY INDUSTRIES OF THE UNITED STATES, 1939¹

By R. H. FIEDLER, *Chief, Division of Fishery Industries*

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¹ Administrative Report No. 41, Appendix III to the Report of the U. S. Commissioner of Fisheries, 1940. Approved for publication June 20, 1940.

FOREWORD

This report constitutes a summary of the activities of the Division of Fishery Industries, as well as a review of the fishery statistics collected by the Division during the past year. As its name indicates, this Division of the Bureau is concerned with the activities and welfare of the commercial fisheries and fishery industries and the fishermen and shoresmen engaged therein; the fish canning and preserving industries; and the trade in fishery products. Its functions include the conduct of studies or activities: (1) To determine the extent and magnitude of our aquatic resources and the commercial importance of our fishery industries; (2) to learn the economic condition of fishermen and shoresmen engaged in the fishery industry, their place in the national economy, and what measures can be taken to improve their well-being; (3) to determine the character, utility, and effectiveness of different forms of fishing apparatus and vessels, suggest improvements therein, and discourage the use of those forms which are unnecessarily destructive or unprofitable; (4) to learn the effect of fishing on the supply of fish and suggest measures to promote orderly and sustained production; (5) to study and develop fisheries for hitherto unutilized fishes; (6) to investigate the preservation of fishery products, suggest improved methods, and discourage wasteful practices in this field; (7) to ascertain what use can be made of aquatic products not now utilized to economic advantage; (8) to inquire into the nutritive value of aquatic foods for man and his domestic animals, and promote the consumption of these foods; (9) to ascertain the means and methods of transporting fishery products on land and sea and recommend economical practices; (10) to inquire into the condition and extent of the wholesale and retail trade in fishery products and promote the more orderly marketing of our fishery harvest; (11) to introduce useful foreign methods or processes of capture, preservation, utilization, or marketing fishery products; (12) to handle matters relative to the administration of the act which authorizes cooperative associations of producers of aquatic products; and (13) to conduct the Fishery Market News Service authorized by act of Congress in 1937.

Results of the various technological, economic, and marketing investigations carried on by the Division are published in separate documents as each project is completed, and a brief résumé of each current project is contained in this report. Information obtained from statistical surveys is published in part 2 of this report, which includes all the detailed statistical information that has become available since issuance of the previous report,² together with such summarized statements and interpretations of the statistics as are deemed significant and useful.

² Fishery Industries of the United States, 1938, by R. H. Fiedler: Appendix III to the Report of the U. S. Commissioner of Fisheries for 1939. pp. 169-554.

Part I. OPERATIONS OF THE DIVISION

COOPERATION WITH OTHER FEDERAL AGENCIES

It has been the established policy of the Bureau of Fisheries, and of this Division, to cooperate with other Federal agencies wherever the activities are such that mutual information can be exchanged with advantage, or where, by working cooperatively, the results of such mutual work may be furthered or its ends made more effective and valuable.

Thus, the technologists of this Division gave courses in canning fishery products to State Extension Service workers at the request of and with the cooperation of the Extension Service of the United States Department of Agriculture. Demonstrations and practical instruction on other related subjects pertaining to the preservation of fishery products, and a better utilization of the excellent food value of fish, were given to State Extension Service workers through and with the cooperation of the Extension Service of the United States Department of Agriculture. In some cases, students or State Extension Service workers were detailed to the Bureau's laboratories in Washington, D. C., for instruction, and in other cases one of our technologists visited some of the States for this purpose.

Cooperation was also given by members of our technological staff to chemists and bacteriologists of the Food and Drug Administration, United States Department of Agriculture, at various times in connection with the development and application of tests or methods of determining the quality and constituents of various fishery products.

The Department of Labor, through several of its divisions, has been helpful during the past year in connection with the Division's studies of the retail marketing of fish as well as studies of labor conditions in the fisheries. This Division's staff also assisted and was aided by the Maritime Commission and the Maritime Labor Board in studies of fisheries employment. Advice and assistance has been furnished the Federal Surplus Commodities Corporation in connection with its programs of buying fish for distribution to relief clients. The Food and Drug Administration of the Department of Agriculture has cooperated with this Division in furnishing current statistics on the pack of canned shrimp and allied data. Cooperation has been continued by the Bureau of Foreign and Domestic Commerce in furnishing monthly and annual statistics of foreign trade in fishery products, while the local offices of the Bureau of the Customs has furnished the several Market News offices of the Division daily statistics of the imports of fishery commodities. Assistance has been accorded by several of the economic and technological staff of the Division to the Federal Trade Commission in its work in connection with the preparation and promulgation of trade practice rules for the sardine and tuna industries.

The Division also has worked with various Federal agencies in obtaining statistical data on our fisheries. In a cooperative arrangement, the Bureau of Agricultural Economics, Department of Agriculture, furnished statistics on the volume of cold-storage holdings of fish and quantities frozen, and the health authorities in Washington, D. C., assisted in obtaining data on the volume of fish handled at the Municipal Fish Wharf and Market in this city. Cooperation was accorded the Bureau of the Census in obtaining for that Bureau figures on the volume of the quarterly production and holdings of fish oils in the United States.

In addition to the specifically enumerated instances of cooperation with other Federal agencies cited above, which are on a continuing basis or were of a more detailed nature, it should be stated that a very close relationship exists between this Division and many of those Federal agencies whose duties require an interest in fish in particular, foodstuffs or feedstuffs in general, or in various marine activities. The staff of the Division is in almost daily contact with some one or more of these Federal agencies in the exchange of information of inestimable value to the scientific work of the Federal establishment.

COOPERATION WITH STATE AGENCIES

The Division has continued to encourage cooperative relations with State institutions and agencies in the conduct of researches and investigations of mutual interest. This policy has resulted in expanded programs and decreased costs. During 1939 the following cooperative investigations with various States were conducted:

Our Seattle technological laboratory staff has continued its close cooperative relation with members of the faculty and staff of the University of Washington, Seattle, Wash., as in past years.

The University of Maryland and the Maryland State Agricultural Experiment Station, College Park, Md., continued their excellent cooperative relations with our College Park technological laboratory staff. The various departments of animal husbandry of the Maryland State Agricultural Experiment Station continued their cooperation in the conduct of feeding tests of fishery byproducts in the rations of farm animals. The members of the staffs of these two institutions who have worked closely with our College Park technological staff are Dr. L. B. Broughton, Dean of the College of Arts and Sciences; Dr. W. C. Supplee and Mr. L. E. Bopst of the Chemistry Department; Dr. L. H. James, Head of the Department of Bacteriology; and Prof. M. H. Berry, of the Dairy Department. These various cooperative studies are described in greater detail elsewhere in this report.

As discussed in the 1938 report, the Bureau's technologists continued their cooperation with the Virginia State Division of Markets in extending and improving State marketing grades for fishery products sold in that State.

In the conduct of its statistical and market research work, the Bureau obtains unusual cooperation from various States. The statistical surveys of the fisheries in the various States bordering on the Great Lakes, the Pacific Coast States, and Maryland and Virginia have been greatly facilitated by the cooperation obtained from the fishery agencies in these States. With this aid it is now only necessary for the Bureau to conduct partial surveys in these States to supplement the data available from the fishery agencies.

During the year several members of the Bureau's staff cooperated with officials of the Maine Sea and Shore Fisheries Commission and the Connecticut State Board of Fisheries and Game in establishing systems for the collection of detailed fishery statistics in Maine and Connecticut. As the data collected by these agencies will be available to the Bureau, it is anticipated that in the future it will only be necessary for our agents to conduct limited field surveys in these States in order to obtain complete operating unit and catch data.

In addition, in nearly every other State where commercial fishing is prosecuted, some type of cooperation in its statistical work is rendered the Bureau by the State fishery agencies or other organizations. This makes it possible for the Bureau to make statistical surveys of a greater portion of our fishery industries than otherwise would be possible.

COOPERATION WITH FISHERY ADVISORY COMMITTEE

The Division of Fishery Industries cooperated during the year with the Fishery Advisory Committee in the carrying out of the Committee's function as a body advisory to the Secretary. Technical assistance was made available to the Committee at all times, current information upon the Bureau's work was furnished from time to time for the information of the members, and help was furnished in the planning and arrangement of the annual Committee meeting.

On February 2 and 3, 1940, the annual meeting of the Committee was held in Washington, D. C., in the Conference Room of the Secretary of the Interior. Members of the staff of the Division attended. Special statements were furnished to facilitate the conduct of business and considerable assistance and advice were supplied after the meeting in the preparation of the annual report of the Committee.

COOPERATIVE PAN-AMERICAN FISHERY RESEARCH

During the past year the Division continued work toward the development of a program for Pan-American fishery research. Following the detail of the writer as adviser on fishery matters to the President's Educational Commission, which visited Puerto Rico in April 1939, as reported in last year's report of the Division, the Bureau was allotted \$25,000 by the Public Works Administration for the establishment of a fishery research laboratory in Puerto Rico. A site for this laboratory, consisting of a plot of approximately 2 acres, has been obtained on the campus of the College of Agriculture and Mechanics Arts at Mayaguez, a fishing port on the western side of the island. This was secured through the cooperation of the Board of Trustees of the University of Puerto Rico. Plans are being drafted for the construction of the laboratory building, which is expected to be ready for occupancy early in 1941.

TECHNOLOGICAL FISHERY RESEARCH

Recent tabulations indicate that the people of Puerto Rico consume around 40 million pounds of fish annually. Except for a few million pounds produced locally, this is all imported—mostly from foreign countries. There is reason to believe that local fisheries can be expanded to supply a large part of this demand. Thus, research at

the laboratory will center on the development of more efficient means for capturing local species, on exploration of nearby fishing banks to locate productive fishing areas, on technological improvement of processing methods, on means for distributing the preserved catch to the people of the island, and on the biology of various important aquatic forms. Some work may also be done on the culture and distribution of fresh-water fishes to augment the very effective work in this field now being done by the local fishery agency. The fisheries of the Virgin Islands of the United States will also benefit by research at this laboratory.

Located at the "cross roads" between North and South America, the new laboratory will also serve as a focal point for fishery research in the American republics. In addition to the permanent research staff which will be assigned to the laboratory, it is planned to employ a group of student assistants, recruited from various American republics, to assist in the research work of the laboratory. After a training period of about 2 years, these assistants would be in a position to aid their own governments in solving their local fishery problems.

In this connection the Bureau has received numerous requests from other American republics for the detail of fishery investigators to assist in the development of their local fisheries. Some assistance has already been given and further work is contemplated during the coming year. However, the requests for this type of service are greater than our ability to serve. It is believed, therefore, the establishment of the laboratory in Puerto Rico will be of material assistance in this direction.

STATISTICS

In the development and prosecution of a fishery, it is important that statistics be collected and published on its yield and abundance. This is most necessary in order to evaluate the condition and trend of the fishery from the standpoint of conservation and sustained production. In the main there is a lack of statistical information on the fisheries of most of the countries of the Western Hemisphere. This situation was brought to the attention of delegates from various American republics attending the Eighth American Scientific Congress at Washington, D. C., in May 1940, in an address by the writer before the statistical section of the Congress on the subject "Need and plan for a statistical program in furthering conservation of Inter-American fisheries."³ The delegates showed considerable interest toward the development of such a program and as a result the statistical section of the Congress, and the Congress in plenary session, passed the following resolution:

Since the fishing industry represents a great natural resource both from the national and inter-American viewpoints—

BE IT RESOLVED by the Eighth American Scientific Congress that the Inter-American Statistical Institute be requested to devise a plan in accordance with which the American Republics may collect and publish fishery statistics in a uniform manner.

The Inter-American Statistical Institute, based on the lines of the International Statistical Institute, was formed at the time of the congress by the American members of the International organization.

³ Published as Fisheries Memorandum 8-352, U. S. Bureau of Fisheries, Washington, May 1940.

EXHIBITS AT EXPOSITIONS

Exhibits depicting the contributions of the Bureau of Fisheries in the broad fields of Federal activity were displayed at the New York World's Fair and San Francisco Golden Gate International Exposition in 1939. These displays were planned with the aid of the Division of Fishery Industries.

Various display materials were furnished to individuals and groups during the year to exhibit as widely as possible through these devices the various phases of the fishery industries.

At Tampa, Fla., a diorama of the sponge fisheries of Florida was exhibited through the duration of the Pan-American Exposition in January 1939.

ECONOMIC AND MARKETING INVESTIGATIONS

There is a constant demand upon the Division of Fishery Industries for studies of the marketing of fishery commodities and other economic studies relating to the commercial fisheries. It has been possible to undertake only one new large-scale study of this kind with available personnel and funds during the past year. However, a continuing study of cooperation among fishermen, and other long-time studies, were active during 1939, and, as is customary each year, many short-time economic and marketing studies were made in order to satisfy the urgent demands placed upon the Division. Some of these shorter studies were conducted preliminary to or closely associated with administrative activities of the Bureau and consequently were not published. Other studies, which were published through the Bureau's facilities, were also widely circulated through fishery periodicals and other publications.

One of the chief aims of the Division's marketing research is to portray the processes of fish distribution in such a way as to enable all elements of the trade to understand more completely their functions as they relate to the rest of the industry. As the details of this picture are clarified, it is possible to point out respects in which the marketing system may not operate with full efficiency. These economic studies may serve as a basis for rationalizing the distribution of fishery products, through the suggestion of remedies for various defects in the marketing system and in its operations. Since there are areas in the fish trade which are relatively unorganized as compared to many other distribution systems, and since fish consumption is unjustifiably low, this type of work should be productive.

In pursuing this program the Division carries on studies of its own, such as the retail survey and other studies discussed below. It also analyzes the products of research in other fields so as to apply to fishery marketing whatever is of significance. In this way not only new findings but new research methods and techniques are made available. Innovations in marketing practice developed in this country and abroad are also examined and given currency, if likely to be of value.

During 1939 the economic and marketing investigations of the Division were largely conducted under the immediate supervision of Ralph Russell, Associate Economist, with the assistance of Keith O. Burr, Junior Statistician.

Reports of various economic studies and activities in progress during 1939, or completed during that year, are given below.

FISHERY COOPERATIVE ORGANIZATIONS

The research and services in regard to fishery cooperative organizations, like those in the other economic fields covered by this Division, consist primarily of collecting, analyzing, and disseminating information. An advisory service is offered to fishermen who are considering the desirability of forming cooperatives, and information is given to enable them to decide whether or not cooperative organization is likely to bring them benefits.

In addition, fishery cooperatives already in operation are advised as to how to meet characteristic problems of cooperatives, as well as difficulties peculiar to their particular situations. While it is difficult to handle requests on this subject by correspondence, our statistical agents are often able to give advice on the spot in regard to matters requiring broad knowledge of the fisheries. With specific regard to the organization of cooperatives, and with reference to cooperative principles or methods, Fishery Circular No. 22, "Organizing and Incorporating Fishery Cooperative Marketing Associations," by L. C. Salter, has been particularly useful in answering inquiries.

Cooperative associations enable fishermen to undertake collective action in conducting their economic affairs. They also serve as a device for readily disseminating information and educating fishermen as to the fundamental economic relationships of their industry. When organized into cooperative associations, fishermen can effect desirable practices whereby the fish they catch are processed and distributed. The cooperative enables them to extend their marketing operations, if necessary, into any phase of marketing which is not operating to their advantage. Through cooperatives fishermen are usually better able to control the availability, quality, and prices of supplies and services which they require. Cooperation offers a method whereby it may be possible to rehabilitate certain fish populations which have suffered severe depressions over a long period.

In the pursuit of its functions of collecting, analyzing, and disseminating information, the Bureau endeavors to keep informed of new cooperative undertakings by fishermen, and to serve as a clearing house for such material.

At present, 35 active fishery cooperatives which engaged in economic activities are listed in the Bureau's files, though full information is not available on all of them. Twenty-one are on the West coast, 11 on the East coast, and 3 in the Great Lakes region. As regards their distribution by States, California has 10, Washington 9, Oregon 2, New Jersey 3, Florida 4, Minnesota and Maine each have 2, and Michigan, Maryland, and North Carolina each have 1. Cooperatives in 3 States have suspended operations since the 1935 canvass, as follows: California 1, Minnesota 1, and Virginia 1.

During the past year the organization of 7 fishery cooperatives on the West coast was reported; 6 of these being in Washington and 1 in California. Another West coast cooperative, organized in 1938, first came to the Bureau's attention in 1939. Considerable organizational activity occurred on the East coast without as yet resulting in the formation of new cooperatives. This interest was particularly

noted in Boston, Gloucester, and Martha's Vineyard, Mass., and on certain parts of the Maine coast.

Current information on cooperation among fishermen in other countries is obtained through publications and correspondence. During the year, requests for information were received from neighboring countries to the north and south of the United States. Visitors from Newfoundland, Nova Scotia, Venezuela, Brazil, and Sweden discussed cooperation among fishermen with members of our staff.

Of particular interest among foreign developments are the programs of fishery rehabilitation arising in Nova Scotia and spreading to New Brunswick, Newfoundland, British Columbia, and, to a limited extent, to the United States. The Nova Scotian development was reported by Ralph Russell in an article entitled, "Nova Scotia Fishermen Aided by Cooperatives," in the November 1939 issue of *Fishery Market News*. Progress in Newfoundland was summarized in the February 1940 issue of this publication in a report entitled, "Newfoundland Develops Fishermen's Cooperatives."

The process of adult education and establishment of economic enterprises, which is the fundamental concept of the programs, begins with the awakening of interest and the development of local leadership. Under their own selected leaders, the people study their economic situation and then plan to correct it. Usually a start is made by establishing credit unions. The experience gained by managing these credit unions teaches the people business methods and control of economic enterprises. Other economic and social developments usually follow and involve cooperative techniques. This program seems adaptable to conditions in some fishing areas of the United States. In fact, the movement has already begun in one or two localities. The Bureau is an interested observer of such attempts to adapt the procedure to our conditions.

A committee of the Maine State Chamber of Commerce studied the problems of the fisheries of that State and recommended the formation of a division of fishery rehabilitation in the State government. This division would undertake to evoke leadership among the fishermen so that they might initiate a program of adult education and cooperative development.

Lectures on cooperation, designed primarily for Boston fishermen, were sponsored by the Massachusetts State Board of Education. These lectures, each of which was given by a different authority in this field, extended over a period of several weeks. Among other subjects, the Nova Scotian developments were discussed.

A report containing material collected in a recent survey of fishery cooperatives in the United States was advanced further toward publication during the year, and an excerpt was printed in a report of hearings before the House Committee on Merchant Marine and Fisheries. The study dealt with data obtained from 54 of the 59 cooperative associations reporting. The number of producers dealing with these cooperatives, either directly as members or indirectly as fishermen on boats commanded by members, totaled 12,500 and the volume of business was over \$9,000,000. The investment of the cooperatives in plants, equipment, and other facilities was about \$5,200,000. The investment by the members of these cooperatives in fishing equipment totaled over \$20,700,000 in boats and over \$3,600,000 in gear.

Commercial operations of one type or another were conducted by 31 of the 59 associations reporting. Of 22 associations on the Pacific coast, 14 were commercial, while only 9 of the 22 in the North Atlantic area were commercial. The South Atlantic and Gulf area also reported a predominance of noncommercial associations, only 4 of 11 being commercial. Although no survey was made in the Great Lakes area, 3 commercial associations were located and reported.

Number and type of fishermen's cooperatives, according to location, 1935

Area	Total number of associations	Number of commercial associations	Number of noncommercial associations
North Atlantic.....	22	9	13
South Atlantic and Gulf.....	11	4	7
Great Lakes.....	3	3	.....
Pacific coast.....	22	14	8
Alaska.....	1	1	.....
Total.....	59	31	28

Of the 31 commercial associations shown in the above table, 13 reported business in fresh fish, 2 sold only processed fish, and 4 sold both fresh and processed fish. In addition, there were 8 cooperatives that did not handle fish for sale, but acted as bargaining associations, while 4 associations made no report as to the type of business they conducted.

Over one billion pounds of fish were sold by 19 associations reporting on volume, and the dollar volume of all associations reporting this figure totaled \$8,921,615. The value of fish represented in this amount does not include all of the billion pounds, since some associations reported volume but not value.

Purchasing of supplies for members is an important function of cooperatives in this field, and 12 associations reported purchases ranging from \$1,800 to \$100,000, and totaling nearly \$300,000. The association reporting purchases of \$100,000 was engaged only in purchasing. In addition, there were 7 associations engaged in purchasing which did not report the volume. Eight other cooperatives indicated their intention to undertake purchasing for their members. Petroleum products, chiefly motor fuel, were the leading items purchased by the fishery cooperatives for their members, although nets and netting, ice, boxes, tanbark, tar, rope, and miscellaneous marine supplies and fishing equipment were also reported.

A bill (S. 2605) to amend the Agricultural Marketing Act was introduced by Senator Norris, and hearings will be held during 1940. This bill, if enacted into law, might be of some value to fishermen in that it would broaden the definition of cooperatives so as to permit Federal loans to cooperatives with a considerable proportion of nonfarmer membership. Thus, agricultural cooperatives with some fishermen members might be eligible for assistance by the Farm Credit Administration.

The report of the Maritime Labor Board, made available early in 1940, deals to some extent with the types of union organization among fishermen and among workers in allied industries. This report may well serve as a basis for further study of the status of this type of organization among fishermen.

During the year 1939 no complaints of violation of the antitrust acts by fishery cooperatives were referred to the Secretary of the Interior, who is empowered under the Fishery Cooperative Marketing Act to investigate such complaints. However, it should be noted that during the spring of 1939 a decision of a Federal district judge in Portland, Oreg., declared a fishermen's union to be a cooperative and subject to the provisions of the antitrust laws. This decision may prove of considerable importance in the field of labor problems in the fishery industry, as well as in the whole field of cooperation.

RETAIL MARKETING OF FISH AND SHELLFISH

An extensive survey of the retailing of fresh and frozen fish was initiated early in 1939 and continued throughout the year. This study embraced many phases of fish retailing, but emphasis was upon the methods and practices of the trade. During the spring the Bureau employed 25 temporary investigators who surveyed 10,000 retail food stores in representative cities in the Eastern United States. It was found that only 4,000 of these stores handled fresh fish, and these were investigated in detail as to type of customers, nature of fish business, and facilities for handling fish. From the 6,000 stores not handling fresh fish, only a few general facts were requested.

The volume of fish sales represented by the stores which handled fresh fish amounted to over 60 million pounds in 1938, while the reported value of sales exceeded \$9,000,000. These 4,000 stores, located in both commercial and residential sections of some 50 cities, include nearly 1,200 chain stores, over 2,000 independent stores and voluntary chain stores, and about 400 fish markets.

The volume of sales of fresh fish and shellfish was small for most stores, with heavy sales reported by a small percentage only. Nearly 40 percent of the stores had annual fish sales amounting to less than \$500, while about 30 percent reported fish business ranging from \$500 to \$1,500 and almost 30 percent indicated a volume of \$1,500 or more. A small percentage of the stores did not report on dollar volume of fish sales. For the entire area surveyed, sales of fish on Friday comprised about half of the total weekly sales. About one-third of the weekly sales was divided between Thursday and Saturday, but sales on Thursday were substantially above those on Saturday. The remaining sales were spread over the other days of the week, but less than one-half of 1 percent of the weekly sales occurred on Sunday.

All species that constituted any appreciable percentage of total fish sales were tabulated. However, the data regarding the number of stores selling each species are primarily useful for comparative purposes, since the schedules usually reported only the species making up the bulk of sales. The preliminary results indicate that oysters, with sales by over 2,900 stores in all cities, were reported by more stores and in a larger number of cities than any other species. Haddock, sold by nearly 2,000 stores in some 35 cities, was the second most widely distributed species and halibut, next in importance, was reported by over 1,300 stores in about 30 cities. In the distribution of fresh-water species, catfish, handled by nearly 900 stores in 36 cities, ranked first, while yellow perch was second with sales by some 550 stores in 25 cities. By further analysis of the number of cities and

stores within cities that reported sales of various species, it is hoped to obtain an indication of the importance of the fisheries of different regions in supplying fresh fish and shellfish to consumers in representative localities in the Eastern United States.

The tabulation of the species sold by retailers indicates that about 150 names were reported for the salt-water species sold, about 60 for fresh-water species, and over 20 for shellfish. A preliminary analysis demonstrates that the actual numbers of species involved are much smaller than those indicated, for there is widespread confusion in the names applied to various species. Often a given species is sold by 2 or more names, even within the same city. Over larger areas the same species may be sold under several names, or several species by the same name. This lack of standardized nomenclature is a handicap to increasing the sale and consumption of fishery products.

Preliminary results of the study indicate that very few stores have extensive facilities devoted to selling fish, and only a relatively small amount of space is available for this commodity. Frequently stores handle fish only 2 or 3 days per week, and on these days fish is allocated to a small part of the space usually taken up by meats.

A large percentage of stores report that fish business is profitable, and some operators indicate that fish is the most profitable item handled. However, some owners and managers evidenced little interest in fish sales and consequently devoted little effort to promoting this phase of their business. The schedules are being further analyzed to determine which policies and methods are most effective in the sale of fishery products.

An investigation of food consumption in some of the cities included in our survey is being conducted by the Department of Labor. This material will be useful in interpreting the retail fish marketing data. It will also provide a basis for a detailed analysis of the total amount of fish consumption per capita and the relative consumption of various forms of fishery products in a considerable number of cities.

SURPLUS-FISH SITUATION

As a result of special legislation the Federal Surplus Commodities Corporation, during the fiscal year 1937, purchased 12,059,000 pounds of fishery products at a commodity cost of \$597,000, for distribution to relief clients. In the following fiscal year purchases under similar authority amounted to 3,595,000 pounds at a commodity cost of \$265,000. No fish were purchased by the Corporation during the fiscal year 1939, but in the fiscal year 1940 purchases through March 14 had aggregated 382,000 pounds, with a commodity cost of \$22,300. Authority for the purchase of surplus stocks of fish in 1940 was incorporated in Public Act 393, which was approved on August 11, 1939. The text of this act follows:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That any part of the funds not to exceed \$1,500,000 per year, transferred by the Secretary of Agriculture to the Federal Surplus Commodities Corporation created under and to carry out the provisions of section 32 of the Act of August 24, 1935 (49 Stat. 774), as amended, may also be used by such Corporation for the purpose of diverting surplus fishery products (including fish, shellfish, mollusks, and crustacea) from the normal channels of trade and commerce by acquiring them and providing for their distribution through Federal, State, and private relief channels: Provided, That none of the funds made available to the Federal Surplus Commodities Corporation under this Act shall be used to

purchase any of the commodities designated in this Act which may have been produced in any foreign country. The provisions of law relating to the acquisition of materials or supplies for the United States shall not apply to the acquisition of commodities under this Act.

Sec. 2. (a) From the fund authorized to be transferred by section 1 hereof, the Secretary of Agriculture is authorized to transfer to the Secretary of the Interior sums as follows to be maintained in a separate fund, \$75,000, which shall be used by the Secretary of the Interior to promote the free flow of domestically produced fishery products in commerce by conducting a fishery educational service; and \$100,000, which shall be used by the Secretary of the Interior to develop and increase markets for fishery products of domestic origin.

It will be noted that Public 393 includes, as section 2, provision for expanded fisheries economic, marketing, and technological services; however, the funds for this purpose have not as yet been provided.

COMMERCIAL FISHERIES OF THE WORLD

The world's annual catch of fishery products, based on the most recent available data, amounts to about 35,200,000,000 pounds, valued at \$762,000,000. The United States, including Alaska, with a catch valued at \$100,845,000, leads the countries of the world in the annual value of its yield. Japan's annual catch, valued at \$100,807,000, ranks second. Other countries, the annual catch of which exceeds \$50,000,000 in value, are, in order of their importance, Union of Soviet Socialist Republics; England, including Scotland, Northern Ireland, and Wales; and China. Japan, with a catch of 8,108,000,000 pounds, leads in the annual volume of the catch among the countries of the world, and following is the United States, with a catch aggregating 4,353,000,000 pounds. Other countries whose annual catches exceed 1,500,000,000 pounds are, in order of their importance, Union of Soviet Socialist Republics; China; England, including Scotland, Northern Ireland, and Wales; Norway; and Germany.

STATISTICAL INVESTIGATIONS

Fishery statistics are collected by the Bureau to serve two principal purposes—biological and economic. For this reason the Bureau plans its statistical surveys to obtain comprehensive data which will furnish a complete and reliable picture of the condition and trend of the fisheries. The collection and compilation of these data involve many problems because the fisheries are broad in scope, including over 160 varieties of aquatic products which enter into commercial production. Many of these species are migratory and are taken by a great variety of types of gear in areas along the seacoast, or in interior lakes and streams. If the biological aspect is to be served, complete annual statistics are needed on each of these phases in every section. If the economic aspect is to be served, statistics are needed not only on the phases listed above relative to the biological aspect, but also on the price structure, the processing function, and on marketing and distributing.

It is essential that statistics on these latter phases of the industry be collected and published as soon as possible after the close of business transactions in order that they may be of maximum value to the fishery industry and other interested parties.

BIOLOGICAL ASPECT

The biological aspect must be considered as two problems—the conservation and sustained supply of the resource, and the prediction of future trends or yields. Since the fisheries are usually prosecuted in areas not under private ownership, the problem of the conservation of these fisheries is of national concern. It is important that close watch be kept over the condition of the various fisheries in order to detect depletion, so that remedial measures can be promulgated timely and wisely. For this reason it is imperative that current statistical data be obtained on the yield of our fisheries.

These statistics furnish the biologist with a background upon which to base his prediction of future trends and yields by coupling these data with studies of the life history of the species. Difficulty is experienced in making these predictions because the supply (population) of the species cannot be seen, as is the case with farm animals or crops. The more complete and reliable the statistics on yield are, the better foundation the biologist has for conducting his studies. The Bureau, therefore, attempts to obtain a complete picture of each individual fishery to further these biological studies.

ECONOMIC ASPECT

When the fishery has been conserved, and trends and yields of the fishery have been predicted, the problem still remains of supplying the fishery trade with the information so essential to the conduct of its business activities. In these days of increased competition the very existence of the fishery industry must depend upon reliable economic and statistical information. Such material has been especially valuable during the past few years, when it has been used in national planning. The Bureau endeavors to make its statistical surveys so complete that the industry and the various governmental organizations may turn to it for reliable fishery statistics.

SURVEYS CONDUCTED

The statistical surveys during 1939 were conducted under the immediate supervision of Edward A. Power, Associate Statistician, who was assisted by R. T. Whiteleather, Associate Marketing Agent. The statistical surveys were conducted under the general direction of Fred F. Johnson, Assistant Chief of the Division. These surveys included the collection and dissemination of statistics of the commercial catch and its value, fishing craft and apparatus, and employment in the fisheries. In addition, data were collected on employment and compensation of those engaged in, and products of, fishery wholesale and manufacturing establishments.

Surveys were made during the year covering all coastal sections as well as the Great Lakes and a portion of the Mississippi River for 1938. Statistics of the fisheries of Alaska were collected by the Division of Alaska Fisheries.

In addition to the above, statistics were collected on the following special phases: The landings of fish by United States fishing vessels at the ports of Boston and Gloucester, Mass., Portland, Maine, and Seattle, Wash. (published monthly); the catch of mackerel in the North Atlantic fishery; the cold-storage holdings of frozen and cured

fish and amount of fish frozen, which are furnished by the Bureau of Agricultural Economics (published monthly); the production, consumption, and holdings of marine-animal oils of the United States and Alaska (published quarterly by the Bureau of the Census); the production of canned fishery products and byproducts of the United States and Alaska; the transactions on the sponge exchange at Tarpon Springs, Fla.; the 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.

The following statistical and marketing agents assisted in the collection and compilation of the statistical data: D. Y. Aska, R. L. Busby, C. H. Chilton, L. S. Christey, E. V. Ebner, M. J. Fraser, R. L. Greer, R. L. Hacker, V. E. Heffelfinger, C. H. Lyles, C. E. Peterson, C. J. Robbins, C. B. Tendick, and F. M. Wood.

For detailed information on the methods employed in the collection of fishery statistics the reader is referred to Administrative Report No. 37, "Fishery Industries of the United States, 1938", by R. H. Fiedler. This Report was published as Appendix III to the Report of the Commissioner of Fisheries for the fiscal year 1939.

FISHERY MARKET NEWS SERVICE

Activities in connection with the organization and development of the Bureau's Fishery Market News Service were continued by the Division during 1939. Several features were added to the service during the year, and a field office was established at Jacksonville, Fla., early in the year. An office also was opened at New Orleans, La., early in January 1940. The Division now has in operation a total of six market news reporting offices in the field. The new features of the service and the activities of each of the field offices are discussed in appropriate sections of this report.

The offices of the Fishery Market News Service, due to their well-chosen locations, release current data covering the production and marketing of about 1½ billion of the nearly 3 billion pounds of fish and shellfish taken annually for food in the United States and Alaska. Landings of fresh fish for food listed daily in the various reports amount to one-quarter of the total annual catch, or over 750 million pounds. Daily reports of receipts at terminal markets add an additional 150 million pounds not duplicated in the landings. Periodic coverage of important canned fishery products, particularly salmon and shrimp, accounts for over 500 million pounds not otherwise included. In addition, about one-half of the fishery products in cold storage in the country are reported upon. Movements in and out of cold storage are released daily and holdings weekly.

The importance of this service to the fishery industry and allied interests is evidenced by the widespread localities and diverse classes of recipients from which requests for this service have been received. Addresses on the mailing lists include every producing and marketing area of importance in the country. Every branch of the fishing industry and numerous groups from allied fields are represented. Among the various classifications on the mailing lists are fishermen and producers; wholesale dealers; brokers; importers and exporters; buyers; retailers; chain stores; cold-storage plants; canners; salters; smokers;

byproducts manufacturers; supply firms; transportation companies; Federal, State, and municipal agencies and officials; unions; associations; fishery publications; newspapers; magazines; libraries; banks; and statistical organizations.

In addition to its activities in connection with the direction and administration of the service, the Washington office of the Fishery Market News Service prepares and disseminates periodic current reviews of fishery market information. These are issued in multilith form and distributed to fishermen, dealers in fishery commodities, and other interested parties. Between 10 and 15 of these reviews are prepared and disseminated each year. These reports, issued in a publication entitled "Fishery Market News," include summarized data made available through the daily and monthly releases of the Fishery Market News Service on the movement, prices, current status of production, and stocks on hand of fishery commodities; articles relating to the fisheries prepared by members of the Bureau's staff, members of the industry, or other parties; excerpts or abstracts from Bureau or other publications relating to the fisheries; and related information.

During 1939 the work of the Fishery Market News Service was carried on under the immediate supervision of A. W. Anderson, Fishery Marketing Specialist, and the general direction of Fred F. Johnson, Assistant Chief of the Division. Assisting in this work, with headquarters in Washington, D. C., but working both at the headquarters office and in the field, were H. E. Timmis, Fisheries Statistical and Marketing Agent, and P. W. Evans, Junior Fisheries Marketing Agent.

FIELD OFFICES

The locations of the offices of the Fishery Market News Service have been carefully chosen in order that they might not only provide a maximum service to the important producing, shipping, or consuming communities near their locations, but that they also be of greatest possible benefit to the industry as a whole. With these important considerations in mind, field offices have been established in New York, N. Y.; Boston, Mass.; Chicago, Ill.; Seattle, Wash.; Jacksonville, Fla.; and New Orleans, La.

Probably the most important of the newer features of the Fishery Market News Service has been the utilization of the radio for the dissemination of fishery market news. Following preliminary surveys and planning during the latter part of 1939, radio programs were inaugurated early in 1940, twice daily over station WWL at New Orleans and station WJJD at Chicago. A fishery program already being broadcast over station WHDH at Boston also was augmented with data made available each day from the Fishery Market News Service at Boston. The scripts for these programs are prepared in the local Fishery Market News offices and include timely data on production, receipts, or other factors of the movement or marketing functions of fishery commodities.

A sample radio script for broadcasting Wednesday morning May 29, 1940, as prepared by the Chicago office, follows:

The following information is made available through the cooperation of the Chicago Market News Service of the United States Bureau of Fisheries:

The Chicago Wholesale Market reports that on Tuesday, May 28, trading was generally light on all varieties with the exception of lake trout and whitefish.

These items were moderate in demand and the market remained fairly steady. The remaining varieties, especially roughfish, moved slowly for the most part and prices were generally low.

Receipts of new fresh-water species for 24 hours ending at 8 a. m., Tuesday, amounted to 128,000 pounds. Trucks transported 65,000 and rail express 63,000 pounds. Individual supplies of the more important varieties, and the market trend, were as follows: Carp, 12,000 pounds, 2 to 2½ cents, liberal supplies combined with a heavy carry-over from Monday kept the market price in a low or depressed condition. Lake herring, 15,000 pounds, 6 to 7, some 8 cents, supplies increased somewhat in comparison with the past week. Prices were moderate though evidencing a downward tendency. Lake trout, 35,000 pounds, 17 to 19 cents, supplies liberal, demand fair, prices remaining steady within the moderate range. Sheepshead, 7,000 pounds, 3 to 3½ cents, supplies plentiful for demand which was rather light. Prices remained low for hard meats and semi. Suckers, 3,000 pounds, 3 to 4 cents, supplies moderate to light, demand light and market prices low. White bass, 4,000 pounds, 7 to 7½ cents, supplies liberal, demand light and prices low. Whitefish, 8,000 pounds, pound net 18 to 20 cents, some at 21 to 22 cents, gill net 17 to 19 cents, supplies moderate, demand fair, prices remaining steady within the moderate to low range. Yellow pike, 9,000 pounds, 12 to 13 cents, demand rather light with prices remaining fairly steady.

The local cold-storage warehouses reported on Monday, May 27, a moderate movement taking place. Approximately 13,000 pounds were frozen, consisting largely of 9,000 pounds of blue and sauger pike; 1,000 pounds each of lake herring and sturgeon, and lesser amounts of filets, lake trout, and pickerel. Approximately 9,000 pounds were withdrawn from the warehouses, consisting mainly of 4,000 pounds of whitefish, 2,000 pounds of lake herring, and 1,000 pounds of lake trout.

Arrangements are now being made not only for market news broadcasts in the other cities where the Division maintains Fishery Market News offices, but also for the conduct of broadcasts to acquaint the general public with information of assistance in buying fish and shellfish, and on the nutritional value of these commodities.

The activities of each of the Division's Fishery Market News offices are here discussed in greater detail.

NEW YORK, N. Y.

The release of reports from the New York office of the Fishery Market News Service was continued during 1939 on a daily basis, with the exception of Sunday and holidays. There were no major changes in the form of these reports from those prepared and disseminated in the preceding year; however, the coverage of firms reporting their daily receipts to the Market News office has been expanded to include most of the hotel supply firms, as well as a majority of the local filleting companies. It also was found possible, through a detailed study of the office procedures, to further simplify certain of the practices and effect greater efficiency and speed, which are essential to a Market News office.

Persons in the fishery and allied industries in the vicinity of New York and elsewhere are placing more and more dependence upon this office as a source of market and other fisheries information. Not only has the mailing list for the daily reports continued to grow, but inquiries by telephone, mail, and by personal visit continue to increase. Persons from the fishery industry in particular avail themselves of the opportunity of making personal contacts with this office; however, other callers conferring with the New York staff for information essential to their activities include representatives of transportation agencies; food editors of publications; editors of trade and industrial magazines; press associations; foreign fishery experts, editors and

students; research students; representatives of other Federal agencies; and agents of city, State, and foreign governments.

During 1939 over 261 million pounds of fresh and frozen fishery products were received in New York. Wholesale dealers in fish and shellfish on the New York Salt-water Market reported to the New York Market News office receipts totaling 228,293,000 pounds, including incomplete data from filleting and hotel supply firms. In addition, imports received by steamship and entered at New York City amounted to 7,711,000 pounds. Detailed records covering the volume of fresh-water fishery products received at Peck Slip are not available, but it is estimated that these receipts totaled about 25 million pounds.

Of the fishery products received at the Salt-water Market, 219,607,000 pounds, or 96 percent, were shipped from domestic sources comprising 27 States and Alaska. The remaining 4 percent consisted of imports, not entered at New York City, from 6 Provinces of Canada and Newfoundland.

Of the Salt-water Market receipts, 122,867,000 pounds, or 54 percent, were transported by truck. Over 21 percent came by freight, 18 percent was landed by fishing craft, 6 percent arrived by express, and less than one-half of 1 percent by coastwise vessels. Domestic shipments were distributed almost exactly in the same manner as the total shipments. The fishery products from Canada and Newfoundland, however, arrived almost exclusively by rail; freight shipments constituting 55 percent and express 44 percent.

Massachusetts, with 57,381,000 pounds, or 25 percent, was the shipper of the greatest volume of fishery products to the Salt-water Market from a single geographical area, well over one-half being shipped by freight and most of the balance by truck. New York State was the second largest supplier, its shipments, practically all by truck, amounting to 22 percent. Fishing craft docking directly at the Salt-water Market were next, landing 18 percent. Following in order were New Jersey, with 7 percent; Florida, 4 percent; and Connecticut and North Carolina, each 3 percent.

Salt-water fish constituted 159,332,000 pounds, or 70 percent, of the total salt-water market receipts. Slightly less than one-half arrived by truck, the remainder being about equally divided between freight shipments and fishing-craft landings.

Of the salt-water fish, flounders—including blackbacks, dabs, gray sole, fluke, lemon sole, and yellowtails—were received in the greatest volume, 39,197,000 pounds, or 25 percent. One-half was shipped by truck and one-third by freight. Cod, with 20,186,000 pounds, or 13 percent, followed, the bulk arriving by freight. Next were haddock, 9 percent, mainly fishing-craft landings; mackerel, 7 percent, mostly truck receipts; and butterfish and scup, each 6 percent, largely truck receipts and fishing-craft landings.

Shellfish and miscellaneous fishery products accounted for most of the remaining 68,582,000 pounds, or 30 percent, four-fifths arriving at the Salt-water Market by truck. Hard clams in the shell, totaling 23,589,000 pounds, formed 34 percent of these products, and practically all the clams were transported by truck. The next most important shellfish items were shrimp, 22 percent, the bulk arriving by truck, and oysters in the shell, 13 percent, almost entirely truck receipts.

Receipts of fresh-water fish at the Salt-water Market were negligible; carp, the largest quantity as well as the most important species, arriving mainly by express.

Of the 7,711,000 pounds of imported fishery products received by steamship and entered at New York City, 3,914,000 pounds, or 51 percent, were classified as fish, and the remainder as shellfish and miscellaneous products. Sixty-one percent of the fish was frozen swordfish from Japan. Frozen sturgeon, 8 percent, mostly from Russia, and frozen smelt, 7 percent, largely from Newfoundland, were the next most important items.

Of the shellfish and miscellaneous fishery products, frozen spiny lobster tails, almost exclusively from the Union of South Africa, amounted to 37 percent. Next in importance were snails, 20 percent, mainly from Morocco, and frozen pulpi, 15 percent, mostly from Portugal.

Japan supplied 2,801,000 pounds, or 36 percent, of all the imports; about 90 percent of which were frozen swordfish. Imports from Portugal accounted for 10 percent, mostly frozen pulpi and frozen sepia. Morocco sent 9 percent, all snails; and Russia 7 percent, largely frozen sturgeon and frozen salmon.

The operations of the Fishery Market News office in New York City during 1939 were carried on and the daily report issued under the supervision of Wm. H. Dumont, Senior Fisheries Marketing Agent, assisted by F. J. Anderson, W. D. Glidden, Jr., and C. W. Morrison, Junior Statistical and Marketing Agents, Joseph Pileggi, Assistant Clerk, and Peter DiMarco, Junior Clerk.

BOSTON, MASS.

The Fishery Market News Service at Boston has been augmented by several new features. These have included the addition of data in the daily reports on the range of prices of fish sold through the New England Fish Exchange; the wholesale prices of fillets of important species; the volume of fish livers landed by fishing craft each day; and the daily movements and weekly holdings of frozen fish at Gloucester. Monthly summaries of receipts and prices, together with appropriate comparisons with the preceding months, also were inaugurated during the year. Of outstanding importance also has been the cooperation of the Market News Service in Boston in supplying current news to station WHDH to augment its radio program relating to fisheries. Particularly is this radio service of interest to fishing craft at sea, since it furnishes them with the latest available information on supplies and prices and consequently gives them a basis on which to determine the most suitable time for landing their fares.

As in the case of the Fishery Market News Service in New York, the service in Boston extends far beyond the release of its daily, monthly, and annual reports. Requests for specialized information available from this office are received daily by telephone, mail, and from individuals calling at the office. Visits to the office are convenient for persons in Boston's fishery industry, since the Fishery Market News office is located on Northern Avenue near the Fish Pier.

Landings at the Boston Fish Pier sold through the New England Fish Exchange during 1939 amounted to nearly 275 million pounds, valued at about \$7,700,000, which represented a decrease of 8 percent

in volume but an increase of 5 percent in value as compared with the landings in the preceding year. Decreased landings of cod, cusk, flounders, mackerel, pollock, rosefish, and whiting all contributed to the reduced receipts in 1939.

Higher average prices were paid for all varieties except flounders, mackerel, and swordfish landed by offshore vessels, and flounders and whiting taken by inshore craft. The average price paid for all varieties was \$2.79 per hundredweight, as compared with \$2.44 in 1938. The average price paid offshore vessels increased to \$2.84 from \$2.45 in 1938, while inshore craft received an average of \$2.40 as compared with \$2.36.

The activities of the Boston office and the issuance of the daily reports and monthly summaries were under the supervision of B. E. Lindgren, Senior Fisheries Statistical and Marketing Agent, who was assisted by J. J. O'Brien, Senior Clerk, and D. L. Knox, Junior Clerk.

For further statistical data on the landings of fish at Boston as well as at Gloucester and New Bedford, Mass., and Portland, Maine, see pages 312 to 346 of this report.

CHICAGO, ILL.

Outstanding among the newer developments in the Fishery Market News Service at Chicago has been the inauguration of a program for the wider and more rapid dissemination of market news information by radio. Two programs are broadcast daily providing shippers in the Great Lakes area with timely information regarding the market for fresh-water fish in both Chicago and New York. It is believed that this service will become increasingly valuable, permitting producers to gauge more accurately the proper volume of production and enabling shippers to determine when and where they should ship.

The large volume of data collected daily in Chicago constantly is being made available to the industry in new and more useful forms. A summary of the data in the daily reports for the preceding week is released each Monday, providing an opportune review of the market. The monthly summary has been expanded to include detailed current and comparative figures on market receipts with particular respect to the origin and method of transportation. Despite the added information and increased volume, the monthly summaries continue to retain their timeliness, each being available to the trade within 10 days after the close of the month covered. An annual summary also is prepared.

During 1939 the rail arrivals reported by express and freight terminals to the Chicago Market News office, and the truck receipts reported by wholesale dealers, amounted to 48,419,000 pounds. About 72 percent, 34,654,000 pounds, was shipped to Chicago from domestic sources—31 States and Alaska. The remaining 28 percent, which also included "in-bond" shipments from Alaska, was imported from 8 Canadian Provinces.

Thirty-six percent of the total, 17,315,000 pounds, arrived by rail freight, 34 percent by express, and 30 percent by truck. Domestic shipments reversed this order—37 percent being shipped by truck, 33 percent by express, and 30 percent by freight. Shippers of imported fishery products, due to the distant production areas, favored rail freight transportation; 50 percent being transported in this manner, 38 percent by express, and only 12 percent by truck.

The State of Michigan shipped to Chicago 6,219,000 pounds of fishery products amounting to 13 percent of the year's supply, mostly by express; followed by Wisconsin with 12 percent, mainly by truck; British Columbia with 11 percent, almost equally divided between express and freight; and Manitoba with 10 percent, largely by freight.

Fresh-water varieties of fishery products constituted 26,891,000 pounds, or 55 percent of Chicago's receipts; salt-water species 26 percent; and shellfish and miscellaneous classifications 19 percent. Fresh-water fish arrived in the greatest quantity by truck and express, salt-water fish by freight and express, and shellfish mostly by freight. Of the fresh-water fish 20 percent, 5,246,000 pounds, was lake trout, being shipped mostly from Michigan by express and from Wisconsin by truck. Thirteen percent was sauger, practically all from Manitoba and largely by freight; and 11 percent was whitefish, mostly from Michigan by express.

Halibut, with 6,725,000 pounds, was shipped to Chicago in greater volume than any other item, and dominated the salt-water fishery supplies. It furnished 54 percent of the 12,476,000 pounds, as compared with 16 percent for rosefish filets, the next most important variety. There were slightly more fresh than frozen halibut, British Columbia sending the bulk of each classification. The fresh fish were shipped by express and the frozen fish by freight. Rosefish filets came almost exclusively from Massachusetts, by far the greater amount by truck.

Shrimp, with 6,398,000 pounds, followed halibut in volume and constituted 71 percent of the 9,052,000 pounds of shellfish and miscellaneous varieties. Louisiana shipped about two-thirds of the shrimp and Texas about one-third, nearly all being transported by freight.

The activities of the Chicago office during 1939 were supervised by E. C. Hinsdale, Fisheries Marketing Agent, assisted by B. F. Lucarz, Junior Clerk.

SEATTLE, WASH.

During 1939 the Seattle reports were expanded to include data each day on the receipts and prices of Alaska halibut and troll-caught salmon at Ketchikan, Juneau, Petersburg, and Sitka and weekly receipts at Wrangell. Bureau representatives transmit these data through the cooperation of the Army Signal Corps. Additional coverage during 1939 was obtained by arrangements with the Canadian Government, through the Halibut Marketing Board at Vancouver, B. C., to receive daily information on the sales of the halibut fleet over the Vancouver fish exchange. With daily receipts and prices now included for these ports, the Seattle market news report presents a current picture of fish receipts throughout Southeastern Alaska, British Columbia, and most of Washington. Plans are now under way to include daily receipts of troll-caught salmon and halibut landings at Eureka, Calif., during the 1940 season.

Another addition to the Seattle reports during 1939 was the development of a weekly summary of fish receipts at Seattle, and a written summary of market conditions, trends, and comparisons with the preceding week's receipts. These summaries are issued every Tuesday and cover the week ending the previous Saturday.

During 1939 it was also possible to obtain and publish weekly statistics on the pack of canned salmon in Alaska, British Columbia, and

Puget Sound, with comparative data for the same period during previous years. Unsold stocks and prices of canned salmon also are reported monthly, with comparative data for the preceding year. Statistics further are obtained and published showing the landings of pilchard in British Columbia, Washington, and Oregon, on a weekly basis. Plans to include similar data for California during the 1940 season are now being made.

Fresh-fish landings at Seattle during the 12-month period ending December 31, 1939, amounted to 47,250,000 pounds, valued at approximately \$3,225,000 to the fishermen. This represented a decrease of 3,750,000 pounds as compared with 1938, but a decrease of only \$50,000 in value. The principal decreases during 1939 were noted in the receipts of chum, or fall salmon, at Seattle, which declined over 3½ million pounds, and halibut, which decreased approximately 1 million pounds, as compared with 1938.

During 1939 the Seattle office was operated and the daily report was issued under the general supervision of V. J. Samson, Fisheries Statistical and Marketing Agent, assisted by K. G. Nordquist, Junior Clerk.

For further statistical data on the landings of fish at Seattle see pages 506 to 511 of this report.

JACKSONVILLE, FLA.

The Fishery Market News Service was inaugurated in Jacksonville early in 1939. The daily report carries the commercial production of fishery products for the majority of the important producing areas in Florida; lists the outgoing shipments by motortruck, rail freight, and express; quotes New York receipts and prices for southern varieties of fish; and summarizes Boston landings and first sales prices. The cold-storage movements and holdings in a number of warehouses in the South Atlantic States are included weekly. A detailed tabulation of the pack of shrimp produced under the supervision of the Seafood Inspection Service of the Food and Drug Administration also is incorporated. The activities of the industry, as reported during the preceding week, are summarized, reviewed, and carried each Monday.

Florida annually produces approximately 70 million pounds of food fish, about 40 percent of which is mullet. Spanish mackerel, red snapper, grouper, bluefish, kingfish, and spotted sea trout are other important marine varieties, while catfish and bullheads are the predominating fresh-water species. The annual shellfish production approximates 20 million pounds. Over one-half of this total consists of shrimp, and crabs make up the major portion of the balance.

Food fish and shellfish are handled by 273 producer-wholesalers in 97 localities. Of the total, 211 produce salt-water fish at 76 localities; 10 producing 1,000,000 pounds or more yearly, 15 producing from 500,000 to 1,000,000 pounds, and 186 producing less than 500,000 pounds. Fresh-water fish are produced by 29 producers at 14 localities, shucked oysters by 42 producers at 20 localities, raw shrimp by 28 producers at 9 localities, crab meat by 24 producers at 18 localities, dry salt fish by 21 producers at 12 localities, sea crawfish by 18 producers at 4 localities, bay scallops by 13 producers at 9 localities, and spiny lobster meat by 3 producers at 2 localities. In addition, at a few localities, stone crabs, conchs, hard clams, green sea turtles, and

soft-shell turtles are produced. There are 8 canning plants at 6 localities packing shrimp, oysters, hard clam products, turtle meat and soup, coquina broth, and frog legs. There also are 5 menhaden meal and oil plants and several shark products and shell novelty companies.

Shipments of fishery products from Florida are made by motortruck, rail freight and express; only nominal quantities being transported by steamship. It is estimated that approximately 59 percent of the fresh fish is shipped in bulk, 35 percent in barrels, 5 percent in 100-pound boxes, and 1 percent in containers of miscellaneous sizes.

After excluding August and September, for which records are not available, truck shipments reported from the Atlantic coast of Florida, and lower Gulf coast as far west as Cedar Keys, totaled about 18 million pounds, or an average of 2,250,000 pounds monthly during the period March to December, 1939.

Rail shipments and passings covering virtually all movements of fishery products by this type of carrier from the Peninsula of Florida, with the exception of some express shipments from middle and upper Gulf coast sections, totaled, during the 10 months from March to December, 1939, 115 carloads of fresh fish, 8 carloads of frozen fish, 1 car of frozen shrimp, and 32,396 express packages of unclassified fishery products. Of the 115 carloads of fresh fish, 59 were shipped during December.

During the first 6 months of the shrimp season starting July 1, 1939, the 40 canneries under the supervision of the Seafood Inspection Service of the Food and Drug Administration operated an average of 63 days each and packed a total of 1,048,754 standard cases of shrimp from 56,512,000 pounds of raw shrimp. The pack was divided into 824,000 cases of wet-pack shrimp in 5¼-oz. tins, 179,000 cases of dry pack shrimp in 5-oz. tins, about 25,000 cases in miscellaneous sizes of tins, and 21,000 cases in glass containers.

During 1939 S. C. Denham, Fisheries Statistical and Marketing Agent, supervised the Jacksonville Fishery Market News office, assisted by J. E. Borum, Junior Clerk.

NEW ORLEANS, LA.

The work of organizing the Fishery Market News Service at New Orleans was started in October 1939, and the first daily report was issued on January 5, 1940. New Orleans is not important in itself as a production center for fishery commodities, but it is the largest centrally located city in the Gulf States and this area is important in the production and distribution of many fishery commodities, particularly shrimp. Considerable dependence is placed upon the market news reporters for furnishing daily information on the status of the fisheries along the Gulf coast to the Market News office in New Orleans. These market news reporters, who are employed on a part-time basis, are located in important producing centers in Alabama, Mississippi, Louisiana, and Texas.

The first section of the daily report issued by the New Orleans office includes information on the production of fish and shellfish in the Gulf producing area. This section is followed by information on carlot rail shipments of fresh and frozen fishery commodities from the Gulf States; express shipments of these commodities from New Orleans; passings of fishery products through New Orleans; rail

arrivals in New Orleans; prices in the New Orleans French market; and marine weather and river forecasts which are furnished by the Weather Bureau. The report also includes daily prices at New York and Chicago for species of local interest; ~~daily cold storage~~ movements and holdings of shrimp; weekly cold storage movements and holdings of all fishery commodities in the Gulf States, and of shrimp in other areas; weekly data on the pack of shrimp by canneries operating under the Seafood Inspection Service of the Food and Drug Administration of the Department of Agriculture; and a weekly summary of the production, shipments, and prices of Gulf fishery products.

Late in January 1940 arrangements were completed with radio station WWL in New Orleans for the broadcasting twice daily of summarized market information. These broadcasts have enabled the industry and allied interests to obtain market information earlier than through the mimeographed releases distributed by mail. Considerable interest has been manifested in the inauguration of this new service, and it has been followed by the establishment of radio market news services in other cities in which the Bureau has Market News offices.

While many species of fish and shellfish contribute to the important fishery industry of the Gulf States, shrimp is by far the most important species, both with respect to volume and value. Although the bulk of the catch of shrimp is canned, large quantities also are marketed either fresh, dried, frozen, or "cooked and peeled." There is a considerable concentration of the shrimp canning industry at Biloxi, Miss., and in the area surrounding Houma, La., both of which are within a 100-mile radius of New Orleans. A large part of the shrimp consumed in New Orleans and its adjacent territory is landed in the Buras, La., area, near the mouth of the Mississippi River. This shrimp is usually sold "heads on," due to a local preference for it in this form. On the other hand, fresh shrimp handled by dealers in the vicinity of Morgan City and Berwick, La., is prepared as "headless" shrimp for the northern markets. The shrimp-drying industry, which is centered in Terrebonne and Jefferson Parishes, south of Houma, commonly utilizes shrimp which is small or mixed in size. A large part of this product is normally exported to the Orient. Shrimp is frozen in several localities along the Gulf coast, the most important freezing centers being New Orleans and Galveston, Tex.

Considerable quantities of fresh shrimp are utilized in the production of shrimp meat or as "cooked and peeled" shrimp. This product is normally packed in 5-pound cans, iced, and shipped to both local and distant markets. It is produced principally in the region between Berwick, La., and Biloxi, Miss.

The oyster and crab industry of the Gulf coast is also of importance. Large quantities of oysters are canned, some sold in the shell, and the balance shucked. After cooking crabs, the meat is usually removed and packed in cans, iced, and shipped to local and northern markets. One cannery in Louisiana is engaged in the processing of crab meat in hermetically sealed cans. There also is a considerable fishery for soft crabs in the vicinity of New Orleans, although it is primarily for nearby markets.

The production of fish in Louisiana and Mississippi is mainly of local interest, with only small quantities being shipped to other markets. However, larger quantities of fish are produced in Alabama

and considerable quantities are shipped into other Southern as well as Northern States.

The New Orleans Fishery Market News office is supervised by C. E. Peterson, Fisheries Statistical and Marketing Agent, who is assisted by R. A. Hoerner, Junior Clerk.

TECHNOLOGICAL INVESTIGATIONS

The purpose of the technological investigations of the Bureau of Fisheries is to increase the economic value of the fishery harvest by more complete and efficient utilization. Toward this end, studies are conducted of the technical phases of fish production, processing, and marketing. In planning these studies efforts are made to select those which have a broad fundamental application.

An important problem facing the fishery industry, and common to many other food industries, is that of seasonal gluts and other irregularities of production. This problem has both its economic and technological aspects. From the economic standpoint the influence of these irregularities on distribution and prices is quite obvious. However, it may be that through further technological research new methods of preserving and storing fishery products may be developed which will assist in adjusting distribution of fishery products to the ability of the markets to absorb them. Such control of the flow of products to the market would tend to eliminate ruinous fluctuations in prices. Therefore, research is being conducted on the refrigeration of fish and its various ramifications, including the role of the individual cold-storage locker in effecting the removal of surplus fish from the market.

The maintenance and improvement of quality in byproducts is another problem of primary concern to the fishery industry which is receiving continuous study. In this connection it is interesting to note that technological research was responsible for improvement in the quality of fish meal, and shifted this product from the fertilizer field to the field of animal foodstuffs, the latter being a more profitable outlet.

A further problem facing the fishery industry is that relative to grading and standardization of fishery products. Through the interests of a section of the industry, companion bills were introduced in Congress (H. R. 6130 and S. 2380, 76th Cong.) to provide for a mandatory or compulsory inspection and permissive or voluntary grading service for fish and fishery products. Hearings were held during the early part of 1940 on H. R. 6130 by the Committee on Merchant Marine and Fisheries of the House of Representatives, but the testimony adduced by witnesses at the hearings indicated that the provisions of the bill had rather far-reaching consequences, and the bill was not reported out by the committee. Later, however, another bill was introduced in the Senate (S. 3576) which would limit the inspection and grading services to fish to be frozen and frozen fish. This was still pending before the Senate Committee at the time this report was prepared.

The value of technological investigations to the welfare of our people does not end with aiding the fishing industry, for other American industries also are making extended use of the results of this work. For example, the Bureau of Fisheries pioneered in this country in the

development of quick-freezing methods as adaptable to the preservation of fishery products. These methods now have widespread application in the preservation of a large number of other foods such as fruits, vegetables, poultry, and meat. In another instance the Bureau led in the search for new sources of vitamins A and D, and found that oils from many species of fish are rich in these vitamins. A direct outgrowth of these investigations is the manufacture of high-vitamin oils from the livers and viscera of various species of fish such as halibut, tuna, and swordfish. Formerly, only cod livers were used for this purpose. This has resulted not only in raising the income of the fishery industry through the sale of products heretofore wasted, but it has also been a boon to the drug industry. Of most importance, however, is the contribution of this work to the health of our people by providing an economical and convenient source of vitamins A and D.

LABORATORIES

The Division carried on its technological studies during 1939 under the direction of Dr. J. R. Manning, Senior Technologist, until his death in August, and since that time under the direction of J. M. Lemon, Technologist. These studies were conducted at the Bureau's laboratories located in Washington, D. C., College Park, Md., and Seattle, Wash. In addition, members of our technological staff cooperated in the conduct of investigations in the laboratories of the University of Maryland and Maryland State Agricultural Experiment Station at College Park, Md.; the University of Washington, Seattle, Wash.; and Washington State College, Pullman, Wash.

The following personnel, in the various laboratories listed below, contributed to the technological investigations described in the ensuing pages of this report:

College Park, Md.—J. M. Lemon, Technologist in Charge; W. T. Conn (deceased) and S. R. Pottinger, Assistant Technologists; Dr. H. W. Nilson, Assistant Pharmacologist; C. F. Lee, W. B. Lanham, Jr., A. L. Fowler (resigned), and W. H. Baldwin, Junior Chemists; J. F. Puncochar and Dr. R. J. Reedy, Junior Bacteriologists; H. E. Crowther, C. E. Swift, and R. H. Flowers, Research Associates; L. F. Ortenzio, H. F. Kraybill, N. G. Sprague, L. J. Barton, R. C. Dawson, Research Fellows; and Roscoe Dwiggins, J. D. Rollow, Ned Oakley, D. J. Bowman, and C. M. Forsythe, Student Assistants.

Seattle, Wash.—R. W. Harrison, Technologist in Charge; M. E. Stansby, Assistant Technologist; and L. O. Simenson, William Clegg, Robert Carlton, Marie Sater, William Winberg, and Leslie Lowen, Chemical or Research Assistants.

Washington, D. C.—N. D. Jarvis, Associate Technologist.

COLLEGE PARK, MD.

Additional facilities for scientific study of problems concerning the fishing industry on the Atlantic coast will be provided the Bureau through an allotment of \$100,000 from the Public Works Administration for the construction of a technological laboratory building on the campus of the University of Maryland at College Park.

The plans contemplate erection of a building which will permit consolidation of the Bureau's technological laboratories which are

now in operation in various buildings of the university, and in the Commerce Building at Washington, D. C. This will provide unified facilities for the study of problems facing the fishery industry of the Atlantic coast.

The work of the College Park Laboratory is in three principal fields: First, chemical and engineering studies on the preservation and utilization of fishery products; second, nutritional and pharmacological studies with fishery products; and third, bacteriological and sanitation studies involving fishery products.

SEATTLE, WASH.

Various improvements were made at the technological laboratory at Seattle in order to increase our facilities for chemical studies in fishery products. Among these were the construction and installation of a special fume hood for exhausting inflammable solvent vapors; a 4- by 8-foot chemical laboratory table with center sink, water, gas, and electrical services; a 2- by 10-foot wall-type titration and apparatus table; and several work tables.

KETCHIKAN, ALASKA

In view of the necessity for technical research from the national standpoint, plans have been prepared by the Bureau for the establishment of a fully equipped fishery products laboratory in Ketchikan, at a cost of \$50,000, made possible by an allotment from the Public Works Administration. This laboratory will be maintained in cooperation with the Territory, a sum of \$20,000 having been appropriated by the Territorial Legislature for this purpose. The Territorial contribution will be administered by the Fisheries Experimental Commission appointed by the Governor of Alaska in accordance with the provisions of the Territorial Act. Establishment of a laboratory of this type in Alaska will fill the pressing need for a greater fund of technical knowledge regarding the utilization of the fishery harvest of Alaska and will, in effect, double the Bureau's facilities for technological research on the Pacific coast.

The research program of the Alaska Laboratory will be concerned with increasing the utilization of fishery waste materials now being discarded; improvement of methods for handling, preserving, and marketing the various species of fish and shellfish now taken commercially for consumption as food; and the development of new and useful products from species of fish and shellfish present in Alaskan waters which heretofore have not been commercially utilized to any extent; all having the primary aim of increasing the value of the fishery industries in the Territory and stimulating and extending employment.

MAYAGUEZ, P. R.

As indicated previously, plans also call for the establishment of a fishery products laboratory in Mayaguez, made possible by an allotment of \$25,000 from the Public Works Administration. Here studies will be conducted on fish production, preserving, and marketing, as related to the fishery industry in Puerto Rico and the Virgin Islands.

PRESERVATION OF FISHERY PRODUCTS FOR FOOD

Studies on this phase of fishery technology are conducted in the field of chemistry, bacteriology, and engineering. These studies are for the purpose of improving the quality of fishery food products; development of scientific tests for judging the quality of fishery products; development of methods for improving the sanitary conditions in fish-packing plants; and the development of additional fresh, frozen, cured, and canned fish foods. During the past year there have been many demands on the Bureau for research on problems of this type. This is indicative of the desire of the fishery industry to place on the market a food product which will meet the most exacting requirements as to quality and wholesomeness, and of the desire to make the most effective use of the fishery harvest. Not only has the fishery industry been instrumental in having these studies conducted, but it has been quick to adapt to commercial practice many of the recommendations of the Bureau resulting from this work. During 1939 studies on the preservation of fishery products for food were conducted in the Bureau's technological laboratories at College Park, Md., Seattle, Wash., and Washington, D. C.

PREPARATION OF CRAB MEAT

Bacteriological and chemical studies of the commercial preparation of the meat of the blue crab (*Callinectes sapidus*), which were begun in 1938, were continued during the past year. These studies were conducted for the purpose of developing more rapid chemical and bacteriological tests for judging the quality of crab meat, for exploring new methods for the packing of crab meat, for effecting improvements in plant equipment, and for more efficient and sanitary handling of crab meat. Following the completion of the work at a temporary laboratory in Crisfield, Md., where bacteriological investigations of the various operations required in the preparation of crab meat were made under actual plant conditions, the laboratory equipment was returned to the Bureau's laboratory at College Park, Md., where additional work was conducted.

Studies to develop a more rapid chemical test for determining the quality of crab meat were conducted on the product as stored in ice under the same conditions as practiced commercially. The following chemical reactions were given consideration as a basis for possible tests for detecting freshness in the crab meat: Degree of acidity or alkalinity (pH), ammonia formation, hydrogen sulfide formation, and the electrometric test for relative freshness.⁴ In studying the degree of acidity or alkalinity of the crab meat, it was found that the pH of the "lump" or white meat increased from about 7.2 in the fresh product to about 7.9 in the stale meat, while the claw meat showed very little variation in pH between the fresh and the stale product. This indicates that the pH test has promise of commercial application at least on the white meat. In studying the formation of ammonia in the crab meat under storage, it was found to increase steadily to a value of about 400 parts per million for white meat and 500 parts per million for claw meat, when a stale odor was evident. This reac-

⁴ The electrometric test was developed for testing the quality of fish such as haddock by technologists of the Bureau of Fisheries. The details of this test are contained in "An Electrometric Method for Detection of Relative Freshness of Haddock," by Maurice E. Stansby and James M. Lemon, U. S. Bureau of Fisheries, Industrial and Engineering Chemistry, Vol. 5, pp. 208-211, May 1933.

tion also has promise of commercial application. The formation of hydrogen sulfide could not be detected in white meat and only a trace in claw meat while still in an edible condition. Therefore, this reaction seems to have no value as a test for freshness. The results obtained by the electrometric test for freshness as now operated cannot be relied upon when applied to crab meat because under commercial practice the crab meat is cooked prior to storage and sale.

Studies to develop a bacteriological test for judging the quality of crab meat were continued at Crisfield, Md., where a large number of cultures were prepared of the various types of bacteria found in that locality. A study of the differential cultural characteristics of the organisms so isolated is now in progress.

Various methods were studied for processing crab meat to retard spoilage. One showing promise of possible use as a precautionary measure to insure the elimination of *Bacillus coli*, and also to reduce the total number of bacteria in the meat, consisted of the pasteurization of the meat after packing in 1-pound cans. It was found that by heating the packed meat for a period of 10 minutes in a steam cooker at a pressure of 5 pounds per square inch, all *B. coli* which had been experimentally inoculated into the meat were destroyed. The total number of bacteria also was lowered considerably as a result of this pasteurization, and the keeping quality of the meat improved as compared with that of the commercially prepared product. The change in the appearance of the meat was negligible, and only a slight decrease in weight occurred.

In connection with the chemical and bacteriological studies relative to the testing and packing of crab meat, an engineering and sanitary study was made of the physical equipment in crab-picking plants located in the area between Maryland and Louisiana. This work was conducted for the purpose of securing information on the most efficient labor and handling practices, and to obtain data on technique for maintaining the plants in a sanitary condition. Following the study, a sanitary code was developed for the preparation of crab meat in cooperation with the industry and at the request of a group of crab packers and other interests. This code was presented to the entire crab-picking industry in the Chesapeake Bay area for its guidance. It is understood that this has been adopted by the majority of the crab-packing plants in this area and has resulted in placing a product of higher quality on the market.

Following is the full text of the code:

SANITARY CODE FOR THE PREPARATION OF CRAB MEAT

I. BUILDINGS AND EQUIPMENT.

a. *Walls*.—Walls, partitions, and ceilings should be as smooth as possible, with no crevices to retain dirt. They should be coated with a washable paint. The picking and packing rooms should be painted white; other rooms should be painted a light color. All openings in walls should be screened and ratproofed.

b. *Floors*.—All floors should be constructed of concrete laid in a single piece. The surfaces should be smooth and waterproofed to permit easy cleaning and should be inclined slightly in the direction of the drains to insure complete drainage of all waste water. Drains should not be simply holes, but should be fitted with drain pipes that have been ratproofed. These drain pipes should either lead into a sewer or should drain out into the water. In plants that are constructed over the water on pilings, floors of wood are permissible if the pilings are of insufficient strength to support a concrete floor. However, provisions should be made for ratproofing and proper drainage.

c. *Screens*.—All doors, windows, and ventilators should be screened. Screen doors should close automatically and should fit tightly for protection against flies, other insects, and vermin. As an extra precaution, flypaper or a non-poisonous insect spray should be used to destroy flies inside the plant.

d. *Toilets and hand-washing facilities*.—Toilets should be of sanitary construction and be of the type approved by the State board of health. Privies should be located at least 50 feet from the plant and be so placed that drainage from them will not contaminate the water supply if the supply is from wells. Toilet paper should be provided at all times.

Facilities for washing hands should be provided in the picking room and the packing room. Running water, liquid soap, paper towels, and a chlorine solution of at least 100 parts per million available chlorine, should be available at all times.

e. *Plant layout*.—Separate space should be provided for each of the various operations. Picking and packing should be done in separate rooms. The cooking room should be separated from the cooling room. A dressing room should also be provided and the hanging of garments in any other place should be strictly prohibited.

f. *Lighting and ventilation*.—Adequate light and ventilation should be provided. Windows should be large and numerous. If windows are obstructed, skylights should be provided. Artificial lights for night operation should be so placed as to provide for even illumination.

g. *Cooking*.—The space provided for cooking should be well screened. Retorts should be provided with vents to permit escape of air.

h. *Cooling*.—Cooling rooms should be used for this purpose only. They should be well screened and rat-proofed. The retort baskets should not be allowed to touch the floor. They should be suspended from the ceiling or allowed to rest on supports from the floor. The supports should be cleaned and sterilized before coming into contact with the baskets. If cooling platforms are used, they should be covered with metal, preferably noncorrosive, with all seams soldered. Low sides should be provided to prevent the crabs from falling from the platform. The surface of the cooling platform should be inclined slightly to permit thorough drainage. Crabs falling to the floor during the cooling process should not, under any circumstances, be replaced into retort baskets or on cooling platforms. They should be either reprocessed or thrown away.

i. *Picking and packing tables*.—Table tops should be covered with metal. Non-corrosive metal is recommended for covering tables. Concrete should not be used for table tops due to porosity, cracking, chipping, etc. Corroded or rusted table tops should not be used; tops should not be painted. Tables should be so constructed as to permit easy disposal of waste. They should be inclined slightly to provide for drainage. Tables next to walls should have the metal covering extend at least 10 inches above the table along the wall.

j. *Stools*.—Great care should be used to provide the proper type of stool or chair. Stools without backs are preferable to chairs, in that they are easier to clean and sterilize and also minimize hand contacts.

k. *Picking pans*.—These should be provided only for holding the 1-pound shipping cans during picking.

l. *Picking knives*.—These should be of one-piece construction, preferably of stainless steel.

m. *Blocks*.—Blocks used for cracking claws should be of smooth metal. Wooden blocks are not recommended.

n. *Cupboards or cabinets*.—These should be provided for storage of sterilized utensils when not in use. They should be constructed with screen doors and be provided with metal shelves.

II. OPERATIONS.

a. *General cleanliness of plant*.—For sterilizing the equipment, either steam under pressure or a chlorine solution should be used. Steam, if available, is preferable to chlorine for sterilizing purposes. Before sterilizing the equipment, all particles of shell, meat, viscera, etc., should be removed with soap and water. If chlorine solution is used for sterilizing, it should contain from 100 to 200 parts per million of available chlorine. Directions for making this strength solution will be found on the containers in which the concentrated chlorine is sold.

1. When cleaning the cookers, all shell, crabs, and foreign matter should be removed. The cookers should be cleaned with water under pressure at the close of operations each day.

2. Cooling platforms and bins should be cleaned and sterilized before use and after each batch of cooked crabs is exhausted.
3. Shovels used for handling cooked crabs and ice should be used for these purposes only. They should be cleaned and sterilized before use and should not be allowed to touch the floor. When not in use they should be kept either on the cooling platform or in the ice bin. Separate shovels should be used for each purpose. It is highly recommended that the blades of the shovels be submerged in a chlorine solution when not in use.
4. Containers used for carrying cooked crabs to the pickers should be cleaned and sterilized at least three times a day.
5. Tables used for all purposes should be cleaned and sterilized before use. Picking tables should be washed and sterilized after the supply of cooked crabs of each picker is exhausted. Packing tables should be washed and sterilized at least three times a day.
6. Picking utensils, such as knives and pans, should be cleaned and sterilized after each lot of crabs in front of the picker is exhausted. Cans in which the meat is picked should be rinsed in chlorine solution before use.
7. Hand contacts with stools should be avoided. Stools should be cleaned and sterilized at the end of operations each day and before use the next day.
8. Facilities for washing the hands should be segregated from facilities provided for washing picking utensils. Separate lots of chlorine solution should be provided for rinsing the hands and sterilizing picking utensils. These solutions should be made up fresh at least three times a day.
9. Ice crushers, bins, and boxes should be cleaned and sterilized before use and also at the end of operations.
10. Floors should be kept free from waste and should be cleaned thoroughly at least once daily. Steam or water under pressure should be used in cleaning.

b. Personal cleanliness.

1. No person afflicted with any communicable disease should be employed in a crab-meat plant. Persons with wounds or sores on the hands should not be allowed to pick crab meat. Periodic check-ups should be made by health authorities or physicians and those persons in good health should be issued approved health certificates.
2. All persons employed in crab-meat plants should wear clean aprons and wearing apparel. Clean, washable caps or hair nets should be worn.
3. Before visiting the toilet, employees should remove aprons and leave them in the room where they are employed. Hands should be washed thoroughly with soap and water followed by a rinse in chlorine solution before starting work and after each absence from the picking room; also after each lot of crabs in front of the picker is exhausted. A person should be designated to see that this provision is strictly followed.

c. Preparation of the meat.

It should be stressed that crab meat, as prepared and shipped, should at all times be free from pollution.

1. Crabs should preferably be picked immediately, or as soon after cooking as is practicable. It is to be emphasized that cooked crabs which fall to the floor or otherwise come into contact with the floor should be either reprocessed or thrown away. If this precaution is not taken, the entire batch of crabs may become contaminated.
2. Crabs should be delivered to the picking tables by a person assigned to that duty. When trimmed crabs are washed for the purpose of removing fat prior to picking, the washing should be done with water under pressure. This should be done at a central point in the plant.
3. Crab meat should be picked directly into new and unused shipping cans in preference to picking pans. This will tend to reduce the number of hand contacts with the meat. The cans should rest in a clean pan while being filled. A person should be assigned the duty of collecting the cans from the pickers as they are filled. The nesting of cans one on top of the other at any time before delivery to the packing room should be avoided. Pickers should use greater care in picking the meat in order to minimize the amount of shell and cartilage in the meat.

4. After the filled cans are delivered to the packing room they should not be permitted to accumulate on the packing table. The practice of dumping the meat out of the can and picking it over to remove cartilage and shells is not recommended. Cans of crab meat should not be nested one on top of the other prior to packing in ice. If the meat is to be washed before icing, this should be done in the can by means of a sprinkling device or spray over a perforated table top or screen. The water used for this purpose should be free from pollution.
5. Crab meat should be iced promptly. The ice prior to crushing should be thoroughly washed on an elevated metal-covered platform. Barrels or ice chests should be thoroughly cleaned and sterilized before use and should be so perforated as to allow proper drainage.

d. *Disposal of waste.*

1. In front of each picker an opening should be provided in the table for the disposal of waste. A large metal container should be placed under each opening. This method will prevent the scattering of waste over the floor. Pickers should not empty these containers; this should be done by a person assigned to this duty. Containers should be washed thoroughly and sterilized each time they are emptied. In no instance should waste be allowed to remain in the containers overnight.
2. In localities where the waste is dried for use in fertilizer, provisions should be made for storage of this waste at the plant. It should be stored in concrete or wooden metal-lined bins which are under cover outside the plant and which are adequately protected from flies and vermin. Waste should be removed at least once a day and should not be allowed to remain in the bin overnight. The bins should be thoroughly cleaned and disinfected after removal of the waste.
3. If drying facilities are not available, waste should be stored as above and disposed of daily by dumping into deep water where there is sufficient current to scatter the waste, or perhaps a more satisfactory disposal should be made of the waste by its use as a fertilizer by local farmers, unless sufficient quantities of waste are available for mechanical reduction.

NOTE.—It is suggested that a competent person be employed at each plant to see that these recommendations are carried out. He should supervise the washing of hands and equipment and be generally on the alert to correct any insanitary conditions that may occur.

PREPARATION OF FRESH OYSTERS

This study was continued during the past year through the use of additional funds obtained by the Division at the instance of members of the oyster-packing industry. A temporary field laboratory was established in the City Hall at Norfolk, Va., through the cooperation of the city health authorities. Technologists stationed at this laboratory made an extended study of commercial practices in the local oyster-packing plants and aboard oyster-fishing boats, and of the condition of oysters as found on the growing beds in that vicinity. One of the primary purposes of this study has been to determine the type of organism responsible for pink discoloration of certain shipments of oysters, and its prevalence. It was found to be an organism commonly known as "pink yeast," and that it was present in fairly large numbers in the mud on the oyster beds and on the equipment on the boats and in the packing plants. The best way to check the spread of this yeast is to wash contaminated equipment thoroughly with fresh water and then spray with a 3 percent solution of formaldehyde.

A survey of oyster-packing plants operating on the North Atlantic seaboard was made for the purpose of obtaining data on the commercial handling of oysters, and technique for maintaining the plants in a sanitary condition. As a result of this work a sanitary code for the

handling of fresh oysters was prepared and presented to the oyster packers at the 1940 annual meeting of the Association of Oyster Growers and Dealers of North America. This code is similar to that for the packing of fresh crab meat which appears on pages 213 to 216 of this report.

Toward the end of the year, the equipment at Norfolk was transferred to the College Park (Md.) Laboratory. Here the following phases of this problem are being considered and will be reported later: (1) Incidence of the pink yeast in fresh, commercially shucked oysters; (2) effect of various chemicals as germicides specific for the pink organism; (3) continuation of the studies on changes in hydrogen-ion concentration (pH) as oysters age, as a possible test for judging quality; (4) effect of washing and blowing on the mineral content of oysters; and (5) studies on containers for packaging oysters.

HANDLING OF FRESH FISH ABOARD FISHING VESSELS AND AT PACKING PLANTS

In recent years difficulties have been experienced in maintaining the quality of fish caught by the large otter trawlers operating from New England ports and handled on the Boston Fish Pier. From time to time, these difficulties have resulted in considerable financial loss to wholesale dealers. As a result, the Massachusetts Fisheries Association, Boston, Mass., and the Fishery Advisory Committee of the Department of the Interior requested the Bureau of Fisheries to conduct studies of this problem in order to recommend changes or improvements in existing methods which would result in the marketing of a product of higher quality. This problem was studied during the summer and fall of 1939.

Investigators accompanied the otter trawlers to observe the actual commercial methods for the capture of the fish and for handling them aboard the trawler. Information was obtained especially on the temperatures of the waters wherein the fish were caught; temperatures of the fresh-caught fish, and of the fish as stored in the hold; effect of the pressure on the various layers of fish as packed in the storage pens; effect of sanitary measures in retarding deterioration of the stored fish; and the applicability of the electrometric test for judging the quality of the stored fish. Studies also were made of the practices used in unloading the catch at the Boston Fish Pier and of the handling of the fish in the packing plants.

Methods for eliminating the use of pitchforks aboard vessels have been suggested by the investigators. These also include suggestions made by previous investigators and cover the use of wire-bladed (potato) shovels for moving fish from one place to another on the vessel, a basket arrangement in the washing boxes on deck which can be raised and tipped to slide the fish from the boxes, and a chute leading from the washing boxes for lowering the fish to the pens in the hold.

Methods suggested for eliminating the use of pitchforks in the unloading process include: (1) Substituting wooden rakes for pitchforks in removing the fish from the pens to the unloading baskets; (2) discharging the fish from the baskets to a weighing box fitted with a trap-door at one end; (3) placing the weighing box on a raised platform on the pier; and (4) removing the fish from the weighing box to a cart by tipping the box at such an angle that the fish slide through the trap-door into the cart.

It was found that the pens in the hold of vessels having mechanical refrigeration are constructed in such a manner that cold air cannot circulate around them. Thus the fish in the topmost layers may be frozen upon arrival at port, while the lower layers remain at a temperature conducive to rapid deterioration. To overcome this, the investigators suggested that the pens be so constructed as to allow an open space of about 2 inches around all sides of each individual pen.

It was found that one of the major factors contributing to deterioration of the fish is the physical damage from punctures made in the flesh by the use of pitchforks in handling the fish aboard vessels, in unloading at the pier, and, in some instances, in the packing plants. Physical damage also is caused by the pressure of large pieces of ice which bruise and rupture the flesh when fish are stored on the vessel in deep pens, or bins. This pressure was found to be as high as 2.5 pounds per square inch on the bottom layer of fish in a pen 5 feet deep. Bacterial contamination of the flesh is made easily possible through the ruptures and bruises caused by these practices. In pens 30 inches deep, the pressure on the lower layer was 1 pound per square inch and bruising was not excessive. It appears, therefore, that the storage pens should be as shallow as possible and that finely crushed ice should be used for refrigeration of the fish while in the pens.

Studies on handling the fish in the packing plants reveal the need for instituting improved sanitary practices. Toward this end, the investigators prepared a set of suggestions which was distributed among the owners of the packing plants. These suggestions are similar to those for the crab-packing plants as outlined on pp. 213 to 216 of this report.

During recent years some of the fish-packing firms in New England have been candling fish fillets to detect those which are unmarketable. The method used in Boston caused considerable glare, and resulted in eyestrain to the inspectors. Attempts were made to remedy this situation by polarizing the light for the candling operation. This proved successful in reducing the glare, but costs for general installation are somewhat high. A partial solution of the problem could be obtained by exposing a smaller illuminated area, thus reducing or entirely eliminating the stray light around the fillets. Special types of light bulbs which minimize glare also may be an aid in this connection. A detailed report of this study is now being prepared by the investigators.

ULTRAVIOLET RAYS IN KILLING BACTERIA

The work on this problem during the past year has been concerned with establishing the effects of intermittent irradiation on the keeping quality of haddock fillets stored under refrigerated conditions. The purpose of this work is to determine whether it would be possible to reduce bacterial contamination in fish while being prepared in the fish processing plants and while being held in cold-storage warehouses and retail display cases, by the use of ultraviolet lamps. A mechanical device, developed by the research workers at the College Park Laboratory, allowed a 30-second exposure of fish fillets to the rays of the ultraviolet lamps for each hour of storage in the experimental refrigerator. At 48-hour intervals during a total storage period of

8 days, samples of the fillets were withdrawn from the experimental and control refrigerators to determine comparative bacteriological counts, and for chemical and organoleptic tests. The results obtained thus far indicate: (1) Bacterial numbers were appreciably lower for the intermittently irradiated than for the nonirradiated control fillets stored under similar conditions of time and temperature (8° C. (46° F.)); (2) cellophane apparently permitted the passage of the ultraviolet rays to the surface of the haddock fillets wrapped in this material; (3) organoleptic tests of the irradiated and control haddock fillets indicated that the irradiated fillets were superior in flavor to the nonirradiated control fillets stored under similar conditions of time and temperature; and (4) this method of intermittent irradiation has commercial possibilities in prolonging the keeping qualities of haddock fillets during storage, especially in display cases or other glass-topped refrigerators as used in retail stores. It probably has similar application in prolonging the keeping qualities of other nonoily fish in storage. As time permits, certain other phases of this investigation which need verification will be made.

PREPARATION AND PACKAGING OF FRESH FISH

During the past year a study was initiated at the laboratory in Washington, D. C., on improvements in methods for the preparation and packaging of fresh fish. Results obtained to date indicate that the addition of preservatives to ice, such as sodium benzoate, are not effective in increasing the length of time during which the fish will remain in good condition. Preservatives added to brine dips do accomplish this purpose, but not in the lowest concentrations; or when the fish is given a very short dip. A plain salt solution is useful as a preservative measure for fresh pan-dressed or filleted fish, when the brine tests 50° salinometer and the dip is 15 minutes. The addition of organic acids to brine dips shows a slight improvement in keeping qualities.

From the standpoint of packaging and preparation, vegetable parchment paper wrappers are more satisfactory than wrappers of the cellophane type, but the retail customer seems to prefer the latter. Experiments with individual hermetically sealed No. 2 tin containers (19 oz.) for fresh fillets and fresh pan-dressed fish were not satisfactory. Fibreboard containers of about 1-pound size with slip cover tops were an improvement in the packaging of fresh pan-dressed fish, but not with fresh fillets.

Conclusions from a previous study that pan-dressing and brine-chilling improved the quality and increased the length of preservation, were confirmed. It was also found that while pan-dressing or brine-chilling were most effective at the point of production, a slight improvement was noted when this was done at the point of distribution.

Work in filleting and dressing various species of fish of the South Atlantic area indicates that these varieties, with the exception of the butterfish and possibly the spot, are suitable for filleting in sizes above one-half pound, round weight. Fish smaller than one-half pound were best prepared by pan-dressing.

FREEZING PACKAGED SALMON AND FLOUNDERS FOR SUBSEQUENT STORAGE IN REFRIGERATED LOCKERS

Salmon has long been the most important species of fish taken on the Pacific coast. Although the greater proportion of the catch is canned, considerable quantities also are sold fresh, frozen, salted, and smoked. Pacific salmon normally are frozen in the round in sharp freezers and distributed in this manner. During the past several years, however, an effort has been made to develop a market for frozen salmon products in packaged form.

For several years there has been a marked development in otter-trawl fishing in the Pacific Northwest, particularly on Puget Sound. This has led to an increased catch of flounders and other small bottom-fish which has created a supply of low-priced fish available for preparation as packaged, frozen products.

A market for packaged salmon and flounders seems possible through the development of the refrigerated locker industry. This industry is particularly beneficial to those who, owing to their geographical location, find it difficult to obtain sea foods during certain seasons of the year. Now, with the refrigerated-locker system, it is possible for them to obtain these foods during seasons of quantity production and store them until needed. In rural communities these lockers consist of self-contained units for installation on the farm. In many small towns and cities the locker is placed in a regular community cold-storage warehouse. These lockers, ranging in size from 8 to 12 cubic feet capacity, can be leased at prices ranging from 75 cents to \$1 per cubic foot per year. All facilities for freezing and preparing sea foods for storage are usually supplied by the operators of the community locker establishment.

In view of the need for information regarding the problems associated with the freezing of salmon and flounders for subsequent storage in refrigerated lockers, the Bureau has undertaken studies of this nature. The program of research is initially concerned with a survey of some of the practical aspects of freezing and storage based on existing commercial facilities on the Pacific coast, with particular attention to the significance of brining, method of packaging and type of wrappers, "quick" freezing versus "sharp" freezing, and temperature of storage. Observations are being made to evaluate drip, dehydration, discoloration, texture, rancidity, and the effects of possible transfer of odors between sea foods and other products stored in the same locker.

While these investigations have not as yet reached a point where it is possible to draw definite conclusions, the data obtained indicate that a latex composition bag furnishes the most efficient protection from evaporation of moisture, and that there is no transfer of odors from frozen sea foods to other foods stored in the same locker.

Additional information obtained suggests the use of chemical treatment (brine dip) as a method for minimizing drip of the stored fish. While storage temperature has some effect on drip, the rate of freezing seems to be of less importance; at least in the early stages of storage.

Storage temperature seems to be the most important factor influencing the color of the flesh. The use of the brine treatment, which

minimizes drip, has an adverse effect on color, but it is not as pronounced as the effect of storage temperatures.

Storage temperature also is an important factor in controlling rancidity, and the brine treatment so far has had less adverse effect in this connection than had been anticipated.

COMPOSITION OF COMMERCIAL SPECIES TAKEN ON THE PACIFIC COAST

Studies relating to the amount of wastage occurring during dressing, and the approximate chemical composition of the edible portions of the various species of food fish landed in Seattle by the commercial fishing fleet, discussed in last year's report, were completed during the year. The data have been tabulated and are being submitted, with a brief discussion, for publication. Information of this type has distinct practical value since it will inform fishermen, fish dealers, and housewives regarding the wastage occurring in preparing fish for market or for the table as dressed fish or packaged fish and will indicate the percentage of edible food material and its approximate food value.

CANNING AQUATIC PRODUCTS

During 1939 a study of commercial methods now used in the canning of fish was completed, together with a compilation of the principles governing these methods. Data were obtained on cannery construction, on the manufacture of glass and tin containers, wood and fibre cases, on the operation of canning machinery, sanitation in canning, spoilage in canned fishery products, methods used in the examination of canned fishery products, and cannery inspection. Flow sheets and charts have been prepared illustrating the preparation of almost every type of commercially canned fishery product. The results of this study have been prepared for publication.

Studies on the canning of the blue crab were completed. Packs were made at different seasons of the year to determine the effect of seasonal variation, and were processed at various pressures to determine the relation of process to discoloration. A number of packs canned previously, which had been in storage for varying periods of time—some up to 18 months—were examined and their condition noted. A report on the studies dealing with this research has been prepared and submitted for publication. It is believed that the method developed by the Bureau is commercially practicable, and if followed carefully a canned crab meat of good quality should be obtained by the packer.

One new study on the canning of fishery products was undertaken during the year. This had to do with the preparation of fish pastes, or sandwich spreads. In view of the fact that considerable quantities of such products are imported into this country, local manufacturers have manifested an interest in the production of these products, especially adapted to the American taste, and the Bureau has been called upon for assistance in this direction. A series of pastes were prepared from bloaters, crabs, shrimp, hard smoked herring, salmon, salmon and shrimp combined, smoked salmon, sardine, and tuna. Following an incubation period to determine which methods of preparation were successful, a report on this work will be prepared.

DEVELOPMENT OF TESTS FOR DETERMINING THE QUALITY OF FISH

During recent years there has been evidenced a need for the development of chemical and bacteriological tests as contrasted to organoleptic tests for determining the quality of fish. This has been occasioned by the desire of the fishery industry for control of quality at all stages in the production and marketing processes, so that the consumer may purchase a product of uniformly high quality. Moreover, there is a need for the industry to meet the requirements of the new food and drug regulations. Such tests also would be needed in an inspection and grading service for the fishery industry, such as has been under consideration in Congress during the past year, if the products handled and marketed are to be judged for quality on an impartial basis. In order to solve these problems, the Bureau during past years has conducted, and is continuing to conduct, considerable technological research on practical tests for quality which can be applied under commercial conditions. Mention has been previously made in this report of such tests for the quality of fresh crab meat and shucked fresh oysters. Following is a brief summary of the past year's progress in developing tests which properly identify the quality of fish under various types of preservation and having varying initial degrees of freshness.

FORMATION OF LACTIC ACID AND ACTION OF ENZYMES AS INDICES OF RELATIVE FRESHNESS OF FROZEN FISH

One of the principal indications of strictly fresh fish is the stiffness of the muscle tissue due to rigor mortis. This condition is accompanied by the development of a high lactic acid content in the flesh of the fish. The development of lactic acid progresses to a maximum in a period varying from 24 to 36 hours, then gradually diminishes until it has completely disappeared. This study was inaugurated for the purpose of observing whether there was a correlation between the lactic acid content of fish flesh and the relative freshness of the fish during periods of storage after freezing. If it can be established that there is a correlation between relative freshness and amount of lactic acid present, it will be possible to make use of this determination for the grading of fish as to quality. Early in the course of this study it was found that it would be necessary to divide the problem into three phases: First, a study of the development and gradual disappearance of lactic acid in the fish flesh; second, the effect of enzymes produced by bacteria which utilizes the flesh of the fish as a medium for growth; and third, the effect of the action of autolytic proteolytic enzymes contained in the flesh of the fish.

Lactic acid.—Information obtained thus far on this phase of the study indicates that the lactic acid content of the flesh of sea trout and striped bass was 0.60 percent at death, or in rigor mortis, and about 0.40 percent after 50 days in cold storage. Flesh of these fish kept on ice for 3 days showed a lactic acid content of about 0.40 percent, which decreased after 50 days in cold storage to 0.35 percent. The lactic acid content of the same kind of fish flesh kept without ice for 3 days dropped to 0.12 percent and showed no further change during 50 days in cold storage. It seems likely, therefore, that this reaction may be used as a test for judging the quality of fish, especially when frozen.

Bacterial enzymes.—The study of this phase of the problem, dealing with the effect of bacterial enzymes on the keeping quality of frozen fish, has not reached a point where any conclusions can be stated.

Autolytic proteolytic enzymes.—The information thus far assembled on this phase of the study indicates that there may be a direct correlation between the age of the fish; that is, whether the fish is one, two, or three or more years old when caught, and the rate of enzyme reaction in the flesh. It appears that the enzymes in the older fish react more slowly than those in the younger fish and, therefore, the older fish can be held in cold storage over considerably longer periods of time without appreciable deterioration from this reaction. The study has not progressed far enough to confirm this assumption. There does, however, appear to be a strong indication that there is a correlation between the age of the fish and the period of time frozen fish may be kept in good condition in storage.

TESTS FOR MEASURING DETERIORATION OF FRESH SALMON

As has been indicated previously, the quality of fresh or preserved fishery products is influenced largely by the conditions of handling prior to sale or preservation and the effectiveness of the methods of preservation used. In order to control the changes taking place in a product as perishable as fresh salmon, and thus improve handling or preservative methods which will lead to preparing products of higher quality, knowledge of the nature of its deterioration and means of measuring the degree of such deterioration quantitatively are helpful.

While several recent publications have suggested tests for measuring deterioration in salmon after canning, very little scientific attention has been given to development of tests for measuring deterioration of salmon while in the fresh condition prior to canning. Accordingly, studies of this nature were inaugurated during the past year. The preliminary work which is now in progress pertains to the significance of bacterial counts, content of ammonia, trimethylamine, volatile acids, volatile alcohols, and hydrogen sulfide; and decrease in the buffering action of the flesh as indices of deterioration indicative and descriptive of the nature of the changes taking place in salmon during storage at high temperature, that is, approximately 70° F., and at low temperature of about 32° F., in ice. At the time this report was prepared this work had not progressed sufficiently to permit reporting conclusions.

IDENTIFICATION OF CANNED SALMON

In previous reports we have discussed briefly the possible use of the refractive index of the free oil in canned salmon as an aid in identifying the species in the can. Data obtained from a representative sampling of the entire Pacific coast and Alaska salmon packs for 1936 and 1938 are summarized in the following table. While it is evident that the overlapping of the values for each species precludes the use of refractive index of free oil as a positive method for identification, the mean values and the standard deviations suggest the utility of the method for supplementing existing criteria. No further sampling is contemplated for the near future, but as time permits the data at hand will be subjected to detailed statistical analysis to determine the extent to which the method can be used.

Refractive index of free oil in canned salmon

Species	Year of pack	Number of samples	Refractive index		
			Range	Mean	Standard deviation
Chinook or king.....	1936	109	1.4693-1.4743	1.47159	0.00101
	1938	77	1.4698-1.4753	1.47178	.00109
Red or sockeye.....	1936	275	1.4705-1.4768	1.47328	.00104
	1938	225	1.4710-1.4773	1.47475	.00116
Chum or keta.....	1936	104	1.4720-1.4766	1.47444	.00090
	1938	103	1.4734-1.4771	1.47489	.00068
Silver and coho.....	1936	125	1.4718-1.4787	1.47584	.00089
	1938	113	1.4744-1.4788	1.47655	.00074
Pink or humpback.....	1936	186	1.4707-1.4789	1.47634	.00126
	1938	152	1.4750-1.4796	1.47718	.00101

CHANGES IN THE COMPOSITION OF PINK SALMON (*Oncorhynchus gorbuscha*)

The commercial fishery for salmon is predicated upon the natural instinct of these fish to return to their parent streams to spawn and die. During the course of the spawning migration, the fish undergo considerable physical change and have been assumed to become poorer in quality, inasmuch as there is a gradual decrease in the pigmentation and firmness of the flesh and a definite diminution of the fat content of the edible portion of the carcass.

In last year's report reference was made to chemical analyses of the flesh of pink salmon which indicated that, from a chemical standpoint, the pronounced changes in physical appearance were accompanied by much less change in the nature and composition of the flesh protein. During the past year feeding tests were made with extracted pink salmon flesh which substantiate the chemical tests in that there appeared to be no significant difference in the nutritive value of the extracted flesh of early- and late-caught fish despite the marked difference in physical appearance. A final report incorporating and discussing the various chemical and biological data is nearing completion and will be submitted for publication shortly.

PEROXIDE TEST AS A MEASURE OF OXIDATIVE DETERIORATION OF FISH OIL

Several years ago a study was begun on the development of rancidity in the oil of fatty fish held under varying conditions of storage. The criterion of rancidity had been the Wheeler test for peroxide formation. Further investigations of this general nature were planned but it was thought advisable to make a preliminary study of the various tests of rancidity, as to the type of rancidity each test indicated, and the relation of the various tests to each other and to that ultimate criterion of rancidity—the organoleptic test which, unfortunately, is not easily capable of quantitative determination.

A study of four methods for testing rancidity was begun, therefore, during the past year. Measurement of oxygen absorption as an estimation of the degree of rancidity was tried and discarded as impracticable. The Shibsted test for fat aldehyde was then applied to a number of fresh oils. Wheeler peroxide values on the same oils showed no correlation whatever to the Shibsted values. A group of measured

samples was also exposed to sunlight and air and the accelerated rate of rancidity was followed by the Wheeler peroxide test and also by a modification of the Wheeler test, suggested by another chemist of the Bureau of Fisheries for the purpose of a more complete estimate of the peroxide content of rancid oils.

As an outcome of this series of tests three further series of accelerated rancidity tests were set up using the same tests on different types of fish oils; body, liver, and viscera oils at all stages of the development of rancidity. Very interesting data have been obtained which permit the development of several new hypotheses concerning the formation and determination of peroxides in oils. The data show that the peroxide determination methods tested do not indicate the time values and cannot be correlated with rancidity formation in the various oils. More work is necessary before any one test, or group of tests can be intelligently interpreted to the determination of the rancidity of the oil in the flesh of samples of frozen fish.

TREATMENTS TO RETARD DETERIORATION OF FISHERY PRODUCTS

ANTIOXIDANTS

Under an industrial fellowship sponsored by the Musher Foundation of New York, studies were continued during most of the past year on the use of antioxidants in retarding the deterioration of fishery products.

The first phase of the problem dealt with preventing oxidation of oil, and with inhibiting protein decomposition, in frozen mackerel and haddock fillets during extended storage by the use of the following antioxidants: Oat flour, water extract of oat flour, and ice made from the water extract of oat flour. The resulting data indicate that fresh fillets dipped in the water extract of oat flour before freezing and storage changed less in cold storage than the controls. Dusting the fresh fillets with oat flour prior to freezing was less effective. Storing fresh fillets in ice made from the water extract of oat flour showed no advantage over storing them in ordinary water ice.

The second phase dealt with the use of an antioxidant mixture "Carblex" composed of glucose and lecithin in maintaining vitamin A potency by decreasing oxidation in cod-liver oil, particularly after the sealed containers are opened for household use. The addition of small amounts of Carblex appeared to be effective in this connection, but its use for this purpose is not recommended in view of a ruling of the United States Food and Drug Administration relative to the addition of preservative substances to food or medicinal products.

The third phase dealt with the addition of Carblex to raw menhaden prior to manufacture into meal and oil to determine whether it would reduce oxidation of the resultant products. A positive effect was observed in the rendered oil, but the finished meal showed generally negative results, since the heating process apparently had an antioxidant effect in itself. The phospholipids of the flesh appeared to be the naturally occurring antioxidants. In general, the addition of Carblex to the raw menhaden did decrease the rate of oxidation in the resultant oils and in some instances inhibited protein decomposition in the meal, but pilot plant studies will be necessary before the laboratory techniques can be applied to commercial practice, especially

to determine optimum amounts of the Carblex to add to the raw material and the best way to incorporate it. The above three phases of this study were conducted at the College Park (Md.) Laboratory.

Additional studies on the use of antioxidants for retarding deterioration of fishery products taken on the Pacific coast were continued at the Seattle (Wash.) Laboratory, also under the sponsorship of the Musher Foundation of New York. Here attention was given to the effectiveness of the various types of water extracts of oat flour, "Avenized" salt (a mixture of oat flour and salt), and Carblex in retarding oxidation of frozen or mild-cured salmon. It appears from this work that the water extracts and the mixtures of oat flour showed little effectiveness in improving the keeping quality of frozen salmon. However, brine containing the water extract of oat flour was found to retard protein and oil decomposition of mild-cured salmon to some extent.

CHEMICAL PRESERVATIVES

During most of the year three industrial fellows were maintained at the College Park Laboratory by the Aquacide Company of Washington, D. C. The research has dealt mainly with the development of chemical preservatives, both liquid and dry powder, for the preservation of fish bait and of fish livers prior to extraction of oil. Trials under practical conditions have shown that properly preserved livers could be held for weeks or even months without refrigeration and still yield a medicinal grade of oil.

A chemically treated fillet wrapper has also been developed which improves the quality and prolongs the keeping time of freshly cut fish fillets. In commercial practice, the coated wrapper has promise of eliminating the need for brine tanks and permitting more sanitary handling of fillets.

These fellowships were discontinued by the sponsors on December 31, 1939. The results of the investigations conducted by the industrial fellows assigned to these problems are being assembled for publication.

MANUFACTURE OF FISHERY BYPRODUCTS

Studies in this field cover the utilization of the various byproducts of the fisheries, and methods for testing and improving their quality.

UTILIZATION OF SALMON CANNERY TRIMMINGS

Because of the potential economic value of salmon-cannery trimmings now being discarded in Alaska, the Bureau has continued its studies to determine means for attaining more complete utilization of these materials. During the year Fishery Investigational Report No. 40, "Pacific Salmon Oils" was published and the information contained therein was made available to the public. This report supplies data regarding the chemical and physical properties of salmon oils, which are suggestive of their utility for technical consumption, and demonstrates conclusively the value of salmon oils as sources of vitamins A and D. It is significant that during the year a quantity of Alaska salmon oil was, for the first time to our knowledge, sold in commercial quantity on the basis of its vitamin potency.

The value of the Bureau's investigations on salmon-cannery trimmings becomes more in evidence with each passing year, as waste

utilization becomes more general and as the monetary return to the industry increases. Several years ago our technologists developed methods for producing high quality, edible salmon oils which could be incorporated in canned salmon, thus adding increased nutritive value to the canned product and leading to greater uniformity of the pack. This method of utilizing the edible portion of the trimmings has become universal practice on the Columbia River and is beginning to be adopted more generally throughout the salmon canning industry. The Bureau's work has brought about a new development in salmon canning methods which gives a product which is preferred in the more critical canned-salmon markets.

During the past several years the trend in vitamin oil consumption has been toward more concentrated products. The Bureau's studies have demonstrated that the visceral portions of the trimmings are a more potent source of vitamins than the body trimmings. Since the preparation of canning oil requires separation of the edible body trimmings from the visceral parts, the latter materials become available for utilization in the manufacture of special vitamin products of greater potency. Our studies on salmon trimmings have demonstrated that oils prepared from total cannery waste normally equal and frequently exceed poultry grades of cod liver oil as sources of vitamin D. However, in view of the above-mentioned trend toward the consumption of more concentrated sources of vitamins, it has become necessary to determine whether it would lead to greater monetary return to the industry to recover a greater total amount of vitamin in total waste oils or to recover a lesser total amount of vitamins in the manufacture of the more concentrated visceral oils. Studies of this nature are in progress. Attention is being given also to the study of equipment suitable for handling small quantities of waste which cannot be accumulated at a central reduction plant.

UTILIZATION OF FISH LIVERS AND VISCERAL ORGANS

In last year's report reference was made to a general survey being conducted to determine the potential value of the liver and viscera from the various species of food fish on the Pacific coast. All work contemplated on this project for the present has been completed, and the data are being tabulated for publication.

PREPARATION OF FISH MEALS OF IMPROVED NUTRITIVE VALUE

During the year the work mentioned in last year's report dealing with the preparation of special dehydrated fish foods was continued in cooperation with the Bureau's Division of Fish Culture and the University of Washington School of Fisheries. The results demonstrate the practicability of conserving special nutritive properties in dehydrated fish waste materials by low-temperature drying without prior removal of water-soluble extractives. Further work on the preparation of fish meals of improved nutritional value is being carried on in connection with the utilization of salmon cannery trimmings where attention is being directed to the possibility of preparing dehydrated products especially high in vitamins A and D, and in riboflavin content.

STORAGE OF FISH MEAL

As discussed in last year's report, the tendency for the so-called fatty fish meals, that is, those prepared from such fish as pilchard, menhaden, salmon, and herring, to heat spontaneously immediately following manufacture and during subsequent storage presents one of the most aggravating problems of the fishery byproducts industry. The spontaneous heating of fish meal necessitates precautionary handling procedures which increase cost of operation, frequently results in a decrease in the quality of the meal, and occasionally causes complete loss due to spontaneous combustion.

During the past year studies have been carried on which demonstrate that air- and moisture-proof containers, such as multiwall paper bags with asphalt-treated liners, prevent spontaneous oxidative heating in fish meal without necessity of the usual precautionary handling methods. The multiwall paper containers have the additional advantages of resisting insect infestation, preventing sifting of the meal during storage and shipment, and practically eliminating the fish meal odor of the package. These factors could possibly result in obtaining lower transportation rates for fish-meal shipments so packed.

After 12 months' storage the only disadvantages of the paper containers appeared to be their greater fragility as compared with the burlap bag and a very slight increase in the caking of the meal. Tests are now underway to determine the upper limit of moisture content permissible in meal if it is to be stored in this moisture-proof type of container. Should the test results continue as encouraging as those obtained to date, and this type of container be adopted by the industry, a considerable market would be developed for a domestic paper product in place of imported burlap.

OXIDATION OF FAT IN FISH MEAL

These studies deal with determining the factors affecting the oxidation of fats in fish meal under various conditions of processing and storage. However, a fundamental attack on the chemistry of fat in fish meal had to be pursued in order to get needed information before undertaking the more practical aspects of the problem.

A preliminary study was made with mixtures of solvents in order to obtain complete extraction of oils irrespective of degree of oxidation. Certain of the resulting data indicate that exposing the meals to light and conditions of elevated temperature and moisture produces an appreciable oxidation in the constitutive fats or oils. A determination of the iodine numbers of some samples of menhaden oil clearly indicates that oxidation of the fish oil takes place more rapidly when isolated from the meal. A protein-fat complex in the meal apparently acts as a natural antioxidant. Pharmacological studies are also being carried out with fractions of oils isolated from the various fish meals.

A second study regarding the determination of fat in fish meal was continued during the year as time permitted. Much useful data has been obtained relative to (a), the effectiveness of various solvents and solvent combinations; (b), the relation of different conditions of fish-meal manufacture and storage to change in the solubility of the fat; and (c), the possibility of differentiating between altered and unaltered fat as a means of evaluating the condition of the fat in the meal.

SOLUBILITY OF FISH PROTEINS

In the normal reduction of fatty fish and fish waste in the manufacture of fish meal and fish oil, approximately 20 percent of the original solid materials passes into solution and is discarded with the waste waters. Because of the importance of this loss, both from the standpoint of economical operation and conservation of raw materials, the Bureau has begun a study of the solubility of fish proteins during cooking in order to determine the possibility of treatment which would decrease the amount of material passing into solution.

NUTRITIVE VALUE OF AQUATIC PRODUCTS

Studies on the nutritive value of aquatic products have always occupied an important place in the Bureau's technological investigations because the nutritive value of a finished product ready for marketing is in most instances the true yardstick or measure of the value of a new method of processing or an improvement in existing methods in the industry. For example—assuming that costs of processing are equal in each case—if a new method of manufacturing fish meal or a new method of freezing fish fillets produces a finished product of better quality, measured in terms of food value, then that is a true estimate of its worth, or justification for its commercial application.

The problems undertaken in this field during the past year have been concentrated on determination of the nutritive value of the edible portion of fishery products, more particularly the biological value of the protein. Considerable effort has also been expended on evaluation of the feeding value of fish meals and a study of changes resulting from conditions of processing and storage.

Study also was made of the biological value of the protein of salmon taken under different physiological periods, such as prior to migration, during migration, and during spawning. Acute and chronic toxicity tests with certain kelp products, Irish moss, and agar, have also been carried out by an industrial fellowship.

NUTRITIVE VALUE OF PROTEINS OF CERTAIN SHELLFISH

Studies were conducted to determine the nutritive value of the protein from the edible portion of various species of shellfish. Adult rats were fed known amounts of the various proteins and the quantity used for maintenance was determined in metabolism trials. All of the proteins were well digested.

On the basis of 100 representing complete utilization for maintenance, the protein of beef round (control) scored 70; of white meat from blue crab, 74; of shrimp, 77; and for the Eastern oyster the comparative score was 90. These data corroborate the previously reported findings that the proteins from fishery products are superior to beef round in promoting growth.

NUTRITIVE VALUE OF ALGINATES FROM KELP

An industrial fellowship was sponsored by the Kelco Corporation, San Diego, Calif., to conduct certain biochemical and pharmacological studies of the nutritive value of products derived from the seaweed

commonly known as kelp (*Macrocystis pyrifera*). One of these problems was to study the nutritive value of an algin product known as "Darylloid." This is a sodiumphosphoalginate with added sugar and dextrin to render the product soluble in milk with a uniform colloidal strength. It is used as a stabilizer in ice cream, chocolate milk, and other food products.

At the close of a series of feeding experiments extending over a 10-week period the data showed that the rats fed the substituted basal diet containing 5 and 10 percent of Darylloid (20 and 40 times the recommended additions to ice cream) were no different in appearance and grew approximately as well as the control rats fed the basal diet. The rats fed diets containing 20 and 30 percent of Darylloid (80 and 120 times the recommended additions) did not grow quite as well but showed no gross symptoms of toxicity either by external appearance or at necropsy. A few rats died early in the test period but no characteristic changes could be discerned at necropsy. The algin did not serve as roughage alone but was digested in increasing amounts in the diets containing the higher levels.

The rats fed the 5 and 10 percent levels were continued on the substituted basal diet containing 5 percent of Darylloid. These rats showed no symptoms of chronic toxicity after a period of 10 months, and the live weights were about equal to those of the controls. Comparable experiments were carried out with sodiualginate "Kelgin" and approximately similar results were obtained when calculated to equivalent alginate content.

Feeding studies also showed that Irish moss and agar have considerable nutritive value. These data are being summarized for publication.

KELP MEAL IN ANIMAL FEEDING

Several years ago a cooperative project was inaugurated between this Bureau and the Dairy Departments of the University of Maryland and of the State Agricultural Experiment Station at College Park, Md., in which it was hoped to determine whether kelp meal could be used as a supplement in the diet of dairy cattle for improving reproduction. This study is being continued with producing or lactating dairy cows on a more extensive scale, and it is believed that information of considerable interest and benefit to both the dairy industry and to the producers of seaweed meals will result from these experiments. It is generally understood that tests of this kind with large farm animals, such as dairy cows, require several years for the production of conclusive results. Up to the present time, however, quite definite improvements in the reproduction records of the animals fed kelp meal have been noted.

POSSIBLE TOXIC PROPERTIES OF CERTAIN FISH MEALS

Last year studies were begun to determine the feeding value of several fish meals which were stored under unfavorable conditions of high humidity and heat. Pilchard meal, a type of white meal made from various kinds of ground fish, and menhaden meal were tested.

Chicks were used largely as test animals and were fed diets in which the various experimental fish meals supplied nearly all of the protein. The data obtained on this experiment indicate that chicks could be

grown satisfactorily to an age of at least 7 weeks on the diets which contained 30 to 35 percent of this experimental meal. In fact, the protein of this meal was found to have a high nutritive value and under some conditions the exposure of meals to high humidity and heat markedly increased the vitamin K content and some vitamins of the B complex through bacterial action.

The data also showed that any subnormal growth in chicks fed diets incorporating the experimental meals was due to a deficiency state rather than any toxicosis caused by some protein or fat decomposition product. This finding is very important in actual practice, since it means that fish meals may be freely incorporated in the rations of farm animals for their valuable protein and mineral content, provided reasonable care is taken to balance the rations for all other food elements by a proper selection of cereals and leafy legumes.

The results obtained in this study have been prepared for publication under the title "Studies on the Feeding Value of Fish Meals: Effect of Heat and Moisture on Protein." It is planned to continue these studies to obtain further data relative to the development of vitamin K and the vitamin B complex in the experimental meals.

FLUORINE IN FISHERY PRODUCTS

These studies were completed and the results as outlined in last year's annual report were published as Fishery Investigational Report No. 44, "Study of the Metabolism of Naturally Occurring Fluorine in Canned Salmon and Mackerel." The conclusions derived from the study were: (1) Inorganic fluorine is three times as effective in producing defects of tooth enamel as is naturally occurring fluorine from canned salmon and mackerel; and (2) all of the fluorine ingested from the basal diet, and 67 percent of the added inorganic fluorine is stored in the body of the rat. Only 21 percent of the fluorine from the canned salmon or mackerel is stored, indicating that the naturally occurring fluorine from these fish is stored at only about one-third of the rate of added inorganic fluorides. Under practical conditions no toxicity symptoms need be expected from the ingestion of naturally occurring fluorine of fish, as evidenced from these tests.

RESEARCH ASSOCIATES AND STUDENT ASSISTANTS

Because of the relatively small size of the Bureau's technological staff, and the rather broad field of research it must cover, it is only possible, as indicated previously, to undertake those problems which are of a fundamental nature, those which have promise of the greatest value to the largest number of persons whose livelihood depends in whole or in part on the fisheries, and those which are possible with the funds and personnel available. For this reason the Division cannot, with present facilities, attack problems of special or restricted interest affecting certain products, process, methods, or industries. However, the Bureau has available, under an arrangement similar to that of other scientific Government bureaus, facilities for research associates and student assistants in its laboratories. The salaries and expenses of these employes are paid by the firms or groups who are interested in the problems on which they are working, and the investigations are carried out under the supervision of the Bureau's technologists in its

laboratories and under its control. Thus the Bureau provides these industries and groups with laboratory, consulting, and library facilities, which, in most instances, cannot be obtained elsewhere.

Within the limits of its facilities, the Bureau also has opened its technological laboratories to research students who are pursuing courses in universities, and who are selecting investigational problems in the fisheries as their major study. This may prove of special benefit to the industry as it brings its problems to the attention of a large group of research workers who in turn may spread interest to applied fishery research.

In the preceding sections of this report we have given the names of organizations which are conducting cooperative projects under the supervision of our technological staff, and which have employed research associates for this purpose. In the preceding section on laboratories we have given the individual names of these research associates and student assistants. The plan of utilizing graduate student assistants for part-time work on research projects has been so successful that the University of Maryland employed from its own funds additional graduate students, by establishing two research fellowships for work on fishery technological research. Some of the new research problems assigned to these research fellows are: (1) Studies on the enzymes in fresh and frozen fish; and (2) chemical and pharmacological studies on the oxidized oils in fish meals. These projects are selected by the student in accordance with his qualifications, approved by both the Bureau and the University, and the results are prepared in a thesis submitted for a master's or a doctor's degree at the end of 3 years of part-time work. The results of such studies are of direct value to the industry. This plan also serves to educate and train scientific fishery investigators for employment by industry and government.

COOPERATION WITH GOVERNMENTS OF DENMARK AND ICELAND

Early in the spring of 1940, at the request of the Danish Government, the facilities of the College Park Laboratory were opened to Ingi Bjarnason, of Iceland, as a Research Fellow. Mr. Bjarnason was in the United States on a scholarship given to him by the Icelandic Government for the purpose of studying the fisheries of this country. While at the laboratory in College Park he conducted research dealing with the development of leather bates from pyloric caeca of cod and haddock. Mr. Bjarnason completed this study early in June and is now summarizing the results of the study for publication.

EDUCATIONAL AND CONSULTING SERVICE

In addition to the research activities described in this report, our economic and technological staffs conduct, along with their regular duties, an educational and consulting service for those interested in the fisheries. During recent years the demand for this type of service has increased. Many requests have been received from groups and individuals to demonstrate improved methods developed in our laboratories for the handling and processing of fishery products, for instruction in fish cookery, and for aid in improving various marketing practices. Insofar as our facilities have permitted, we have

complied with these requests, endeavoring to offer assistance especially where the request has come from a large group or industry. However, we have not been able to satisfy all of the requests received because of insufficient personnel and because of inadequate funds to provide for travel expenses of the demonstrators.

Some of the educational services rendered are discussed or referred to in previous paragraphs of this report. In brief, this work has covered the fields of commercial preserving of fishery products, fish cookery in the home, and the marketing of aquatic products.

Another phase of this service has consisted of answering thousands of letters directed to the Bureau on fishery subjects and of supplying information to persons who have called at the Bureau personally. Many of the latter came from foreign lands to seek fishery information which might be useful in the conduct of the fishing industry in their native country.

PUBLICATIONS OF THE DIVISION

During the calendar year 1939, the following publications were prepared and addresses delivered 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, Maine; and Seattle, Wash.; the monthly reports on the cold-storage holdings of fish and quantities of fish frozen; or the daily reports and monthly summaries of the Fishery Market News Service. The administrative reports, investigational reports, and fishery 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 upon request to the Bureau. The special articles may be obtained from the sources of publication.

Those wishing to receive copies of this report, statistical bulletins as issued, or the periodic Fishery Market News reports issued from the Washington office, should request that their names be placed on the Bureau's mailing lists as follows: No. 128 for this report, 128a for general statistical bulletins, 128b for monthly cold-storage reports, and 128d for the periodic Fishery Market News reports. Those desiring daily reports or monthly summaries of fishery market news, issued from the Division's Fishery Market News offices, should apply direct to the Fishery Market News Service at the nearest of the following six addresses: 33A Fulton Street, New York, N. Y.; 253½ Northern Avenue, Boston, Mass.; 200 North Jefferson Street, Chicago, Ill.; 309 Duval Building, Jacksonville, Fla.; 417 Bell Street Terminal, Seattle, Wash.; or 1100 Decatur Street, New Orleans, La. For historical statistical data on the domestic fisheries for the period 1880 to 1929, 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. Statistical information for the years 1930 to 1937, inclusive, may be obtained from the annual reports of the Division for the years 1931 to 1938, inclusive.

DOCUMENTS, REPORTS, AND CIRCULARS

- FIEDLER, R. H.
Fishery industries of the United States, 1938. 8°, 380 pp. Administrative Report No. 37. Appendix III to Report of Commissioner of Fisheries, 1939. 25 cents.
- HARRISON, ROGER W., ANDREW W. ANDERSON, S. R. POTTINGER, and CHARLES F. LEE.
Pacific salmon oils. 8°, 21 pp., 4 figs. Investigational Report No. 40. 5 cents.
- LEE, CHARLES F., and HUGO W. NILSON.
Study of the metabolism of naturally occurring fluorine in canned salmon and mackerel. 8°, 15 pp., 5 figs. Investigational Report No. 44. 5 cents.
- NILSON, HUGO W., and E. J. COULSON.
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Part 2. FISHERY STATISTICS, 1938

GENERAL REVIEW

Data on the 1938 catch of fishery products were collected in all sections of the United States and Alaska except the Mississippi River area. The combined catch in the areas surveyed shows a decline of 2 percent in volume and 7 percent in value as compared with the catch in the same sections during the preceding year. Decreased catches were made in each of the geographical sections except the Chesapeake Bay and South Atlantic and Gulf States. Marked declines in the value of the catch occurred in the New England, South Atlantic and Gulf, and Pacific Coast States, and in Alaska. The value of the pack of canned fishery products in all sections declined 21 percent as compared with 1937; byproducts decreased 17 percent; cured fish about 5 percent; and packaged fish, 2 percent.

The total catch of fishery products in the United States and Alaska, as based on the most recent surveys, amounted to 4,253,445,000 pounds, valued at \$93,547,000. Slightly over 130,000 fishermen were employed in making this catch.

The production of canned fishery products in the United States and Alaska during 1938 amounted to 667,527,840 pounds, valued at \$83,445,889; the output of byproducts was valued at \$30,576,367; the production of frozen fishery products, excluding packaged products amounted to 117,125,519 pounds, estimated to be valued at \$7,800,000; and fresh and frozen packaged fish and shellfish, 216,661,255 pounds, valued at \$27,243,645. Based on surveys for 1938 in all sections except the Mississippi River area, and for 1931 in that area, the production of cured fishery products amounted to 102,617,256 pounds, valued at \$14,865,530. It is estimated that about 680,000,000 pounds of fresh fishery products (excluding packaged fish and shellfish) valued at about \$50,000,000 were marketed during 1938. The total marketed value to domestic primary handlers of all fishery products in 1938 is estimated at \$214,000,000.

New England States.—In 1938 the commercial catch of fishery products in these States showed an appreciable decrease in both the quantity and value as compared with 1937. Smaller catches of cod, hake, haddock, and sea herring chiefly contributed to the decrease, while catches of mackerel approximately doubled as compared with 1937.

A comparison of the combined vessel landings at Boston and Gloucester, Mass., and Portland, Maine, which are available for 1937 and 1938, shows that although the 1938 landings increased 3 percent in quantity, they declined 9 percent in value as compared with the preceding year.

Middle Atlantic States.—Although the yield of the commercial fisheries in the Middle Atlantic States during 1938 was less than in 1937, the value of the products landed showed an increase. Fewer

fishermen and fishing vessels operated in 1938 than in 1937, and the value of the manufactured fishery products showed a marked decline as compared with 1937. The catch of shad in the Hudson River likewise decreased.

Chesapeake Bay States.—In 1938 the catch of fishery products in these States increased both in volume and value. Catches of alewives, croaker, and spot increased, as did the catch of all species of shellfish taken in this section. The value of menhaden products produced in Virginia, and of fresh-shucked oysters in both States, decreased as compared with 1937, while the total value of salted alewives and fresh-cooked crab meat increased.

South Atlantic and Gulf States.—As compared with 1937, the 1938 catch of fishery products in the South Atlantic and Gulf States sharply increased in poundage; however, the value of the catch declined. The catch of menhaden, a low-priced fish, materially increased, while the catch of oysters and shrimp decreased. Likewise, the value of manufactured fishery products declined owing mainly to a decrease in the pack of canned oysters and shrimp, and in the production of fresh-cooked crab meat.

Pacific Coast States.—The commercial catch of fishery products in the three Pacific Coast States in 1938 declined both in volume and value as compared with the previous year. The 1938 production of canned sardines, tuna, and salmon was less than in 1937; however, the pack of canned mackerel and oysters increased. Although the production of pilchard meal and oil was greater than in the previous year, the combined value of these products was less.

Lake States.—In 1938 the yield of the commercial fisheries of the Lake States decreased in volume, but increased in value. The value of manufactured products, which consist largely of smoked, and fresh and frozen packaged fish, increased as compared with 1937.

Mississippi River and tributaries.—The most recent complete statistics of the catch of the Mississippi River and tributaries are those collected for 1931. As compared with 1922, when the most recent preceding survey was made, there was a decrease in the catch. The decrease was caused principally by a smaller catch of fresh-water mussels. A survey made for Lakes Pepin and Keokuk, and the Mississippi River between these lakes, for 1938, revealed an increase in the catch of fishery products in Lake Pepin and the Mississippi River between these lakes, but a decrease in the catch in Lake Keokuk as compared with the previous year. The production of fresh-water mussel-shell buttons declined in 1938 as compared with 1937.

Alaska.—The catch of fishery products in Alaska in 1938 decreased both in poundage and in value as compared with 1937. A slight decline occurred in the yield of the salmon and herring fisheries as well as in the production of shellfish. The value of cured and frozen fishery products increased while fresh and canned products and byproducts decreased in value as compared with the previous year.

*Fisheries of the United States and Alaska, 1938*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.....	581,198	12,014	181,814	3,827	202,823	2,590	433,896	5,822	1,406,320	23,987
Shellfish, etc.....	50,322	6,281	35,044	4,422	91,771	4,073	187,962	7,252	29,565	2,099
Total.....	631,520	18,275	216,858	8,249	294,594	6,663	621,858	13,074	1,525,885	26,086

Product	Lakes		Mississippi River and tributaries		Alaska		Total	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Fish.....	81,219	6,076	44,062	2,257	791,423	11,881	3,812,755	68,454
Shellfish, etc.....	305	7	38,321	640	2,520	159	435,816	24,913
Whale products.....					4,874	180	4,874	180
Total.....	81,524	6,083	82,383	2,897	798,823	12,220	4,263,445	93,547

NOTE.—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 whose principal fishing ports are in the respective areas but at times they may fish elsewhere.

OPERATING UNITS: BY SECTIONS

Item	New England	Middle Atlantic	Chesapeake	South Atlantic and Gulf	Pacific
Fishermen:					
On vessels.....	Number 5,123	Number 2,357	Number 2,537	Number 4,505	Number 9,235
On boats and shore.....	15,125	5,192	12,760	25,023	14,400
Total.....	20,248	7,549	15,297	29,588	23,635
Vessels:					
Steam.....	20	7	25		1
Net tonnage.....	3,215	884	2,880		32
Motor.....	645	398	179	1,042	1,341
Net tonnage.....	19,313	6,951	2,805	12,656	39,125
Sail.....		4	137	73	3
Net tonnage.....		36	1,703	691	1,421
Total vessels.....	665	409	341	1,115	1,845
Total net tonnage.....	22,528	7,871	7,388	13,347	40,578
Boats:					
Motor.....	4,510	1,631	5,993	7,132	5,583
Other.....	4,490	2,442	5,285	9,083	989
Accessory boats.....	661	111	99	229	924
Apparatus:					
Haul seines.....	84	211	326	902	226
Purse seines.....	99	32	33	56	613
Lampara nets.....					233
Otter trawls.....	509	215	28	3,463	74
Beam trawls.....					21
Paranzella nets.....					12
Gill nets.....	6,856	3,594	8,991	10,292	3,980
Trammel and bar nets.....					985
Pound nets, trap nets, and weirs.....	524	412	2,419	2,762	38
Stop nets.....	53	68			
Fyke nets.....	140	1,416	2,900	665	1,660
Bag nets.....	138				9
Other nets ²	498	285	1,624	7,697	628
Hooks, baits, or snoods.....	2,687,707	493,669	2,145,820	1,127,219	1,439,654
Fish wheels.....				8	
Eel pots and traps.....	3,945	3,529	14,970	1,750	
Brush traps.....				29,600	
Lobster pots and traps.....	302,510	16,323			
Crab, crawfish, and turtle pots and traps.....	5,834	10	830	10,494	38,520

¹ All figures are for 1938, except those for the Mississippi River and tributaries, which are for 1931.

² Includes dip, push, reef, crab, drag, cast, and drop nets.

Fisheries of the United States and Alaska, 1938—Continued

OPERATING UNITS: BY SECTIONS—Continued

Item	New England	Middle Atlantic	Chesapeake	South Atlantic and Gulf	Pacific
Apparatus—Continued.	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Clam dredges.....	102	105		1	
Crab dredges.....		74	296		
Mussel dredges.....	4	8			
Oyster dredges.....	150	235	447	864	2
Scallop dredges.....	3,270	56		54	
Crab scrapes.....			784		
Tongs, rakes, shovels, hoes, forks, picks, and grabs.....	6,757	3,878	6,967	3,440	5,846
Diving outfits.....				72	18
Other apparatus ¹	1,453	10,817	450	6,816	436

Item	Lakes	Mississippi River and tributaries	Alaska	Total
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	1,616		11,007	36,440
On boats and shore.....	5,360	15,884		93,744
Total.....	6,976	15,884	11,007	130,184
Vessels:				
Steam.....	44		5	102
Net tonnage.....	1,019		417	8,447
Motor.....	425		830	4,860
Net tonnage.....	5,003		11,364	97,217
Sail.....				217
Net tonnage.....				3,851
Total vessels.....	469		835	5,179
Total net tonnage.....	6,022		11,781	109,515
Boats:				
Motor.....	1,662	4,426	1,682	32,619
Other.....	1,659	10,120	3,403	37,471
Accessory boats.....				2,024
Apparatus:				
Haul seines.....	325	1,013	155	3,242
Purse seines.....			722	1,556
Lampara nets.....				233
Otter trawls.....			1	4,290
Beam trawls.....			7	28
Paranzella nets.....				12
Gill nets.....	177,167	101	4,719	215,700
Trammel and bar nets.....	116	518		1,663
Pound nets, trap nets, and weirs.....	11,199	374	465	18,193
Stop nets.....				121
Fyke nets.....	2,905	32,541		42,227
Bag nets.....				147
Other nets ²		191	100	11,023
Hooks, baits, or snoods.....	3,685,250	2,459,179	(³)	14,038,498
Fish wheels.....			241	247
Eel pots and traps.....				24,194
Brush traps.....				29,600
Lobster pots and traps.....				318,833
Crab, crawfish, and turtle pots and traps.....	740	456	2,193	59,077
Clam dredges.....				208
Crab dredges.....				370
Mussel dredges.....		440		452
Oyster dredges.....				1,745
Scallop dredges.....				3,380
Crab scrapes.....				784
Tongs, rakes, shovels, hoes, forks, picks, and grabs.....	19	3,994		30,901
Diving outfits.....				90
Crowfoot bars.....	62	4,480		4,542
Other apparatus ⁴		3,781		23,783

¹ Includes persons in boats and shore fisheries.² Includes dip, push, reef, crab, drag, cast, and drop nets.³ Number not determined.⁴ Includes periwinkle, cockle, and fish pots; harpoons, spears, hooks, coquina scoops, octopus and slat traps, and wire baskets.

NOTE.—The South Atlantic and Gulf section includes the fisheries of Lake Okeechobee, Fla.

Fisheries of the United States and Alaska, 1938--Continued

CATCH: BY SECTIONS

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

Species	New England		Middle Atlantic		Chesapeake		South Atlantic and Gulf		Pacific	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
FISH	4,307	20	122	2	23,087	215	11,611	114		
Alewives.....			1	(^o)			24	1		
Amberjack.....	61	1	10	(^o)					735	9
Anchovies.....			1	(^o)						
Angelfish.....							1	(^o)		
Barracuda.....							(^o)	(^o)	2,530	159
Black bass.....					93	10				
Bluefish.....	121	11	1,291	111	354	22	6,393	306		
Blue runner or hard-tail.....							749	9		
Bonito.....	28	3	805	31	42	1	11	(^o)		
Bowfin.....							5	(^o)		
Buffalo fish.....							60	2		
Butterfish.....	1,680	69	8,599	306	3,205	45	15	(^o)		
Cable or crab eater.....					23	1	8	(^o)		
Cabrilla.....									145	7
Carp.....	35	2	628	43	824	50	225	3	130	4
Catfish and bullheads.....			182	12	1,181	44	4,961	178	312	41
Cigarfish.....							9	(^o)		
Cod.....	118,385	2,211	10,848	469	(^o)	(^o)			10,352	142
Crappie.....					3	(^o)	561	19		
Crevalle.....	1	(^o)					190	4		
Croaker.....	1,729	32	6,987	72	46,310	599	6,692	98		
Cunner.....	90	1		(^o)						
Cusk.....	7,545	130	(^o)	(^o)						
Dolphin.....							3	(^o)		
Drum:										
Black.....			1	(^o)	126	1	1,859	56		
Red or redfish.....	2	(^o)	6	(^o)	136	2	3,303	173		
Eels:										
Common.....	514	28	376	31	295	27	123	4		
Conger.....	126	3	38	1	4	(^o)				
Flounders.....	46,836	1,571	14,908	804	838	46	1,035	64	15,401	739
Flying fish.....									63	2
Frigate mackerel.....	2	(^o)	72	1						
Gizzard shad.....			(^o)	(^o)	562	7	63	1		
Goosefish.....	(^o)	(^o)	3	(^o)						
Groupers.....			17	1			4,814	151	68	3
Grunts.....							54	1		
Haddock.....	157,935	3,453	11,109	414						
Hake.....	23,827	321	365	9	12	(^o)			36	(^o)
Halibut.....	1,972	206	48	6					23,900	1,931
Hardheads.....									13	1
Harvestfish or "starfish".....					490	8	429	13		
Herring, sea.....	21,047	191	1,176	7					872	7
Herring smelt.....	(^o)	(^o)								
Hokory shad.....	7	(^o)	29	(^o)	167	3	156	4		
Hogchoker.....					2	(^o)				
Hogfish.....					(^o)	(^o)	45	1		
Horse mackerel.....									4,134	46
Jewish fish.....							136	6		
Kingfish (California).....									493	13
Kingfish or "king mackerel".....			140	5			3,607	137		
King whiting or "kingfish".....	7	(^o)	105	4	265	11	2,084	58		
Lamprey.....	2	(^o)								
Launce.....			(^o)	(^o)						
"Lingcod".....									3,810	105
Mackerel.....	39,346	1,165	3,923	148	20	1			79,848	859
Menhaden.....	328	2	86,941	340	95,053	361	303,122	825		
Minnows.....	(^o)	(^o)								
Mofarra.....							333	3		
Moonfish.....							(^o)	(^o)		
Mullet.....			85	3	27	1	36,139	1,193	4	(^o)
Muttonfish.....							283	18		
Paddlefish or spoonbill cat.....							40	4		
Permit.....							16	(^o)		
Piefish.....							71	1		
Plke or pickrel.....					46	7		(^o)		
Pilchard or sardine.....							1	(^o)	1,110,401	6,812
Pinfish.....							24	(^o)		

¹ Less than 500 pounds or dollars.

Fisheries of the United States and Alaska, 1938—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	
	Quantity	Value	Quantity	Value	Quantity ^(*)	Value ^(*)	Quantity	Value	Quantity	Value
FISH—continued										
Pollock	40,287	449	407	8			807	165	1	(*)
Pompano									286	10
Rock bass									4,500	191
Rockfishes										
Rosefish	65,005	803							28	1
Rudderfish									3,309	137
Sablefish										
Salmon:										
Atlantic	16	5								
Blueback, red, or sockeye									10,891	845
Chinook or king									24,359	2,884
Chum or keta									12,331	266
Humpback or pink									39	1
Silver or coho									16,615	930
Sand perch			1	(*)	7	(*)				
Sculpin									155	9
Scup or porgy	11,804	275	7,442	123	2,306	38	59	2		
Sea bass	3,727	155	2,249	126	344	15	203	11		
Sea bass, black (California)										408
Sea bass, white (California)										620
Sea catfish							221	6		
Sea robin	373	4	85	1	3	(*)				
Shad	503	30	3,591	285	4,207	394	1,418	217	1,798	68
Sharks, including grayfish	198	5	243	3	237	3	3,682	24	8,092	141
Sheepshead:										
Fresh-water							5	(*)		
Salt-water							976	31	72	3
Silversides			2	(*)						
Skates	354	4	139	1	9	(*)				528
Skipper or "billfish"		(*)	(*)	(*)						
Smelt	767	68							4,092	150
Snapper:										
Lane							2	(*)		
Mangrove							296	10		
Red			32	2			8,110	586		
Snook or sergeantfish							617	21		
Spadefish							11	(*)		
Spanish mackerel			10	1	457	31	7,225	337	13	1
Spilltail									11	(*)
Spot	8	(*)	186	3	3,928	74	6,180	100	1	(*)
Squaifish										
Squetegus or "sea trout":										
Gray	339	10	7,543	240	13,617	261	5,100	196		
Spotted					402	33	7,239	541		
White							249	0		
Squirrel hake			182	2						
Steelhead trout									2,264	140
Striped bass	301	29	311	37	2,869	232	523	49	44	2
Sturgeon	11	1	10	2	16	2	72	8	112	3
Suckers	124	3	91	4	4	(*)	2	(*)	(*)	(*)
Sunfish			1	(*)	9	(*)	868	31		
Surfshes (perch)									313	12
Swellfish			58	2	34	1	1	(*)		
Swordfish	2,088	350	51	10					722	81
Tautog	198	7	44	1	2	(*)	1	(*)		
Tenpounder							370	7		
Tilfish	367	14	808	25						
Tomcod	19	1	5	(*)	7	(*)			3	(*)
Tripletail							18	(*)		
Tuna and tunalike fishes:										
Albacore									17,726	960
Bluefin	1,567	58	256	10			1	(*)	17,728	983
Bonito									7,753	280
Skipjack									22,654	1,133
Yellowfin									78,318	4,705
Turbot							2	(*)		
Whitebait									107	7
Whitefish, common									68	4

* Less than 500 pounds or dollars.

Fisheries of the United States and Alaska, 1938—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	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
FISH—continued										
White perch.....	2	(^o)	71	5	727	26	145	6		
Whiting.....	25,095	274	10,184	114	140	3				
Wolfish.....	2,612	49	6	(^o)						
Yellow perch.....	19	(^o)	11	1	245	15	9	(^o)		
Yellowtail:										
Atlantic.....							169	14		
Pacific.....									6,812	253
Miscellaneous.....									285	6
Total.....	581,198	12,014	181,814	3,827	202,823	2,590	433,896	5,822	1,406,320	23,987
SHELLFISH, ETC.										
Crabs:										
Hard.....	2,048	52	1,684	61	49,390	871	25,154	347	12,899	658
King or "horse-shoe".....			2,541	6						
Soft and peelers.....	(^o)	(^o)	439	135	5,681	436	377	56		
Stone.....							54	12		
Crawfish.....									94	8
Lobsters:										
Common.....	11,408	2,143	574	102	2	(^o)				
Spiny.....							328	23	1,198	179
Shrimp.....	105	8	125	21	8	1	140,150	4,545	1,872	40
Abalone.....									424	92
Clams:										
Coquina.....							16	(^o)		
Hard.....	4,720	493	5,193	773	2,863	385	1,105	100	875	69
Pismo.....									54	11
Razor.....	513	14							1,228	212
Soft.....	12,735	844	1,246	88	2	1			28	6
Surf.....	1	(^o)	1,614	72						
Mixed.....									93	8
Limpets.....	1	(^o)								
Conchs.....			7	1			8	(^o)		
Mussels, sea.....	24	1	243	18	30	1				
Octopus.....									97	5
Oysters, market:										
Eastern, public.....	135	24	545	111	22,428	1,442	13,078	681		
Eastern, private.....	8,503	1,530	15,599	2,585	10,984	928	0,603	389	48	18
Pacific.....									8,734	562
Western.....									275	188
Periwinkles and "cockles".....	94	5								
Scallops:										
Bay.....	1,227	385	21	6			167	10	20	5
Sea.....	5,850	622	3,059	350						
Squid.....	2,153	20	2,047	34	363	4			1,615	37
Sea urchins.....	97	(^o)								
Terrapin.....					9	3	18	3		
Turtles.....	3	(^o)	58	4	11	1	298	6		
Irish moss.....	177	16								
Kelp.....	120	1								
Sponges.....							606	1,071		
Bloodworms.....	143	41	22	21						
Sandworms.....	256	53	27	25						
Tropang.....									11	1
Total.....	50,322	6,261	35,044	4,422	91,771	4,073	187,962	7,252	20,565	2,090
Grand total.....	631,520	18,275	216,858	8,249	294,594	6,663	621,858	13,074	1,525,885	26,086

* Less than 500 pounds or dollars.

Fisheries of the United States and Alaska, 1938—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								
Alewives							39, 127	351
Amberjack							25	1
Anchovies							806	10
Angelfish							1	(⁶)
Barracuda							2, 530	169
Black bass			14	2			107	12
Bluefish							8, 159	450
Blue pike	8, 718	594					8, 718	594
Blue runner or hardtail							749	9
Bonito							886	35
Bowfin	6	(⁶)	428	9			439	9
Buffalofish			15, 772	688			15, 832	690
Burbot	358	6					358	6
Butterfish							13, 699	420
Cable or crab eater							31	7
Cabrilla							145	1
Carp	4, 859	170	11, 892	455			18, 533	727
Catfish and bullheads	791	58	10, 267	878			17, 694	1, 211
Chubs	5, 852	703					5, 852	703
Cigarfish							9	(⁶)
Cisco	846	103					846	103
Cod					960	5	140, 545	2, 827
Crappie	(⁶)	(⁶)	41	3			605	22
Crevalle							191	4
Croaker							60, 718	801
Cunner							92	1
Cusk							7, 545	130
Dolly Varden trout					91	7	91	7
Dolphin							3	(⁶)
Drum:								
Black							1, 988	57
Red or redfish							3, 446	175
Eels:								
Common	44	3	7	1			1, 859	94
Conger							168	4
Flounders					258	7	79, 276	3, 231
Flying fish							63	2
Frigate mackerel							74	1
Garfish	6	(⁶)	73	1			79	1
Gizzard shad							625	8
Goldfish	215	9					215	9
Goosefish							3	(⁶)
Groupers							4, 899	155
Grunts							54	1
Haddock							169, 044	3, 867
Hake							24, 240	330
Halibut					19, 366	981	45, 256	3, 124
Hardheads							13	1
Harvestfish or "starfish"							919	21
Herring:								
Lake	20, 523	635					20, 523	635
Sea					179, 735	899	202, 829	1, 104
Herring smelt							(⁶)	(⁶)
Hickory shad							359	7
Hogchoker							2	(⁶)
Hogfish							45	1
Horse mackerel							4, 134	46
Jewfish							136	5
Kingfish (California)							493	13
Kingfish or "king mackerel"							3, 807	142
King whiting or "kingfish"							2, 401	73
Lake trout	9, 360	1, 497					9, 360	1, 497
Lamprey							2	(⁶)
Louche							(⁶)	(⁶)
"Lingcod"					2	1	3, 812	106
Mackerel							123, 137	2, 173
Menhaden							485, 474	1, 528
Minnows			1	(⁶)			1	(⁶)
Mojarra							333	8
Mooneye	11	1	3	(⁶)			14	1
Moonfish							(⁶)	(⁶)
Mullet							36, 255	1, 197

⁶ Less than 500 pounds or dollars.

Fisheries of the United States and Alaska, 1938—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								
Muttonfish.....							233	18
Paddlefish or spoonbill cat.....			951	43			991	47
Permit.....							16	(^o)
Pigfish.....							71	1
Pike or ploverel.....	231	19	5	(^o)			233	26
Pilchard or sardine.....							1,110,401	6,312
Pinfish.....							24	(^o)
Pollock.....							40,694	457
Pompano.....							808	165
Quillback.....			268	11			268	11
Rock bass.....	38	2					324	18
Rockfishes.....					7	(^o)	4,513	191
Rosefish.....							65,005	803
Rudderfish.....							28	1
Sablefish.....					1,290	39	4,599	176
Salmon:								
Atlantic.....							16	5
Blueback, red, or sock-eye.....					234,203	5,027	245,094	5,872
Chinook or king.....					18,554	466	42,913	2,650
Oum or keta.....					76,770	754	89,101	1,020
Humpback or pink.....					235,937	3,193	235,976	3,194
Silver or coho.....					24,242	602	40,867	1,432
Sand perch.....							8	(^o)
Sauger.....	935	91	2	(^o)			937	91
Sculpin.....							155	9
Scup or porgy.....							20,951	438
Sea bass.....							6,523	307
Sea bass, black (California).....							408	24
Sea bass, white (California).....							629	54
Sea catfish.....							221	6
Sea robin.....							461	5
Shad.....							11,517	995
Sharks, including grayfish.....							12,452	176
Sheepshead:								
Fresh-water.....	3,417	101	3,905	143			7,327	244
Salt-water.....							1,048	34
Silversides.....							2	(^o)
Skates.....							1,030	10
Skipper or "billfish".....							1	(^o)
Smelt.....	1,846	65					6,705	273
Snapper:								
Lane.....							2	(^o)
Mangrove.....							296	10
Red.....							8,142	688
Snook or sergeantfish.....							617	21
Spadefish.....							11	(^o)
Spanish mackerel.....							7,705	370
Splittail.....							11	(^o)
Spot.....							10,300	177
Squawfish.....							1	(^o)
Squeteagues or "sea trout":								
Gray.....							26,599	707
Spotted.....							7,041	574
White.....							249	9
Squirrel hake.....							162	140
Steelhead trout.....	1	(^o)			8	(^o)	2,273	140
Striped bass.....							4,048	349
Sturgeon.....	31	10					252	26
Sturgeon, shovelnose.....			88	8			88	8
Suckers.....	5,002	154	315	13			5,336	174
Sunfish.....	44	3	22	1			944	35
Surfscapes (perch).....							313	12
Swellfish.....							93	3
Swordfish.....							2,861	441
Tautog.....							245	8
Tanpounder.....							370	7
Tilfish.....							1,175	89
Tomcod.....							34	1
Tripletail.....							18	(^o)
Tullibees.....	878	44					878	44

^o Less than 500 pounds or dollars.

Fisheries of the United States and Alaska, 1938—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								
Tuna and tunalike fishes:								
Albacore.....							17,726	986
Bluefin.....							19,552	1,051
Bonito.....							7,753	286
Skipjack.....							22,654	1,133
Yellowfin.....							78,318	4,705
Turbot.....							2	(⁶)
Whitebass.....	736	43	3	(⁶)			739	43
Whitebait.....							107	7
Whitefish:								
Common.....	3,302	659					3,370	663
Menominee.....	153	15					153	15
White perch.....							945	37
Whiting.....							35,410	391
Wolfish.....							2,018	49
Yellow perch.....	8,017	602					8,301	618
Yellow pike.....	4,999	499	5	1			5,004	500
Yellowtail:								
Atlantic.....							169	14
Pacific.....							6,812	253
Miscellaneous.....							285	6
Total.....	81,219	6,076	44,062	2,257	791,423	11,881	3,812,755	68,454
SHELLFISH, ETC.								
Crabs:								
Hard.....					886	81	92,061	2,070
King (Pacific coast).....					49	5	49	5
King or "horseshoe".....							2,541	6
Soft and peelers.....							6,497	627
Stone.....							54	12
Crawfish.....	6	1	29	(⁶)			129	9
Lobsters:								
Common.....							11,984	2,245
Spiny.....							1,526	202
Shrimp.....			40	4	792	34	143,101	4,653
Abalone.....							424	92
Clams:								
Coquina.....							16	(⁶)
Hard.....					14	(⁶)	14,779	1,820
Pismo.....							54	11
Razor.....					785	39	2,526	265
Soft.....							14,011	939
Surf.....							1,015	72
Mixed.....							93	8
Limpets.....							1	(⁶)
Conchs.....							15	1
Mussels, sea.....							207	20
Mussel shells.....	299	6	37,255	422			37,554	428
Octopus.....							97	5
Oysters, market:								
Eastern, public.....							36,186	2,258
Eastern, private.....							41,737	5,450
Pacific.....							8,734	562
Western.....							275	183
Periwinkles and "cockles".....							94	5
Scallops:								
Bay.....							1,435	415
Sea.....							8,909	981
Squid.....							6,178	104
Sea urchins.....							97	(⁶)
Terrapin.....			19	(⁶)			46	6
Turtles.....			94	3			464	14
Frogs.....			875	131			875	131
Irish moss.....							177	18
Kelp.....							120	1
Sponges.....							606	1,071
Pearls and slugs.....		(⁶)		80				80
Bloodworms.....								62
Sandworms.....								283
Trepang.....							11	1
Total.....	305	7	38,321	640	2,523	159	435,816	24,913

⁶ Less than 500 pounds or dollars.

Fisheries of the United States and Alaska, 1938—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
WHALE PRODUCTS ¹								
Meal.....					1,224	21	1,224	21
Oil, sperm.....					1,364	55	1,364	55
Oil, whale.....					2,286	104	2,286	104
Total.....					4,874	180	4,874	180
Grand total.....	81,524	6,083	82,383	2,897	798,823	12,220	4,253,445	93,547

CATCH: BY STATES

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

States	Marine and coastal rivers		Mississippi River and tributaries		Lakes ²		Total	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Alabama.....	10,917	449	1,822	33			12,739	482
Arkansas.....			16,733	411			15,733	411
California.....	1,294,520	17,055					1,294,520	17,055
Connecticut.....	11,838	1,420					11,838	1,420
Delaware.....	17,507	144					17,507	144
Florida.....	238,103	4,908			2,335	80	241,443	4,988
Georgia.....	19,835	381					19,835	381
Illinois.....			14,263	307	1,155	157	15,418	524
Indiana.....			7,718	157	763	66	8,481	223
Iowa.....			7,778	302			7,778	302
Kansas.....			455	17			455	17
Kentucky.....			1,622	61			1,622	61
Louisiana.....	103,883	3,391	19,213	995			123,096	4,386
Maine.....	67,207	2,521					67,207	2,521
Maryland.....	57,203	2,260					57,203	2,260
Massachusetts.....	537,850	13,169					537,850	13,169
Michigan.....					28,838	2,265	28,838	2,265
Minnesota.....			3,498	138	8,203	291	11,701	429
Mississippi.....	14,200	603	2,650	123			16,910	726
Missouri.....			928	77			928	77
Nebraska.....			145	16			145	16
New Hampshire.....	796	109					796	109
New Jersey.....	108,095	2,908					108,095	2,908
New York.....	91,217	5,193			2,376	209	93,593	5,402
North Carolina.....	198,705	1,950					198,705	1,950
Ohio.....			185	7	22,040	1,503	22,225	1,510
Oklahoma.....			40	4			40	4
Oregon.....	71,728	2,400					71,728	2,400
Pennsylvania.....	39	4			2,674	268	2,713	272
Rhode Island.....	13,820	1,056					13,820	1,056
South Carolina.....	7,911	274					7,911	274
South Dakota.....			114	11			114	11
Tennessee.....			3,435	104			3,435	104
Texas.....	24,844	1,036	139	6			24,983	1,042
Virginia.....	237,331	4,403					237,331	4,403
Washington.....	169,631	6,632					169,631	6,632
Wisconsin.....			2,045	68	15,475	1,325	18,120	1,393
Alaska.....	798,823	12,220					798,823	12,220
Total.....	4,087,203	84,486	82,383	2,897	83,850	6,164	4,263,445	93,547

¹ The weight of whales caught was not determined; therefore, the weight of manufactured products is shown.

² 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.

NOTE.—This table does not include data on the whale fishery conducted by United States enterprise in the Southern Hemisphere. There were 7,254,300 gallons of whale oil, valued at \$3,026,831, produced in this fishery during 1938.

Fisheries of the United States and Alaska, 1938—Continued

SEED OYSTER FISHERY

Item	New England		Middle Atlantic		Chesapeake		Total	
OPERATING UNITS								
Fishermen:	<i>Number</i>		<i>Number</i>		<i>Number</i>		<i>Number</i>	
On vessels.....	185		1,440		42		1,667	
On boats and shore:								
Regular.....	81		126		1,260		1,467	
Casual.....	93		31		138		262	
Total.....	359		1,597		1,440		3,396	
Vessels:								
Steam.....	3						3	
Net tonnage.....	279						279	
Motor.....	17		13		14		44	
Net tonnage.....	415		267		74		756	
Sail.....	21		118				139	
Net tonnage.....	155		2,713				2,868	
Total vessels.....	41		131		14		186	
Total net tonnage.....	849		2,980		74		3,903	
Boats:								
Motor.....	23		102		542		667	
Other.....	104		32		162		298	
Apparatus:								
Dredges.....	182		255				437	
Yards at mouth.....	161		333				494	
Tongs.....	96		157				253	
Rakes.....	27						27	
CATCH								
Oysters, seed:	<i>Bushels</i>	<i>Value</i>	<i>Bushels</i>	<i>Value</i>	<i>Bushels</i>	<i>Value</i>	<i>Bushels</i>	<i>Value</i>
Public, spring.....	90,812	\$60,913	1,616,678	\$496,882	613,800	\$122,890	2,321,290	\$680,685
Public, fall.....	28,822	23,396	7,108	5,983	620,340	109,068	656,270	138,447
Private, spring.....	328,061	335,063	29,800	32,553			357,861	367,596
Private, fall.....	25,379	24,161	20,533	23,113			45,912	47,274
Total.....	473,074	443,533	1,674,119	558,511	1,234,140	231,958	3,381,333	1,234,002

NOTE.—Of the total number of persons fishing for seed oysters, 2,367 are duplicated among those fishing for market oysters or other species. Similarly the following craft and gear are duplicated: 11 motor vessels, 72 sailing vessels, 343 motorboats, 277 other boats, 162 dredges, 556 tongs, and 135 rakes.

Yield of the fisheries of the United States, 1938:¹ By gear

Gear	New England		Middle Atlantic		Chesapeake	
	Pounds	Value	Pounds	Value	Pounds	Value
Purse seines.....	33,813,700	\$933,366	84,558,600	\$390,972	63,612,000	\$358,769
Haul seines.....	1,376,100	37,973	1,612,100	107,725	10,842,500	293,560
Stop seines.....	10,183,600	109,680				
Gill nets.....	22,416,700	370,709	4,697,500	307,420	1,525,700	118,849
Lines.....	60,082,900	1,449,623	6,993,800	308,798	44,010,700	782,232
Pound nets.....	22,370,400	344,183	40,723,300	858,082	84,735,700	1,508,100
Floating traps.....	8,271,300	169,103				
Other traps.....	71,700	5,449			16,200	389
Wells.....	5,770,000	48,308	1,176,000	2,806		
Stop nets.....			271,000	20,703		
Fyke nets.....	174,800	7,153	439,200	26,909	1,568,200	87,137
Dip nets.....	4,303,100	62,601	694,400	147,104	1,617,800	129,970
Cast nets.....			4,700	422		
Bag nets.....	147,900	12,250	100,000	17,000		
Push nets.....	49,100	14,624				
Otter trawls.....	412,235,400	8,164,343	45,085,900	1,795,099	10,726,000	228,750
Pots.....	13,708,100	2,211,140	2,050,600	194,624	610,600	23,552
Harpoons.....	2,290,700	355,474	51,300	9,572		
Spears.....	20,300	1,950	25,000	1,674		
Scrapes, crab.....					2,842,500	178,370
Dredges.....	15,786,500	2,458,021	21,033,500	3,022,101	13,679,700	735,322
Tongs.....	1,072,000	228,203	3,793,500	641,109	23,757,300	1,705,496
Rakes.....	2,252,600	292,357	2,072,100	249,792	2,063,600	170,020
Forks.....	8,027,300	450,631	63,700	46,840		
Hoes.....	5,857,200	525,683	870,700	54,223		
Picks.....					420,000	78,750
By hand.....	339,900	21,462	521,300	56,263	2,537,400	257,744
Total.....	631,620,300	18,275,182	216,858,500	8,240,244	294,593,900	6,662,951

Gear	South Atlantic and Gulf		Pacific		Lakes	
	Pounds	Value	Pounds	Value	Pounds	Value
Purse seines.....	300,697,000	\$814,673	1,026,100,500	\$7,713,344		
Haul seines.....	35,933,800	1,053,896	3,687,700	231,733	5,484,800	\$220,567
Gill nets.....	46,494,100	1,906,983	34,520,700	1,914,688	38,273,700	3,176,278
Trawl nets.....	8,373,800	442,090	925,100	75,930	167,100	5,080
Lines.....	47,772,900	1,608,685	208,663,200	10,972,186	2,332,200	364,813
Pound nets.....	14,530,400	375,027	1,095,400	68,383	6,016,500	555,726
Other traps.....	81,000	12,000	14,019,700	834,949	23,018,200	1,390,293
Wells.....			245,100	2,746		
Wheels.....	11,200	148				
Fyke nets.....	431,500	12,284	339,600	40,448	2,927,000	167,923
Dip nets.....	1,127,900	46,155	4,398,000	208,853		
Cast nets.....	368,400	14,807				
Bag nets.....			1,451,600	28,320		
Push nets.....	16,000	300				
Reef nets.....			476,800	27,002		
Lampara and ring nets.....			198,367,500	1,902,276		
Paranzella nets.....			12,525,200	4,595,635		
Otter trawls.....	139,751,100	4,620,134	6,147,100	175,787		
Beam trawls.....			440,300	16,693		
Pots.....	3,603,500	108,055			6,000	450
Harpoons.....			721,800	80,708		
Spears.....	517,600	33,054				
Dredges.....	11,471,900	607,059	(²)	(²)		
Tongs.....	6,806,300	462,149	11,335,000	1,074,552		
Crowfoot bars.....					225,400	4,600
Rakes.....	387,400	35,727	(³)	(³)		
Forks.....	2,900	322				
Grabs.....	1,022,900	42,423				
Picks.....					30,000	770
Hooks.....	160,600	210,062				
Diving apparatus, abalone and sponge.....	482,000	857,930	424,300	91,979		
By hand.....	1,343,900	57,540			43,600	712
Total.....	621,858,100	13,073,403	1,525,884,600	26,080,301	81,524,500	6,083,212

¹ Data are for 1938 except those for Mississippi River and tributaries which are for 1931.

² Includes the catch by drop nets and wire baskets.

³ This catch was made by scoop nets.

⁴ Includes a small catch by otter trawls.

⁵ The catch by shovels, rakes, and dredges is included with tongs.

Yield of the fisheries of the United States, 1938: By gear—Continued

Gear	Mississippi River and tributaries		Total	
	Pounds	Value	Pounds	Value
Purse seines.....			1, 538, 781, 800	\$10, 211, 143
Haul seines.....	13, 739, 657	\$574, 541	72, 706, 657	2, 519, 995
Stop seines.....			10, 183, 600	109, 688
Gill nets.....	166, 698	6, 547	148, 093, 998	7, 831, 480
Trammel nets.....	1, 134, 206	75, 615	10, 500, 206	598, 715
Lines.....	10, 140, 037	772, 245	379, 905, 737	16, 158, 482
Pound nets.....	224, 275	9, 541	172, 995, 975	3, 680, 048
Floating traps.....			8, 271, 300	169, 103
Other traps.....			37, 206, 800	2, 449, 080
Weirs.....			7, 191, 100	53, 859
Wheels.....			11, 200	148
Stop nets.....			271, 000	20, 703
Fyke nets.....	18, 507, 204	797, 130	24, 385, 504	1, 128, 984
Dip nets.....	30, 045	3, 307	12, 171, 245	597, 906
Cast nets.....			15, 363, 100	15, 229
Bag nets.....			1, 899, 500	57, 570
Push nets.....			65, 100	14, 924
Reef nets.....			476, 500	27, 092
Lampara and ring nets.....			198, 367, 500	1, 902, 276
Paranzella nets.....			12, 525, 200	595, 635
Otter trawls.....			613, 945, 500	14, 890, 113
Beam trawls.....			440, 300	16, 693
Pots.....	* 310, 455	* 26, 277	20, 409, 555	2, 559, 098
Harpoons.....			3, 063, 500	445, 754
Spears.....	2, 250	270	565, 150	38, 948
Scrapes, crab.....			2, 842, 500	178, 370
Dredges.....	3, 699, 100	40, 958	65, 070, 700	6, 864, 361
Tongs.....	1, 601, 876	21, 091	49, 355, 076	4, 122, 500
Crowfoot bars.....	20, 893, 550	265, 443	21, 119, 950	270, 043
Rakes.....	370, 130	4, 029	7, 145, 830	752, 825
Forks.....	4, 812, 737	76, 214	12, 899, 637	574, 007
Hoes.....			6, 727, 900	579, 906
Grabs.....	873, 099	130, 621	1, 595, 999	173, 044
Picks.....			450, 000	79, 520
Hooks.....			160, 600	216, 062
Diving apparatus, abalone and sponge.....			900, 300	949, 909
By hand.....	5, 877, 304	93, 528	10, 663, 404	487, 249
Total.....	82, 382, 523	2, 897, 357	3, 454, 622, 423	81, 327, 650

* Includes the catch by baskets.

Industries related to the fisheries of the United States and Alaska, 1938¹

Item	New England	Middle Atlantic	Chesapeake	South Atlantic and Gulf
Transporting:				
Persons engaged:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	241	134	1,187	325
On boats.....	65	104	-----	188
Total.....	306	238	1,187	513
Vessels:				
Motor.....	91	34	593	121
Net tonnage.....	1,485	568	6,545	1,127
Sail.....	-----	-----	-----	36
Net tonnage.....	-----	-----	-----	359
Total vessels.....	91	34	593	157
Total net tonnage.....	1,485	568	6,545	1,486
Boats.....	35	82	-----	138
Wholesale and manufacturing:				
Establishments.....	421	383	582	742
Persons engaged:				
Proprietors.....	440	179	737	770
Salaried employees.....	754	952	379	575
Wage earners:				
Average for season.....	10,068	5,065	11,728	16,822
Average for year.....	6,038	3,598	5,070	5,470
Salaries and wages paid.....	\$6,960,883	\$7,413,363	\$3,135,628	\$3,452,182
Manufactured products.....	\$10,967,143	\$16,435,934	\$9,224,417	\$11,762,783
Fishermen's manufactured products:				
Persons engaged.....	3,396	287	128	1,323
Products.....	\$1,216,024	\$347,970	\$17,009	\$264,271

Item	Pacific	Lakes	Mississippi River and tributaries	Alaska	Total
Transporting:					
Persons engaged:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	190	30	29	1,923	4,059
On boats.....	1	-----	-----	(*)	358
Total.....	191	30	29	1,923	4,417
Vessels:					
Steam.....	-----	2	-----	5	7
Net tonnage.....	-----	63	-----	18,008	18,671
Motor.....	74	15	8	396	1,332
Net tonnage.....	1,539	175	104	13,989	25,532
Sail.....	-----	-----	-----	-----	36
Net tonnage.....	-----	-----	-----	-----	359
Total vessels.....	74	17	8	401	1,375
Total net tonnage.....	1,539	238	104	82,597	44,562
Boats.....	1	-----	-----	* 718	974
Wholesale and manufacturing:					
Establishments.....	341	214	217	230	3,130
Persons engaged:					
Proprietors.....	315	146	204	15,154	90,244
Salaried employees.....	1,155	486	355		
Wage earners:					
Average for season.....	16,645	2,140	4,275		
Average for year.....	6,065	1,268	3,483	()	()
Salaries and wages paid.....	\$10,282,514	\$2,830,878	\$3,080,430	()	()
Manufactured products.....	\$48,621,239	\$3,560,743	\$2,482,729	\$40,946,478	\$152,001,466
Fishermen's manufactured products:					
Persons engaged.....	133	206	216	()	()
Products.....	\$150,872	\$104,470	\$8,751	()	()

¹ Data for Mississippi River and tributaries are for 1931 except that the value shown for manufactured products includes that of mussell-shell products for 1938.

* Included on vessels.

* Includes scows, houseboats, pile drivers, etc.

* Statistics not available.

NOTE.—Of the total number of persons engaged in the preparation of fishermen's manufactured products 5,327 have also been included as fishermen, and 1,866 of the persons shown on transporting craft have also been included as fishermen.

MANUFACTURED FISHERY PRODUCTS

The output of manufactured fishery products (canned, cured, packaged, and byproducts), in the United States and Alaska during the most recent years for which data are available was valued at \$156,131,431. Of this amount, canned products accounted for 53 percent, byproducts 20 percent, fresh and frozen packaged products 17 percent, and cured products 10 percent.

Since complete general statistical surveys were conducted for 1938 in each of the geographical sections of the United States and Alaska, except the Mississippi River area, the following compilation of manufactured fishery products consists of data for 1938 with the exception of a small quantity of salted and smoked fish produced in the Mississippi River section.

Manufactured fishery products of the United States and Alaska, 1938¹

Item	Quantity	Value
Alewives:		
Salted:		
Round.....	pounds.. 1, 114, 600	\$36, 292
Canned.....	do 5, 739, 155	120, 255
Pickled ²	do 5, 188, 900	134, 037
Spiced.....	do 2, 511, 300	400, 800
Tight-pack cut.....	do 1, 166, 350	38, 164
Tight-pack roe.....	do 58, 620	2, 369
Smoked.....	do 221, 250	10, 712
Canned.....	standard cases 52, 826	143, 558
Roe, canned.....	do 37, 641	165, 711
Oil.....	gallons 18, 681	3, 277
Amberjack, smoked.....	pounds 2, 180	545
Barracuda, fresh fillets.....	do 300, 000	44, 675
Bluefish, smoked.....	do 1, 200	216
Blue pike:		
Fresh fillets.....	do 2, 241, 095	477, 679
Frozen fillets.....	do 317, 250	65, 013
Blue runner, salted.....	do 325, 800	12, 962
Buffalofish, smoked ²	do 477, 000	113, 226
Butterfish, smoked ²	do 625, 325	156, 223
Cabrilla, fresh fillets.....	do 85, 000	16, 300
Carp, smoked ²	do 308, 017	89, 184
Catfish and bullheads, smoked.....	do 10, 400	2, 080
Chub, cisco, and tullibee, smoked ²	do 7, 130, 861	2, 030, 968
Cod:		
Fresh fillets.....	do 12, 270, 194	1, 236, 041
Frozen fillets.....	do 8, 607, 443	753, 713
Fresh sticks.....	do 310, 900	34, 865
Smoked fillets.....	do 622, 334	69, 170
Salted:		
Green ²	do 3, 888, 231	164, 004
Dry.....	do 4, 253, 922	208, 411
Boneless and absolutely boneless.....	do 9, 492, 797	1, 479, 789
Tongues.....	do 25, 220	2, 442
Roe.....	do 94	19
Stockfish.....	do 6, 678	878
Oil:		
Cod.....	gallons 4, 604	1, 308
Cod-liver.....	do 261, 558	164, 986
Croaker:		
Fresh fillets.....	pounds 142, 000	14, 230
Fresh pan-dressed.....	do 280, 000	21, 000
Cusk:		
Fresh fillets.....	do 1, 091, 785	105, 532
Frozen fillets.....	do 184, 915	14, 813
Fresh sticks.....	do 636, 300	65, 788
Salted:		
Green ²	do 1, 600	40
Boneless.....	do 121, 958	9, 145
Smoked fillets.....	do 763, 223	74, 780
Eels:		
Salted.....	do 132, 854	12, 179
Smoked ²	do 122, 938	32, 286
Flounders:		
Fresh fillets.....	do 5, 818, 521	901, 264
Frozen fillets.....	do 1, 876, 905	265, 262
Fresh steaks.....	do 420, 000	86, 500

See footnotes at end of table.

Manufactured fishery products of the United States and Alaska, 1938—Continued

Item	Quantity	Value
Grouper:		
Fresh fillets..... pounds.....	52,000	\$8,350
Fresh steaks..... do.....	421,630	69,471
Fillets, salted..... do.....	9,000	800
Smoked..... do.....	1,100	215
Haddock:		
Fresh fillets..... do.....	20,176,963	2,034,755
Frozen fillets..... do.....	21,203,405	1,382,355
Fresh sticks..... do.....	73,000	11,300
Smoked fillets..... do.....	46,300	5,450
Finnan haddie..... do.....	733,509	65,574
Finnan haddie, canned..... standard cases.....	488	7,518
Hake:		
Fresh fillets..... pounds.....	2,523,501	207,690
Frozen fillets..... do.....	351,048	20,385
Fresh sticks..... do.....	674,800	65,432
Salted:		
Green..... do.....	1,873,142	59,547
Dry..... do.....	1,020,059	57,908
Boneless and absolutely boneless..... do.....	207,538	15,095
Halibut:		
Fresh fillets..... do.....	34,500	10,150
Frozen steaks..... do.....	82,089	13,052
Salted, green..... do.....	4,900	398
Herring, lake:		
Fresh fillets..... do.....	33,905	3,579
Salted..... do.....	3,561,960	132,060
Smoked..... do.....	698,944	71,659
Herring, sea:		
Salted:		
Pickled, Scotch cure..... do.....	2,180,150	130,424
Brine salted..... do.....	382,000	11,870
Pickled in vinegar..... do.....	835,900	35,522
Norwegian cure..... do.....	192,800	5,784
Roe..... do.....	2,100	357
Roused..... do.....	416,900	12,755
Spiced..... do.....	549,438	49,828
Split..... do.....	289,500	11,177
Smoked:		
Hard bloaters..... do.....	170,050	9,749
Soft bloaters..... do.....	491,140	28,028
Unclassified bloaters..... do.....	481,530	53,940
Boneless..... do.....	1,991,214	243,087
Lengthwise..... do.....	81,100	4,367
Medium scaled..... do.....	373,538	32,931
Klippered..... do.....	223,922	39,692
Unclassified, whole..... do.....	92,900	9,100
Canned, "sardines"..... standard cases.....	671,635	2,367,045
Meal..... tons.....	17,747	592,588
Oil..... gallons.....	4,579,565	1,298,837
Hogchoker, salted..... pounds.....	11,000	500
King mackerel, smoked..... do.....	3,050	805
Lake trout:		
Fresh fillets..... do.....	74,038	23,453
Smoked..... do.....	748,044	222,217
"Lingcod," fresh fillets..... do.....	298,486	36,459
Mackerel:		
Fresh fillets..... do.....	202,302	34,332
Frozen fillets..... do.....	485,355	33,439
Salted, split, dry..... do.....	1,788,064	167,883
Smoked..... do.....	678,920	120,921
Canned..... standard cases.....	965,629	2,896,220
Meal..... tons.....	1,574	58,580
Oil..... gallons.....	86,364	25,878
Menhaden:		
Acid scrap..... tons.....	21,814	418,936
Dry scrap..... do.....	26,096	1,006,428
Meal..... do.....	13,178	570,192
Oil..... gallons.....	4,189,129	1,173,667
Mullet:		
Salted..... pounds.....	1,904,000	118,822
Roe, salted..... do.....	44,300	11,191
Smoked..... do.....	48,300	9,362
Paddlefish or spoonbill cat:		
Smoked..... do.....	276,200	168,833
Roe, salted..... do.....	1,595	812
Pilchard:		
Canned, "sardines"..... standard cases.....	2,261,678	7,102,358
Meal..... tons.....	89,927	3,437,892
Oil..... gallons.....	17,539,567	5,205,337

See footnotes at end of table.

Manufactured fishery products of the United States and Alaska, 1938—Continued

Item	Quantity	Value
Pollock:		
Fresh fillets.....	pounds..... 2,720,958	\$179,188
Frozen fillets.....	do..... 10,570,535	562,142
Salted:		
Green ?.....	do..... 438,911	11,805
Dry.....	do..... 332,225	14,985
Rockfishes, fresh fillets.....	do..... 1,176,237	182,985
Rosefish:		
Fresh fillets.....	do..... 6,066,632	478,197
Frozen fillets.....	do..... 13,085,350	1,089,318
Sablefish:		
Kipped.....	do..... 689,024	81,680
Pickled.....	do..... 100,364	4,167
Salted.....	do..... 182,740	10,107
Smoked ?.....	do..... 184,840	47,270
Salifish, smoked.....	do..... 12,040	2,206
Salmon:		
Frozen steaks.....	do..... 158,305	38,177
Dried.....	do..... 1,002,025	71,340
Salted:		
Dry.....	do..... 45,800	3,362
Mild-cured.....	do..... 12,342,010	2,447,805
Pickled.....	do..... 1,177,685	122,421
Eggs for fish food.....	do..... 7,300	365
Smoked ?.....	do..... 9,049,520	2,692,296
Kipped.....	do..... 2,728,875	468,980
Canned:		
Blueback, red, or sockeye.....	standard cases..... 2,671,396	21,707,727
Chinook or king.....	do..... 214,868	2,775,910
Chum or kota.....	do..... 845,353	3,064,549
Humpback or pink.....	do..... 3,233,258	12,484,099
Silver or coho.....	do..... 290,588	2,161,302
Steelhead trout.....	do..... 15,256	172,202
Caviar.....	do..... 1,563	28,077
Eggs for bait.....	do..... 4,656	85,348
Meal.....	tons..... 1,846	61,807
Oil ?.....	gallons..... 165,825	68,593
Sauger:		
Fresh fillets.....	pounds..... 1,089,164	231,257
Frozen fillets.....	do..... 583,780	127,594
Sea bass:		
Fresh fillets (Atlantic).....	do..... 94,000	13,880
Fresh pan-dressed (Atlantic).....	do..... 95,000	9,900
Fresh steaks (black, Pacific).....	do..... 210,000	33,600
Fresh fillets (white, Pacific).....	do..... 143,000	28,600
Shad:		
Smoked.....	do..... 185,425	37,696
Canned.....	standard cases..... 10,845	29,950
Canned, roe.....	do..... 3,015	95,909
Sharks, including grayfish, fresh fillets.....	pounds..... 50,000	5,000
Sharks:		
Fins.....	do..... 41,870	17,248
Skins.....	do..... 147,520	17,555
Liver oil.....	gallons..... 129,705	330,397
Sheepshead:		
Fresh fillets.....	pounds..... 28,338	4,234
Smoked ?.....	do..... 37,517	4,015
Snapper, red:		
Fresh fillets.....	do..... 75,824	23,268
Fresh steaks.....	do..... 14,000	3,110
Spanish mackerel:		
Fresh fillets.....	do..... 6,000	1,255
Salted.....	do..... 88,000	4,973
Smoked.....	do..... 950	178
Spot, salted.....	do..... 201,600	10,559
Squeteagues, or "sea trout":		
Fresh fillets.....	do..... 279,500	36,995
Fresh pan-dressed.....	do..... 365,000	25,800
Salted.....	do..... 13,300	1,995
Smoked.....	do..... 1,150	267
Sturgeon:		
Smoked and kippered ?.....	do..... 842,683	570,632
Roe, salted ?.....	do..... 343	335
Caviar, canned.....	standard cases..... 2,491	307,298
Suckers, smoked.....	pounds..... 1,500	150
Swellfish, fresh sticks.....	do..... 5,000	500
Swordfish, fresh steaks.....	do..... 116,400	28,280
Totouva, fresh steaks.....	do..... 1,790,000	358,000

See footnotes at end of table.

Manufactured fishery products of the United States and Alaska, 1938—Continued

Item	Quantity	Value
Tuna and tuna-like fishes:		
Canned:		
Albacore..... standard cases..	384, 185	\$2, 310, 733
Bluefin..... do.....	333, 374	1, 094, 896
Bonito..... do.....	167, 979	678, 595
Striped..... do.....	348, 254	1, 729, 108
"Tonno"..... do.....	140, 400	946, 725
Yellowfin..... do.....	1, 306, 132	7, 461, 071
Yellowtail..... do.....	83, 819	363, 908
Meal..... tons.....	9, 660	350, 031
Oil..... gallons.....	192, 515	55, 654
Wahoo, smoked..... pounds.....	900	40
White bass, fresh fillets..... do.....	22, 143	4, 093
Whitefish:		
Fresh fillets..... do.....	40, 865	14, 935
Smoked ¹ do.....	1, 839, 539	493, 819
Caviar, canned..... standard cases..	1, 052	36, 478
Whiting:		
Fresh fillets..... pounds.....	346, 646	25, 787
Frozen fillets..... do.....	830, 615	71, 762
Frozen sticks..... do.....	1, 173, 794	71, 665
Frozen pan-dressed..... do.....	5, 251, 639	192, 662
Smoked..... do.....	1, 200	240
Wolfish:		
Fresh fillets..... do.....	78, 537	7, 894
Frozen fillets..... do.....	130, 200	13, 634
Yellow perch:		
Fresh fillets..... do.....	855, 299	193, 285
Frozen fillets..... do.....	106, 812	24, 509
Yellow pike:		
Fresh fillets..... do.....	344, 859	76, 618
Frozen fillets..... do.....	83, 899	15, 723
Smoked..... do.....	2, 000	400
Crabs, hard:		
Meat, packaged, fresh-cooked..... do.....	9, 366, 122	2, 872, 532
Canned..... standard cases..	13, 037	249, 268
Dry scrap..... tons.....	1, 515	25, 135
Crab, king, Pacific, canned..... standard cases..	508	9, 747
Crab, king, "horseshoe":		
Meal..... tons.....	123	4, 215
Dry scrap..... do.....	265	9, 689
Lobsters, common, meat, packaged, fresh-cooked..... pounds.....	212, 529	228, 709
Shrimp:		
Frozen packaged..... do.....	3, 348, 500	457, 709
Cooked and peeled..... do.....	1, 478, 522	451, 269
Sun-dried..... do.....	2, 037, 209	359, 177
Smoked..... do.....	375	113
Canned..... standard cases..	1, 077, 003	4, 872, 393
Bran or meal..... tons.....	1, 598	33, 163
Abalone steaks..... pounds.....	429, 343	151, 686
Clams, hard:		
Fresh-shucked..... gallons.....	27, 194	45, 565
Canned:		
Whole..... standard cases..	20, 935	98, 337
Minced..... do.....	20, 885	116, 059
Chowder..... do.....	428, 321	1, 547, 780
Juice..... do.....	8, 329	33, 590
Broth bouillon, and cocktail..... do.....	8, 627	35, 618
Shells, ground, poultry food..... tons.....	3, 019	23, 524
Clams, razor:		
Fresh-shucked..... gallons.....	28, 280	11, 443
Canned:		
Whole..... standard cases..	3, 402	27, 514
Minced..... do.....	87, 019	683, 228
Clams, soft:		
Fresh-shucked..... gallons.....	509, 714	722, 204
Pickled..... do.....	80	160
Canned:		
Whole..... standard cases..	119, 622	439, 472
Chowder..... do.....	48, 274	156, 953
Juice..... do.....	23, 151	41, 267
Steamed ¹ pounds.....	272, 745	21, 238
Clams, mixed, fresh-shucked..... gallons.....	1, 392	1, 740
Marine-shell products:		
Buttons..... gross.....	6, 228, 339	3, 042, 893
Novelties..... do.....		554, 610
Mussel-shell, fresh-water, products:		
Buttons..... gross.....	10, 022, 452	2, 639, 804
Novelties..... do.....		15, 400
Poultry feed..... tons.....	4, 446	25, 845
Lime..... do.....	1, 111	1, 140

See footnotes at end of table.

Manufactured fishery products of the United States and Alaska, 1938—Continued

Item	Quantity	Value
Oysters:		
Eastern:		
Fresh-shucked..... gallons..	6,069,052	\$7,930,138
Canned..... standard cases..	371,003	1,422,101
Pacific:		
Fresh-shucked..... gallons..	377,703	417,031
Canned..... standard cases..	111,348	464,375
Western or native, fresh-shucked..... gallons..	27,473	216,042
Shell products:		
Poultry feed..... tons..	258,431	1,076,709
Lime and dust..... do.....	61,461	213,636
Lime, burned..... do.....	14,789	93,338
Scallops:		
Bay, fresh-shucked..... gallons..	122,133	362,858
Sea, fresh-shucked..... do.....	990,066	1,082,131
Alligator hides..... pounds..	88,356	7,363
Whale products:		
Meal (meat)..... tons..	396	15,796
Meal (bone)..... do.....	216	6,618
Oil, whale..... gallons..	7,559,100	3,120,488
Oil, sperm..... do.....	181,900	54,570
Unclassified products:		
Fillets, fresh..... pounds..	⁶ 68,200	⁶ 7,884
Fillets, frozen..... do.....	⁷ 304,766	⁷ 46,275
Pan-dressed, fresh..... do.....	⁸ 40,000	⁸ 2,780
Other packaged, fresh and frozen..... do.....	⁹ 209,716	⁹ 28,632
Salted, including spiced..... do.....	¹⁰ 1,908,675	¹⁰ 145,119
Smoked..... do.....	¹¹ 50,901	¹¹ 7,666
Canned:		
Fish for cat and dog food..... standard cases..	413,434	888,399
Fish cakes, balls, etc..... do.....	97,263	665,307
Fish flakes..... do.....	46,721	291,426
Fish paste..... do.....	3,987	143,147
Other..... do.....	¹² 55,041	¹² 440,007
Scrap, miscellaneous, dry and green..... tons..	¹³ 1,435	¹³ 38,101
Meal:		
Groundfish..... do.....	7,726	364,250
Miscellaneous..... do.....	¹⁴ 10,123	¹⁴ 425,142
Oil:		
Fur seal..... gallons..	29,865	4,157
Miscellaneous..... do.....	¹⁵ 86,817	¹⁵ 28,906
Miscellaneous liver..... do.....	¹⁶ 114,942	¹⁶ 1,980,960
Glue..... do.....	383,769	805,804
Other byproducts..... do.....	¹⁷ 86,353	¹⁷ 505,933
Total, fresh and frozen packaged products..... pounds..	216,661,255	27,243,645
Total, cured products..... do.....	102,617,250	14,865,530
Total, canned products..... do.....	667,527,840	83,445,889
Total, byproducts..... do.....		30,576,367
Grand total.....		156,131,431

¹ All data are for 1938 except for a small quantity of salted and smoked fish produced in the Mississippi River section which are for 1931.

² This is usually an intermediate product and although shown in the total may also be shown in its final stage of processing elsewhere in the table.

³ Data are for 1938 and 1931.

⁴ Data are for 1931.

⁵ Includes the production of both edible and industrial salmon oil.

⁶ Includes fresh fillets of red drum, sablefish, scup, sea robin, striped bass, suckers and swellfish.

⁷ Includes frozen fillets of croaker, halibut, lake herring, king whiting, lake trout, "lingcod," salmon, red snapper, Spanish mackerel, squeteagues, white bass, and whitefish.

⁸ Includes fresh pan-dressed king whiting, scup, and Spanish mackerel.

⁹ Includes fresh steaks of cod, sea bass, red snapper, swordfish, and wolfish; frozen steaks of cod, grouper, haddock, and pollock; fresh pollock sticks; and fresh packaged sea crawfish meat.

¹⁰ Includes dry salted barracuda, cusk, haddock, and sea bass; green salted haddock; salted boneless haddock and pollock; salted crevalle, mackerel, mackerel fillets, pilchard, salmon eggs, salmon bellies and tuna; mild-cured shad; and spiced chubs and lake herring.

¹¹ Includes smoked alewives with roe, pollock fillets, barracuda, cod, red drum, flounders, haddock, halibut, moon-eye, scup and tuna.

¹² Includes canned salted cod, kippered sturgeon, pickled eels, haddock chowder, swordfish, tuna roe, soft crabs, shrimp soup, hard clam stew, razor clam juice, coquina clam broth, pickled sea mussels, oyster soup, smoked oysters, squid, crayfish bisque, fish chowder, groundfish roe, rat poison bait, crab and shrimp gumbo, fish bouillon, shore dinners, shellfish newberg, and turtle, terrapin, and frog products.

¹³ Includes alewife, herring, shark, and miscellaneous dry scrap; and miscellaneous green scrap.

¹⁴ Includes alewife, rosefish, salmon egg, shark, clam, starfish, and miscellaneous fish meal.

¹⁵ Includes rosefish, shark and miscellaneous fish oil.

¹⁶ Includes burbot, halibut, tuna, sablefish, swordfish, and miscellaneous liver oil. A small amount of halibut viscera oil is also included.

¹⁷ Includes herring pomace, pearl essence, lime from crushed clam shells, fresh-water mussel-shell products, isinglass, and kelp products.

NOTE.—Some of the above products have been manufactured from raw products imported from another country; therefore, they cannot be correlated directly with the catch within the United States and Alaska.

CANNED FISHERY PRODUCTS AND BYPRODUCTS TRADE

The output of canned fishery products and byproducts in the United States and Alaska in 1938 was valued at \$114,022,256. Of this total, canned products comprised \$83,445,889, and byproducts \$30,576,367; a decrease of 21 percent in the value of canned products and 17 percent in the value of byproducts when compared with the respective values of the same groups of commodities for the previous year.

Fishery products were canned at 382 establishments in the United States and Alaska during 1938. The combined output of these canneries amounted to 17,004,379 standard cases. The net weight of the products canned amounted to 667,527,840 pounds.

Canned fishery products or byproducts were prepared in 26 States and in Alaska during 1938. Alaska ranked first in the value of the products, accounting for 34 percent of the total, and California ranked second, with 31 percent.

Canned fishery products and byproducts of the United States and Alaska, 1938

SUMMARY OF PRODUCTION: BY COMMODITIES

Product	Number of plants	Standard cases	Pounds	Value
Canned products:				
Salmon:				
United States.....	27	472,721	22,690,608	\$5,728,892
Alaska.....	98	6,806,998	326,735,904	36,636,897
Sardines:				
Maine.....	25	671,635	16,790,875	2,367,045
California.....	81	2,261,678	108,560,544	7,102,358
Tuna and tunaliko fishes.....	20	2,754,143	60,099,432	15,183,636
Mackerel.....	24	965,629	46,350,192	2,596,220
Alewives.....	10	52,826	2,785,648	143,558
Alowife roe.....	29	37,641	1,800,768	105,711
Shad.....	8	10,845	520,590	29,850
Shad roe.....	10	3,015	144,720	95,909
Cat and dog food.....	9	413,434	10,844,832	885,399
Fish flakes.....	4	45,721	2,194,808	291,426
Finnan haddie.....	3	46,488	23,424	7,518
Fish cakes, balls, etc.....	6	97,263	4,668,624	665,307
Fish paste.....	3	3,987	191,376	143,147
Sturgeon caviar.....	4	2,491	119,568	307,298
Whitefish roe and caviar.....	5	1,052	50,496	36,478
Salmon roe and caviar (for food).....	4	1,563	75,024	26,077
Salmon eggs (for bait).....	4	4,666	223,488	95,348
Miscellaneous fish and roe.....	14	19,792	950,016	182,729
Clam products.....	60	1,769,665	19,312,005	3,189,628
Oysters.....	42	482,441	7,236,615	1,898,476
Shrimp.....	50	1,077,003	18,118,297	4,872,963
Crabs.....	21	13,699	657,552	260,134
Turtle products.....	4	7,410	355,680	80,869
Miscellaneous shellfish, etc.....	14	26,583	1,275,984	170,486
Total.....	* 382	17,004,379	667,527,840	83,445,889
Byproducts:				
Oyster and marine clam-shell products.....		tons.....	Quantity 330,425	Value \$1,416,557
Fresh-water mussel-shell products.....				2,698,879
Marine pearl-shell products.....				4,197,503
Scrap, meal, etc.....		tons.....	205,216	7,418,163
Marine animal oils.....		gallons.....	85,140,135	13,526,015
Liquid glue.....		do.....	383,769	805,804
Miscellaneous byproducts.....				513,446
Total.....				30,576,367
Grand total.....				114,022,256

¹ "Out-out" or "drained" weights of can contents are included for whole or minced clams and gross can contents for other clam products.

² Exclusive of duplication.

Canned fishery products and byproducts of the United States and Alaska, 1938—Con.

VALUE OF PRODUCTION: BY STATES

State	Canned products	Byproducts	Total
Maine.....	\$3,319,212	\$340,060	\$3,659,272
Massachusetts.....	1,354,127	2,106,003	3,478,545
Rhode Island.....		18,415	
Connecticut.....	564,287	1,010,609	1,010,609
New York.....		4,586,870	5,151,137
New Jersey.....	1,215,126	1,692,644	3,020,702
Pennsylvania.....		112,932	
Delaware.....	606,476	364,179	1,862,872
Maryland.....	104,502	992,217	1,190,120
Virginia.....		1,085,613	
North Carolina.....	85,028	1,099,679	1,476,915
South Carolina.....	312,208		
Georgia.....	743,663	716,569	1,808,176
Florida.....	347,914		
Alabama and Mississippi.....	1,917,037	77,135	1,994,772
Louisiana.....	2,776,572	349,511	3,126,083
Texas, Illinois, Missouri, Wisconsin, and Minnesota.....	525,928	169,926	695,854
Iowa.....	3,782,575	2,169,263	2,169,263
Washington.....		1,444,398	5,206,973
Oregon.....	3,638,815	368,415	4,007,230
California.....	25,232,688	9,798,607	35,031,295
Alaska.....	37,059,161	2,073,287	39,132,438
Total.....	83,445,880	30,576,367	114,022,256

PACK OF CANNED SALMON: STANDARD CASES

Product	Alaska							
	Southeastern		Central		Western		Total	
	Cases	Value	Cases	Value	Cases	Value	Cases	Value
Chinook or king:								
1-pound tall.....	13,641	\$93,468	15,488	\$103,975	6,219	\$45,188	35,348	\$242,571
1-pound flat.....	1,450	11,890	4,381	40,887	280	2,690	6,111	55,357
½-pound flat.....	1,279	13,325	1,075	17,390	-----	-----	2,364	30,716
Total.....	16,370	118,673	20,944	162,252	6,499	47,718	43,813	328,643
Blueback, red, or sockeye:								
1-pound tall.....	125,542	911,488	384,267	2,850,896	1,823,605	13,928,747	2,338,414	17,691,131
1-pound flat.....	13,247	116,386	38,361	318,542	-----	-----	51,608	434,928
½-pound flat.....	53,802	598,554	50,618	578,628	18,222	216,029	122,642	1,393,211
4-pound flat.....	-----	-----	8,569	64,527	-----	-----	8,569	64,527
Total.....	192,591	1,626,428	481,815	3,812,593	1,846,827	14,144,776	2,521,233	19,583,797
Silver or coho:								
1-pound tall.....	132,147	807,301	69,839	428,618	345	1,937	202,331	1,237,851
1-pound flat.....	2,688	18,816	157	1,072	-----	-----	2,845	19,888
½-pound flat.....	8,930	84,746	3,092	27,921	-----	-----	12,022	112,667
4-pound flat.....	-----	-----	5,123	28,906	-----	-----	5,123	28,906
Total.....	143,765	910,863	78,211	486,511	345	1,937	222,321	1,399,811
Humpback or pink:								
1-pound tall.....	1,845,078	7,094,557	1,318,415	5,006,070	-----	-----	3,163,493	12,100,827
1-pound flat.....	-----	-----	4,105	18,317	-----	-----	4,105	18,317
½-pound flat.....	41,691	250,497	9,091	57,515	-----	-----	50,782	308,012
4-pound flat.....	-----	-----	14,498	54,767	-----	-----	14,498	54,767
Total.....	1,886,769	7,345,054	1,346,109	5,136,669	-----	-----	3,232,878	12,481,723
Chum or keta:								
1-pound tall.....	469,306	1,681,816	250,046	907,034	59,614	216,171	778,960	2,805,021
½-pound flat.....	5,147	28,969	379	2,105	-----	-----	5,523	31,074
4-pound flat.....	-----	-----	2,264	7,328	-----	-----	2,264	7,328
Total.....	474,453	1,710,785	252,686	916,467	59,614	216,171	786,753	2,843,423
Grand total.....	2,713,948	11,711,803	2,179,765	10,514,492	1,913,285	14,410,602	6,806,998	36,636,897

Canned fishery products and byproducts of the United States and Alaska, 1938—Con.

PACK OF CANNED SALMON: STANDARD CASES—Continued

Product	United States						Grand total. United States and Alaska	
	Washington		Oregon		Total			
	Cases	Value	Cases	Value	Cases	Value	Cases	Value
Chinook or King:								
1-pound tall.....	905	\$4,896	1,953	\$9,793	2,858	\$14,479	38,206	\$257,050
1-pound oval.....	24	528	572	12,584	596	13,112	596	13,112
1-pound flat.....	5,334	59,448	21,936	239,661	27,270	299,107	33,381	354,464
1/2-pound oval.....	3	80	160	4,020	153	4,100	153	4,100
1/2-pound flat.....	23,474	337,791	106,278	1,612,677	129,752	1,950,468	132,106	1,981,183
1/4-pound flat.....	213	2,215	10,213	163,788	10,426	166,001	10,426	166,001
Total.....	29,953	404,756	141,102	2,042,511	171,055	2,447,267	214,868	2,775,910
Blueback, red, or sockeye:								
1-pound tall.....	563	5,067			563	5,067	2,338,977	17,696,198
1-pound flat.....	30,359	346,093			30,359	346,093	81,967	781,021
1/2-pound flat.....	106,834	1,543,092	9,231	166,158	116,065	1,709,250	238,707	3,102,461
1/4-pound flat.....	476	9,520	2,700	54,000	3,176	63,520	3,176	63,520
4-pound flat.....							8,569	64,527
Total.....	138,232	1,903,772	11,931	220,158	150,163	2,123,930	2,671,396	21,707,727
Silver or coho:								
1-pound tall.....	29	186	78	499	107	685	202,438	1,238,536
1-pound flat.....	2,872	21,253	13,967	111,736	16,839	132,989	19,684	152,877
1/2-pound flat.....	10,594	101,702	34,153	321,038	44,747	422,740	59,769	535,407
1/4-pound flat.....			16,574	205,677	16,574	205,677	16,574	205,677
4-pound flat.....							5,123	28,905
Total.....	13,495	123,141	63,772	638,850	77,267	761,991	299,588	2,161,302
Humpback or pink:								
1-pound tall.....	13	55			13	55	3,163,506	12,100,682
1-pound flat.....	17	81			17	81	4,122	18,398
1/2-pound flat.....	350	2,240			350	2,240	51,132	310,252
4-pound flat.....							14,498	54,767
Total.....	380	2,376			380	2,376	3,233,258	12,484,099
Chum or keta:								
1-pound tall.....	22,786	82,576	31,004	111,614	53,790	194,190	832,756	2,999,211
1/2-pound flat.....	2,272	12,723	2,538	14,213	4,810	26,936	10,833	58,010
4-pound flat.....							2,264	7,328
Total.....	25,058	95,299	33,542	125,827	58,600	221,126	845,853	3,064,549
Steelhead:								
1-pound flat.....	601	4,808	1,621	12,968	2,222	17,776	2,222	17,776
1/2-pound oval.....			2,535	35,490	2,535	35,490	2,535	35,490
1/2-pound flat.....	670	6,700	5,471	54,710	6,141	61,410	6,141	61,410
1/4-pound flat.....	340	4,488	4,018	53,038	4,358	57,526	4,358	57,526
Total.....	1,611	15,996	13,646	156,206	15,256	172,202	15,256	172,202
Grand total.....	208,729	2,545,340	263,992	3,183,552	472,721	5,728,892	7,279,719	42,365,789

NOTE.—“Standard cases” represents the various sized cases converted to the equivalent of forty-eight 1-pound cans to the case. Salmon were canned at 21 plants in Washington, 6 in Oregon, and 98 in Alaska.

Canned fishery products and byproducts of the United States and Alaska, 1938—Con.

PACK OF CANNED BARDINES

Sardines (herring)	Maine		Sardines (pilchard)	California	
	Cases	Value		Cases	Value
Quarters, ¼ pound (100 cans):			1 pound:		
In olive oil.....	1,654	\$9,382	Oval:		
In cottonseed oil.....	562,640	2,018,613	In mustard (48 cans).....	222,069	\$673,768
In mustard.....	56,267	222,117	In tomato sauce (48 cans).....	1,047,044	3,165,642
In tomato sauce.....	3,914	16,764	In natural oil (48 cans).....	38,399	111,815
Three-quarters, ¾ pound (48 cans):			Tall:		
In mustard.....	32,760	100,189	In natural oil (48 cans)....	382,270	884,394
			Oval and tall:		
			In other sauces and oils (48 cans).....	12,627	40,798
			½ pound:		
			8 Z short:		
			In tomato sauce (96 cans).....	9,860	28,451
			In natural oil (96 cans)....	266,810	772,698
			Flat, oval, oblong and 8 Z short:		
			In various sauces and oils (48 cans).....	136,160	337,415
			5-ounce tall:		
			In tomato sauce (100 cans)....	30,115	94,657
			In natural oil (100 cans).....	270,886	783,081
			Other sizes:		
			In various sauces and oils (standard cases).....	18,568	209,639
Total.....	657,225	2,367,045	Total.....	2,434,806	7,102,358
Total (standard cases).....	671,635	.....	Total (standard cases).....	2,261,678	.....

NOTE.—“Standard Cases” represents the various sized cases converted to the uniform basis of one hundred ¼-pound cans to the case of sardines (herring), and forty-eight 1-pound cans to the case of sardines (pilchard).

Sardines were canned at 25 plants in Maine and 31 in California.

PACK OF CANNED TUNA AND TUNALIKE FISHES

Product and size	Albacore		Yellowfin		Bluefin		Striped	
	Cases	Value	Cases	Value	Cases	Value	Cases	Value
¼-pound (48 cans).....	29,883	\$118,206	198,472	\$781,977	33,432	\$120,599	20,391	\$71,265
¼-pound (100 cans).....	(¹)	(²)						
½-pound (48 cans).....	³ 273,802	⁴ 1,714,572	887,069	5,151,739	265,036	1,346,044	287,362	1,435,646
1-pound (48 cans).....	⁵ 22,490	⁶ 251,901	84,878	890,452	16,187	147,564	⁷ 19,046	⁸ 170,242
4-pound (12 cans).....	(¹)	(¹)	2,522	33,761			(¹)	(¹)
Total (actual cases).....	326,175	2,084,679	1,172,931	6,857,929	314,655	1,615,097	326,799	1,677,153
Total (standard cases).....	333,723	.....	1,161,095	.....	314,125	.....	335,650	.....
Flakes:								
¼-pound (48 cans)....	34,664	162,090	⁹ 118,129	¹⁰ 503,346	15,890	66,722	¹¹ 12,604	¹² 51,955
1-pound (48 cans)....	¹³ 7,899	¹⁴ 763,964	¹⁵ 713,454	¹⁶ 7100,396	¹⁷ 1,929	¹⁸ 713,077	(¹)	(¹)
Total (actual cases).....	42,563	226,054	131,583	603,742	17,319	79,799	12,604	51,955
Total (standard cases).....	50,462	.....	145,037	.....	19,249	.....	12,604	.....
Grand total (actual cases).....	368,738	2,310,733	1,304,514	7,461,671	331,974	1,694,896	339,403	1,729,108
Grand total (standard cases).....	384,185	.....	1,306,132	.....	333,374	.....	348,254	.....

See footnotes at end of table.

Canned fishery products and byproducts of the United States and Alaska, 1938—Con.

PACK OF CANNED TUNA AND TUNALIKE FISHES—Continued

Product and size	"Tonno"		Bonito		Yellowtail		Total	
	Cases	Value	Cases ⁽¹⁾	Value ⁽¹⁾	Cases ⁽¹⁾	Value ⁽¹⁾	Cases	Value
¾-pound (48 cans).....							282, 178	\$1, 092, 047
½-pound (100 cans).....	119, 004	\$846, 356	4, 078	\$25, 573			123, 682	871, 929
¼-pound (48 cans).....	15, 820	100, 369	87, 275	355, 540	51, 293	\$233, 241	1, 507, 647	10, 303, 051
1-pound (48 cans).....			33, 228	265, 452	16, 263	130, 667	192, 062	1, 856, 298
4-pound (12 cans).....							2, 522	33, 791
Total (actual cases)	135, 424	946, 725	124, 581	676, 595	67, 556	363, 908	2, 468, 121	14, 222, 086
Total (standard cases)	140, 400		157, 979		83, 819		2, 526, 791	
Flakes:								
½-pound (48 cans).....							180, 787	784, 113
1-pound (48 cans).....							23, 282	177, 437
Total (actual cases)							204, 069	961, 550
Total (standard cases)							227, 352	
Grand total (actual cases)	135, 424	946, 725	124, 581	676, 595	67, 556	363, 908	2, 672, 190	15, 183, 636
Grand total (standard cases)	140, 400		157, 979		83, 819		2, 754, 143	

¹ The pack in ¾-pound cans, 100 to the case, has been converted to the equivalent of ½-pound cans, 48 to the case.

² The pack in 4-pound cans, 12 to the case, has been converted to the equivalent of 1-pound cans, 48 to the case.

³ The pack in ¼-pound cans, 48 to the case, has been converted to the equivalent of ½-pound cans, 48 to the case.

⁴ The pack of creamed tuna in ¾-pound cans, 48 to the case, and tuna flakes in 1-pound cans, 48 to the case, have been converted to the equivalent of ½-pound cans, 48 to the case.

⁵ The pack of creamed tuna in ¾-pound cans, 48 to the case, has been converted to the equivalent of 1-pound cans, 48 to the case.

⁶ The pack in 4-pound cans, 12 to the case, has been converted to the equivalent of ½-pound cans, 48 to the case.

NOTE.—"Standard cases" represents the various sized cases converted to the equivalent of 48 ½-pound cans to the case. Tuna and tunalike fishes were canned at 15 plants in California, 1 in Washington, 3 in Oregon, and 1 in Massachusetts. The pack of all varieties of tuna and tunalike fishes in California amounted to 2,673,516 standard cases, valued at \$14,686,677, while the pack of albacore tuna in Washington and Oregon, and bluefin tuna in Massachusetts, totaled 80,627 standard cases, valued at \$496,959.

PACK OF CANNED MACKEREL

Size	Cases	Value
8-ounce (48 cans).....	10, 421	\$28, 849
8-ounce (96 cans).....	41, 869	135, 923
16-ounce (48 cans).....	902, 656	2, 592, 232
Other sizes (standard cases).....	15, 893	139, 216
Total (actual cases).....	970, 839	2, 896, 220
Total (standard cases).....	965, 629	

NOTE.—"Standard cases" represents the various sized cans converted to the equivalent of 48 1-pound cans to the case. Mackerel were canned at 2 plants in Massachusetts, and 22 in California.

PACK OF CANNED ALEWIVES AND ALEWIFE ROE: STANDARD CASES

Product	Maine, Massachusetts, Delaware, and Virginia		Maryland		North Carolina		Total	
	Cases	Value	Cases	Value	Cases	Value	Cases	Value
Alewives.....	21, 064	\$50, 492	31, 762	\$93, 066			52, 826	\$143, 558
Alewife roe.....	16, 971	70, 897	12, 132	57, 661	8, 538	\$37, 153	37, 641	165, 711
Total.....	38, 035	121, 389	43, 894	150, 727	8, 538	37, 153	90, 467	309, 269

Canned fishery products and byproducts of the United States and Alaska, 1938—Con.

PACK OF CANNED ALEWIVES AND ALEWIFE ROE: ACTUAL CASES

Product and size	Cases	Value
Alewives:		
14, 16, 17, 19 ounces (24 cans).....	⁹ 73,027	⁹ \$91,226
26 ounces (24 cans).....	24,343	52,332
Total		143,558
Alewife roe:		
8 ounces (48 cans).....	21,108	50,206
10, 14, 16, and 17 ounces (24 cans).....	¹⁰ 51,385	¹⁰ 115,565
Total		165,771
Grand total		309,329

⁹ Consists principally of 14-ounce cans. Includes 4,450 cases of 48 cans to the case.

¹⁰ Consists principally of 17-ounce cans.

NOTE.—“Standard cases” represents the various sized cases converted to the equivalent of 48 1-pound cans to the case. Alewives were canned at 1 plant in Massachusetts, 1 in Delaware, 5 in Maryland, and 3 in Virginia. Alewife roe was canned at 1 plant in Maine, 1 in Delaware, 7 in Maryland, 6 in North Carolina, and 14 in Virginia.

PACK OF CANNED OYSTERS: STANDARD CASES

State	Cases	Value
New Jersey and Maryland.....	4,967	\$20,482
South Carolina.....	79,811	297,818
North Carolina and Florida.....	16,791	60,450
Alabama and Georgia.....	28,167	105,440
Mississippi.....	180,328	714,712
Louisiana.....	61,029	223,199
Washington and Oregon.....	111,348	464,375
Total	482,441	1,886,476

PACK OF CANNED OYSTERS: ACTUAL CASES

Size	Cases	Value
3½-ounce (48 cans).....	¹¹ 20,325	¹¹ \$68,361
4-ounce (48 cans).....	12,218	45,079
5-ounce (24 cans).....	104,379	193,541
5-ounce (48 cans).....	297,346	1,143,769
8-ounce (24 cans).....	13,090	48,609
8-ounce (48 cans).....	45,584	290,239
10-ounce (24 cans).....	25,498	96,878
Total		1,886,476

¹¹ Includes the pack in 2-ounce cans, 100 to the case, which has been converted to the equivalent of 3½-ounce cans, 48 to the case.

NOTE.—“Standard cases” represents the various sized cases converted to the equivalent of 48 five-ounce cans to the case. Oysters were canned at 1 plant in New Jersey, 2 in Maryland, 1 in North Carolina, 5 in South Carolina, 1 in Georgia, 2 in Florida, 2 in Alabama, 13 in Mississippi, 3 in Louisiana, 6 in Washington, and 2 in Oregon. The pack of oyster soup and smoked oysters has not been included in the pack of oysters but has been shown under “Pack of Miscellaneous Canned Products.”

Canned fishery products and byproducts of the United States and Alaska, 1938—Con.

PACK OF CANNED CLAMS AND CLAM PRODUCTS: STANDARD CASES

Product and State	Whole		Minced		Chowder		Juice, broth, and cocktail		Total	
	Cases	Value	Cases	Value	Cases	Value	Cases	Value	Cases	Value
Soft clams:										
Maine, Massachusetts, and New Jersey.....	¹¹ 119, 622	¹² \$439, 472			¹³ 48, 274	¹³ \$156, 953	¹⁴ 23, 151	¹⁴ \$41, 267	191, 047	\$637, 692
Hard clams:										
Maryland and Florida.....	(¹⁵)	(¹⁵)	(¹⁶)	(¹⁶)	13, 205	29, 113	(¹⁷)	(¹⁷)	13, 205	29, 113
New Jersey.....					179, 133	648, 776	(¹⁷)	(¹⁷)	179, 133	648, 776
Washington.....	16, 551	66, 080	12, 948	\$60, 356	(¹⁸)	(¹⁸)	2, 507	5, 876	32, 006	132, 312
New York and Alaska.....	¹⁵ 4, 384	¹⁵ 32, 257	¹⁶ 7, 937	¹⁶ 55, 703	(¹⁹)	(¹⁹)	¹⁷ 14, 926	¹⁷ 65, 650	27, 247	153, 610
Massachusetts, Rhode Island, Pennsylvania, and Illinois.....					¹⁵ 236, 518	¹⁸ 872, 031			236, 518	372, 031
Total.....	20, 935	98, 337	20, 885	116, 059	428, 856	1, 549, 920	17, 433	71, 526	488, 109	1, 835, 842
Razor clams:										
Washington and Oregon.....	1, 879	15, 032	54, 698	449, 718			88	352	56, 665	465, 102
Alaska.....	1, 523	12, 482	32, 321	238, 510					33, 844	250, 992
Total.....	3, 402	27, 514	87, 019	688, 228			88	352	90, 509	716, 094
Grand total.....	143, 959	565, 323	107, 904	804, 287	477, 130	1, 706, 873	40, 672	113, 145	769, 665	3, 189, 628

¹¹ Packed in Maine and New Jersey.

¹² Packed in Maine and Massachusetts.

¹³ Packed in Maine.

¹⁵ A small production of whole clams in Florida has been included with the New York and Alaska production.

¹⁶ A small production of minced clams in Florida has been included with the New York and Alaska production.

¹⁷ The production of hard clam juice in New Jersey and Florida, and broth from coquina clams produced in Florida, has been included with the New York and Alaska production.

¹⁸ A small pack of hard clam chowder in Washington and New York has been included with the Massachusetts, Rhode Island, Pennsylvania, and Illinois production.

Canned fishery products and byproducts of the United States and Alaska, 1938—Con.

PACK OF CANNED CLAMS AND CLAM PRODUCTS: ACTUAL CASES

Product and size	Whole		Minced		Chowder		Juice, broth, and cocktail		Total	
	Cases	Value	Cases	Value	Cases	Value	Cases (19)	Value (19)	Cases	Value
Soft clams:										
No. 1 (48 cans)	89,761	\$327,698			15,790	\$59,532			105,551	\$387,230
1-pound (24 cans)					9,259	22,333			9,259	22,333
1-pound (48 cans)	8,956	54,292							8,956	54,292
No. 2 (24 cans)	11,999	43,810			(19)	(19)	11,741	\$18,978	23,740	62,788
No. 10 (6 cans)	(19)	(19)			(19)	(19)			1,488	2,334
Other sizes (standard cases)	3,532	13,672			25,077	75,088	9,513	19,955	38,122	108,715
Total		439,472				156,953		41,267		637,692
Hard clams:										
½-pound (48 cans)	(19)	(19)	12,823	\$46,191			(19)	(19)	12,823	46,191
No. 1 (48 cans)	1,137	9,155	2,573	14,465	231,575	822,942	2,779	13,853	238,064	960,415
1-pound (12 cans)					178,187	298,553	(19)	(19)	178,187	298,553
1-pound (48 cans)	2,735	18,682					269	1,279	3,004	19,961
No. 2 (24 cans)	4,419	26,941							4,419	26,941
No. 10 (6 cans)	7,708	35,553	(19)	(19)	8,082	31,346	4,796	23,185	20,586	90,084
Other sizes (standard cases)	983	8,006	8,053	55,403	115,702	397,079	8,109	33,209	132,847	493,697
Total		98,337		116,059		1,549,920		71,526		1,835,842
Razor clams:										
½-pound (48 cans)			86,566	552,144					86,566	552,144
No. 1 (48 cans)	3,028	24,958	17,576	134,395			88	352	20,692	160,205
1 lb. (48 cans)	234	2,556	119	1,189					353	3,745
Total		27,514		688,228				88	352	716,094
Grand total		565,323		804,287		1,706,873		113,145		3,189,628

¹⁹ The production of this item has been included with "Other sizes (standard cases)."

NOTE.—"Standard cases" represents the various sized cases converted to the equivalent of 48 No. 1 cans. Soft clam products were canned at 19 plants in Maine, 2 in Massachusetts, and 1 in New Jersey; hard clam products, at 1 plant in Massachusetts, 1 in Rhode Island, 1 in New York, 3 in New Jersey, 1 in Pennsylvania, 2 in Maryland, 1 in Florida, 4 in Washington, 1 in Illinois, and 3 in Alaska; razor clam products, at 5 plants in Washington, 1 in Oregon, and 13 in Alaska; and coquina clam products, at 1 plant in Florida.

Canned fishery products and byproducts of the United States and Alaska, 1938—Con.

PACK OF CANNED SHRIMP: STANDARD CASES

State	Dry pack (in tins)		Wet pack (in tins)		Wet pack (in glass)		Total	
	Cases	Value	Cases	Value	Cases	Value	Cases	Value
Georgia.....	21,700	\$101,192	95,646	\$418,197	25,139	\$206,368	142,485	\$725,757
Florida.....	5,867	26,963	10,536	45,605	15,803	128,108	32,206	200,676
Alabama and Texas.....	8,903	37,820	97,963	400,843	(¹⁰)	(¹⁰)	106,866	438,663
Mississippi.....	59,582	241,640	167,524	706,206			227,106	947,746
Louisiana.....	110,617	485,990	428,057	1,818,860	¹⁰ 29,666	¹⁰ 254,692	568,340	2,559,651
Total.....	206,669	893,505	799,726	3,389,720	70,608	589,168	1,077,003	4,872,393

PACK OF CANNED SHRIMP: ACTUAL CASES

Size	Cases	Value	Size	Cases	Value
In tins, dry:			In tins, wet—Continued.		
4-ounce (48 cans).....	4,894	\$18,352	Other sizes (standard cases).....	46	\$210
5-ounce (24 cans).....	4,507	0,580	In glass, wet:		
5-ounce (48 cans).....	176,915	749,485	2½-ounce (48 jars).....	28,747	119,710
8¼-ounce (24 cans).....	28,588	116,088	4-ounce (24 jars).....	10,793	32,789
In tins, wet:			5¾-ounce (24 jars).....	48,769	206,876
4-ounce (48 cans).....	3,787	12,166	6-ounce (24 jars).....	57,450	229,793
5¾-ounce (24 cans).....	98,448	223,549	Total.....		4,872,393
5¾-ounce (48 cans).....	739,376	3,114,313			
9¾-ounce (24 cans).....	2,913	11,551			
32-ounce (12 cans).....	4,297	27,931			

¹⁰ A small pack of shrimp in glass produced in Texas has been included with Louisiana production.

NOTE.—“Standard cases” represents the various sized cases converted to the equivalent of forty-eight 5-ounce cans to the case in the dry pack and forty-eight 5¾-ounce cans to the case in the wet pack. Shrimp were canned at 4 plants in Georgia, 5 in Florida, 2 in Alabama, 13 in Mississippi, 24 in Louisiana, and 2 in Texas.

PACK OF MISCELLANEOUS CANNED FISHERY PRODUCTS: STANDARD CASES

Product	Atlantic and Gulf coasts ¹¹		Pacific coast (including Alaska)		Total	
	Cases	Value	Cases	Value	Cases	Value
Shad.....			10,845	\$29,950	10,845	\$29,950
Shad roe.....			3,015	95,909	3,015	95,909
Cat and dog food.....	230,010	\$347,171	183,424	641,228	413,434	889,399
Fish flakes ¹²	45,721	291,426			45,721	291,426
Fish cakes, balls, etc.....	97,263	665,307			97,263	665,307
Fish paste.....	3,987	143,147			3,987	143,147
Finnan haddie.....	488	7,518			488	7,518
Sturgeon caviar.....	2,491	307,298			2,491	307,298
Whitefish roe and caviar.....	1,052	36,478			1,052	36,478
Salmon roe and caviar (for food).....	1,563	28,077			1,563	28,077
Salmon eggs (for bait).....			4,656	85,348	4,656	85,348
Miscellaneous fish and roe ¹³	17,520	159,601	2,272	23,128	19,792	182,729
Crabs.....	(¹⁴)	(¹⁴)	¹⁴ 13,699	¹⁴ 200,134	13,699	260,134
Turtle products.....	7,410	80,869			7,410	80,869
Miscellaneous shellfish, etc. ¹⁵	15,765	103,445	10,818	67,041	26,583	170,486
Total.....	423,270	2,170,337	228,729	1,102,738	651,999	3,273,075

¹¹ Includes the production of whitefish caviar by one firm in Wisconsin.

¹² Tuna flakes are not included in this table, but are included in the table for canned tuna and tunalike fishes.

¹³ Includes fish chowder, salted cod, haddock chowder, pickled eels, fish bouillon, kippered sturgeon, rat poison bait, swordfish, deep sea roe, and tuna roe.

¹⁴ The production of hard crabs by one firm in Virginia and one firm in South Carolina is included with the production for the Pacific coast.

¹⁵ Includes terrapin products, oyster soup, pickled mussels, shrimp soup, frog and frogs' legs, crab and shrimp gumbo, crayfish, squid, shellfish newburg, and smoked oysters.

NOTE.—“Standard cases” represents the various sized cases converted to the equivalent of forty-eight 1-pound cans to the case. Shad were canned at 9 plants; shad roe, at 10 plants; cat and dog food, at 9 plants; fish flakes, at 4 plants; fish cakes, balls, etc., at 6 plants; fish paste, at 3 plants; finnan haddie, at 3 plants; sturgeon caviar, at 4 plants; whitefish roe and caviar, at 5 plants; salmon roe and caviar (for food), at 4 plants; salmon eggs (for bait), at 8 plants; miscellaneous fish and roe, at 14 plants; crabs, at 21 plants; turtle products, at 4 plants; and miscellaneous shellfish, etc., at 14 plants.

Canned fishery products and byproducts of the United States and Alaska, 1938—Con.

PRODUCTION OF OYSTER AND MARINE CLAM-SHELL PRODUCTS ²⁶

State	Crushed shell for poultry feed		Shell lime		Total	
	Tons	Value	Tons	Value	Tons	Value
Rhode Island, New York, and Delaware.....	1,530	\$12,662	433	\$1,943	1,963	\$14,605
New Jersey.....	4,514	35,228	1,480	6,567	5,994	41,795
Pennsylvania.....	3,606	33,748	627	2,744	4,233	36,492
Maryland.....	32,200	145,800	19,970	35,800	52,170	181,600
Virginia.....	21,569	123,071	²⁷ 32,012	²⁷ 184,665	53,681	307,736
North Carolina, South Carolina, and Florida.....	33,565	159,921	1,375	4,250	34,940	164,171
Alabama, Louisiana, and Texas.....	126,431	392,852	9,431	32,416	135,862	425,268
Mississippi.....	17,584	64,335	5,338	4,833	22,922	69,198
Washington and Oregon.....	8,755	78,183	5,029	31,643	13,784	109,825
California.....	11,696	53,433	2,260	12,433	13,976	65,866
Total.....	261,450	1,099,233	77,975	317,324	339,425	1,416,557

²⁶ The production in Washington includes both clam and oyster-shell products.

²⁷ Of this amount 14,789 tons valued at \$93,338 were reported as burned lime.

NOTE.—The above crushed shell products were prepared at 2 plants in Rhode Island, 1 in New York, 7 in New Jersey, 4 in Pennsylvania, 1 in Delaware, 3 in Maryland, 9 in Virginia, 4 in North Carolina, 1 in South Carolina, 1 in Florida, 1 in Alabama, 3 in Mississippi, 1 in Louisiana, 2 in Texas, 9 in Washington, 1 in Oregon, and 4 in California.

PRODUCTION OF FRESH-WATER MUSSEL-SHELL PRODUCTS

Item	Iowa, Missouri, Wisconsin, Illinois, Massachusetts		New York		Total	
	Quantity	Value	Quantity	Value	Quantity	Value
Pearl buttons.....gross.....	8,376,261	\$2,189,481	1,646,191	\$450,023	10,022,452	\$2,639,504
Crushed shell for poultry feed						
tons.....	²⁸ 4,446	²⁸ 25,845	(²⁹)	(²⁹)	4,446	25,845
lime.....do.....	²⁸ 1,111	²⁸ 1,140	(²⁹)	(²⁹)	1,111	1,140
Other products ²⁹		32,390				32,390
Total.....		2,248,856		450,023		2,698,879

²⁸ A small production in New York has been combined with that in Iowa.

²⁹ Consists of mussel-shell chips and novelties produced in Iowa; and novelties produced in Massachusetts.

NOTE.—Mussel shells purchased during the year amounted to 18,522,000 pounds, valued at \$219,196. Shells were taken in 15 States in the Mississippi River Valley and Great Lakes region. The producing States in the order of their importance were: Tennessee, which contributed 24 percent of the total quantity, Arkansas, 18 percent; Illinois, 16 percent; Indiana, 14 percent; Kentucky, 10 percent; Iowa, 6 percent; Texas, 3 percent; Alabama, Michigan, and Wisconsin, each 2 percent; Missouri, Ohio, Minnesota, and Oklahoma, each 1 percent; and Louisiana, less than 1 percent.

PRODUCTION OF MARINE PEARL-SHELL PRODUCTS ³⁰

Item	Massachusetts, Rhode Island, and Connecticut		New York		New Jersey	
	Gross	Value	Gross	Value	Gross	Value
Pearl buttons.....	³¹ 1,540,363	³¹ \$919,609	1,254,224	\$688,604	1,495,932	\$1,153,457
Novelties ³²		149,389		76,200		76,604
Total.....		1,068,998		764,804		1,232,061

Item	Maine, Pennsylvania, Maryland, Florida, California		Total	
	Gross	Value	Gross	Value
Pearl buttons ³¹	³² 1,937,820	³¹ \$881,223	6,228,339	\$3,642,893
Novelties ³²		250,417		554,610
Total.....		1,131,640		4,197,503

³⁰ Produced principally from imported shells.

³¹ Pearl buttons manufactured in Connecticut.

³² Pearl buttons manufactured in Maine, Pennsylvania, and Maryland.

³³ Includes knife handles, handles for manicure sets, dolls, lamps, mounted fish decoys, etc.

NOTE.—Marine pearl-shell products were manufactured at 1 plant in Maine, 2 in Massachusetts, 1 in Rhode Island, 6 in Connecticut, 9 in New York, 20 in New Jersey, 1 in Pennsylvania, 1 in Maryland, 12 in Florida, and 2 in California.

Canned fishery products and byproducts of the United States and Alaska, 1938—Con.

FISH UTILIZED AND PRODUCTS OF THE MENHADEN INDUSTRY

State	Menahden utilized	Products						Total
		Dry scrap and meal		Acidulated scrap		Oil		
	Number	Tons	Value	Tons	Value	Gallons	Value	Value
New York, New Jersey, Delaware, and Georgia.....	188,507,000	6,652	\$280,943	9,674	\$191,031 ⁽¹⁾	1,589,228	\$447,221	\$919,195
Virginia.....	144,167,000	10,681	401,468	(4)	(4)	1,087,503	319,065	720,533
North Carolina.....	271,322,000	14,338	594,262	7,176	133,481	1,801,042	346,638	1,074,371
Florida.....	168,437,000	7,603	299,957	4,964	94,424	231,356	60,743	455,124
Total.....	² 772,433,000	³ 39,274	³ 1,576,620	21,814	418,936	4,189,129	1,173,667	3,169,223

¹ The production of acidulated scrap by 1 firm in Virginia has been included with the New York, New Jersey, Delaware, and Georgia production.

² 466,330,800 pounds.

³ Of this production, 26,096 tons, valued at \$1,006,428 were reported as dry scrap and 13,178 tons, valued at \$570,192, as meal.

NOTE.—The menhaden factories were located as follows: 1 in New York, 3 in New Jersey, 2 in Delaware 10 in Virginia, 10 in North Carolina, 1 in Georgia, and 5 in Florida.

PRODUCTION OF MISCELLANEOUS BYPRODUCTS

Product	Atlantic and Gulf coasts ¹⁾		Pacific coast (including Alaska)		Total	
	Quantity	Value	Quantity	Value	Quantity	Value
Dried scrap:						
Blue crab..... tons.....	1,515	\$25,135			1,515	\$25,135
King crab..... do.....	255	9,689			255	9,689
Miscellaneous ²⁾ do.....	1,435	38,101			1,435	38,101
Meal:						
Groundfish "white fish"..... do.....	7,725	364,250			7,725	364,250
Herring..... do.....	1,652	42,974	16,095	\$549,614	17,747	592,588
Mackerel..... do.....			1,574	58,580	1,574	58,580
Pilchard..... do.....			89,927	3,437,892	89,927	3,437,892
Salmon..... do.....			1,846	61,807	1,846	61,807
Tuna..... do.....			9,650	350,631	9,650	350,631
King crab..... do.....	123	4,215			123	4,215
Shrimp..... do.....	1,426	29,763	170	3,400	1,596	33,163
Whale (meat)..... do.....			396	15,796	396	15,796
Whale (bone)..... do.....			216	5,618	216	5,618
Miscellaneous ³⁾ do.....	7,821	336,313	2,302	88,829	10,123	425,142
Oil:						
Alewife..... gallons.....	18,681	3,277			18,681	3,277
Cod..... do.....	4,604	1,308			4,604	1,308
Cod-liver..... do.....	281,556	164,986			281,556	164,986
Fur-seal..... do.....			29,865	4,157	29,865	4,157
Herring..... do.....	56,462	6,132	4,523,113	1,292,705	4,579,565	1,298,837
Mackerel..... do.....			86,364	25,878	86,364	25,878
Pilchard..... do.....			17,539,567	5,205,337	17,539,567	5,205,337
Salmon ⁴⁾ do.....			165,825	68,693	165,825	68,693
Shark liver..... do.....	(4)	(4)	129,705	4 330,397	129,705	330,397
Tuna..... do.....			192,515	55,654	192,515	55,654
Whale:						
Sperm..... do.....			181,900	54,570	181,900	54,570
Other..... do.....	7,254,300	3,025,831	304,800	103,657	7,559,100	3,129,488
Liver, miscellaneous ⁵⁾ do.....	15,836	648,426	99,106	1,332,534	114,942	1,980,960
Miscellaneous ⁶⁾ do.....	74,322	25,541	12,495	3,363	86,817	28,906
Shark fins..... pounds.....	41,870	17,248			41,870	17,248
Shark skins..... do.....	147,520	17,555			147,520	17,555
Liquid glue ⁷⁾ gallons.....	383,769	805,804	(4)	(4)	383,769	805,804
Miscellaneous byproducts ⁸⁾		145,363				478,643
Total.....		5,711,911		13,382,294		19,094,205

¹⁾ Includes the production of burbot-liver oil in Minnesota and Wisconsin.

²⁾ Includes alewife, herring, shark, and miscellaneous dry and green scrap.

³⁾ Includes alewife, rosefish, salmon egg, shark, starfish, clam, and miscellaneous meals.

⁴⁾ Includes a considerable quantity of salmon oil especially prepared for human consumption.

⁵⁾ The production of shark-liver oil in Massachusetts and Florida has been included with the production in the Pacific Coast States.

⁶⁾ Includes burbot, halibut, sablefish, swordfish, tuna, and miscellaneous liver oils. A small quantity of halibut viscera oil has been included with the Pacific coast production of miscellaneous liver oils.

⁷⁾ Includes rosefish, shark, and miscellaneous fish oils.

⁸⁾ A quantity of liquid glue produced by one firm in California is included with the production of liquid glue on the Atlantic and Gulf coasts.

⁹⁾ Includes isinglass, kelp products, pearl essence, and herring pomace.

NOTE.—The whale products shown for the Atlantic and Gulf Coasts were produced on factory ships operating in the Southern Hemisphere.

FROZEN FISH TRADE¹

FISH FROZEN

During 1938 the output of freezing plants which reported their activities to the Government amounted to 186,096,050 pounds of fishery products. At the time these products were held in cold-storage plants they were estimated to be valued at about \$13,000,000. Compared with the output in 1937, this is an increase of 11 percent in volume. Six items accounted for 48 percent of the total amount frozen. In the order of their importance, they were: Haddock fillets, which accounted for 11 percent of the total; rosefish fillets and whiting, each 9 percent; halibut, 8 percent; pollock, 6 percent, and mackerel 5 percent. Other products frozen in considerable quantity during the year were cod fillets, silver salmon, and shrimp.

Production of frozen fishery products, 1938

BY SPECIES AND MONTHS

Species	Month ending the 15th of--					
	January	February	March	April	May	June
FROZEN FISH						
Bluefish (all trade sizes)	385,429	67,684	9,043	15,101	35,999	2,317
Butterfish (all trade sizes)	15,642	4,966	26,821	29,850	128,687	208,142
Catfish	34,023	42,217	57,327	78,540	143,302	63,752
Cisco (Lake Erie)	14,284	6,841	21,406	11,500	3,603	2,769
Cisco (lake herring), including bluefish, blackfin, and chub	204,282	39,057	23,056	15,779	57,184	38,313
Cisco (tullibee, Canadian lakes)	280		6,835	422		
Cod, haddock, hake, and pollock (except fillets of cod, haddock, and pollock)	209,187	98,613	134,468	156,877	203,436	318,898
Cod fillets	264,137	221,293	146,107	723,929	1,195,099	739,496
Croaker	9,612	1,076	16,608	625,654	660,250	430,731
Flounders	59,957	21,085	15,037	19,207	116,891	132,124
Haddock fillets	672,395	834,322	905,608	2,760,280	2,634,935	1,130,178
Halibut (all trade sizes)			1,589	173,047	2,589,995	3,225,938
Herring, sea (including alewives and bluebacks)	102,521	45,209	379,970	231,103	1,329,698	1,041,093
Lake trout	26,451	12,123	58,720	28,411	71,352	33,857
Mackerel (except Spanish)	116,673	63,338	38,785	206,444	2,327,078	1,471,370
Perch, yellow	18,047	3,065	4,716	5,721	10,320	7,147
Pike, blue and sauger	5,307	34,092	4,809	5,230	248,871	4,828
Pike, yellow or wall-eyed	8,377	4,188	12,942	6,098	21,950	2,636
Pike (including pickerel, jacks, and yellow jack)	2,499	1,428	58,578	5,109	9,632	1,349
Pollock fillets	1,869,612	703,239	67,900	324,110	862,828	604,509
Rosefish fillets	1,968,948	705,102	550,855	612,321	1,121,985	2,576,744
Sablefish (black cod)	80,340	44,742	337,276	50,847	14,034	41,724
Salmon, king or chinook	12,412	46,066	5,983	46,792	34,355	341,085
Salmon, silver or coho	15,836	23,570	13,286	68,234	17,365	16,818
Salmon, fall and pink	17,099	17,568	209,714	74,942	42,127	15,911
Salmon, steelhead trout	15,659	4,250	10,751	27,732	18,469	27,095
Scup (porgies)	1,023	10,379	1,000	900	61,468	63,181
Shad and shad roe	9,694	6,769	9,731	5,307	297,999	59,432
Smelts, eulachon, etc.	101,212	229,964	73,496	116,806	230,639	69,192
Sturgeon and spoonbill cat	9,635	860	51,701	35,688	49,300	36,841
Suckers	460	60,000	1,214	672	4,071	14,080
Swordfish	434,627	190,023	50,446	92,710	109,152	25,966
Weakfish (including southern "sea trout")	70,484	225	3,868	4,307	85,165	40,509
Whitefish	145,531	176,360	153,698	123,635	56,543	48,625
Whiting	630,627	47,366	121,911	185,069	326,099	2,512,798
Other fish	1,465,640	1,072,777	923,644	1,545,199	1,657,228	1,810,586
Total fish	8,497,147	4,839,833	4,519,239	8,409,720	16,805,760	17,240,113
FROZEN SHELLFISH						
Scallops	(1)	(1)	(1)	(1)	(1)	(1)
Shrimp	(1)	(1)	(1)	(1)	(1)	(1)
Spiny lobster tails	(1)	(1)	(1)	(1)	(1)	(1)
Squid	25,783	7,671	46,398	32,384	438,524	631,730
Other shellfish	683,674	921,712	653,127	640,292	1,004,010	1,605,291
Total shellfish	709,457	929,383	699,525	672,676	1,442,534	2,137,021
Total fish and shellfish	9,206,604	5,769,216	5,218,764	9,082,402	18,248,294	19,377,134

¹ Included with "Other shellfish."

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

Production of frozen fishery products, 1938—Continued

BY SPECIES AND MONTHS—Continued

Species	Month ending the 15th of—						Total
	July	August	September	October	November	December	
FROZEN FISH	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Bluefish (all trade sizes).....	15,547	11,099	17,238	189,155	169,064	84,932	992,068
Butterfish (all trade sizes).....	73,929	220,652	30,171	103,669	247,538	32,071	1,181,944
Catfish.....	30,346	64,079	25,567	40,000	30,146	58,442	676,880
Cisco (Lake Erie).....	6,416	42,679	137,682	101,404	81,308	267,623	697,665
Cisco (lake herring), including bluefin, blackfin, and chub.....	253,973	283,119	236,090	294,902	845,942	1,309,469	3,601,766
Cisco (tullibee, Canadian lakes).....	4,680	36,277	136,183	880	23,965	19,082	228,304
Cod, haddock, hake, and pollock (except fillets of cod, haddock, and pollock).....	233,740	227,712	290,028	184,850	315,580	289,622	2,663,011
Cod fillets.....	806,661	667,510	418,246	454,623	784,342	715,453	7,136,798
Croaker.....	221,981	437,743	230,802	45,240	31,074	4,016	2,712,847
Flounders.....	92,954	54,762	55,471	46,741	235,835	18,150	898,223
Haddock fillets.....	1,818,857	2,744,825	3,673,869	1,850,095	1,045,967	522,507	20,094,341
Halibut (all trade sizes).....	3,135,702	3,681,206	824,971	937,599	791,700	.....	15,302,407
Herring, sea (including alcwives and bluebacks).....	176,108	88,361	87,861	437,228	624,051	429,484	4,972,747
Lake trout.....	52,091	45,920	55,067	159,740	308,497	255,321	1,166,858
Mackerel (except Spanish).....	1,672,951	1,159,748	319,304	68,054	976,342	456,236	8,673,223
Perch, yellow.....	3,063	51,377	84,864	68,553	169,008	110,467	534,548
Pike, blue and sauger.....	6,880	1,951	285	226,794	235,263	108,480	877,500
Pike, yellow or wall-eyed.....	2,893	7,062	16,007	21,812	20,901	4,853	139,310
Pike (including pickarel, jacks, and yellow jack).....	3,189	11,343	7,431	6,219	45,709	23,038	176,524
Pollock fillets.....	702,200	457,129	456,816	679,600	2,302,322	3,285,694	11,995,858
Rosefish fillets.....	1,708,735	1,658,905	2,117,335	1,343,312	1,434,909	864,778	10,604,019
Sablefish (black cod).....	210,035	333,856	650,432	947,501	728,553	337,451	3,782,797
Salmon, king or chinook.....	646,476	436,593	930,321	1,679,563	591,908	48,040	4,620,194
Salmon, silver or coho.....	128,163	1,038,071	2,980,974	1,466,482	781,740	73,984	7,504,492
Salmon, fall and pink.....	45,252	298,020	368,076	631,593	3,251,337	514,900	5,607,189
Salmon, steelhead trout.....	112,556	217,270	149,163	145,637	37,316	46,403	818,846
Scup (porgies).....	124,794	75,851	26,382	17,988	4,963	1,974	390,203
Shad and shad roe.....	105,831	15,069	701	82,200	58,926	20,834	672,233
Smelts, eulachon, etc.....	23,688	53,871	35,670	20,980	58,343	70,372	1,084,033
Sturgeon and spoonbill cat.....	40,646	20,575	44,198	75,246	121,503	32,722	518,605
Suckers.....	12,788	10,476	.....	105	2,063	1,529	108,057
Swordfish.....	53,489	163,607	189,822	96,570	88,878	280,577	1,775,773
Weakfish (including southern "sea trout").....	145,546	234,097	136,513	13,418	43,336	45,904	823,460
Whitefish.....	70,111	85,484	49,421	78,515	186,598	276,617	1,479,528
Whiting.....	6,279,138	2,886,016	2,805,674	597,073	607,099	561,243	17,561,703
Other fish.....	1,752,157	1,469,260	1,740,429	2,522,044	2,020,073	2,211,653	20,205,290
Total fish.....	20,679,666	20,192,246	19,368,123	15,103,061	16,436,987	13,366,632	168,468,443
FROZEN SHELLFISH							
Scallops.....	448,154	202,945	584,291	226,035	291,051	256,808	2,009,944
Shrimp.....	569,760	180,944	226,143	1,038,638	2,403,567	1,627,356	6,035,548
Spiny lobster tails.....	80,337	16,060	42,189	68,429	27,070	45,949	280,940
Squid.....	395,151	184,869	160,266	18,983	149,032	175,936	2,266,417
Other shellfish.....	267,708	119,065	253,452	516,518	227,105	212,854	7,034,898
Total shellfish.....	1,760,110	703,883	1,260,331	1,898,303	3,099,421	2,318,963	17,627,607
Total fish and shellfish.....	22,429,776	20,896,129	20,628,454	17,001,364	19,536,408	15,705,495	186,096,050

Production of frozen fishery products, 1938—Continued

BY GEOGRAPHICAL SECTIONS AND SPECIES

[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
FROZEN FISH								
Bluefish (all trade sizes)	25	879	42	45	1	1		993
Butterfish (all trade sizes)	91	1,077	10	1		3		1,182
Catfish	166	1	59	62	163	221	5	677
Cisco (Lake Erie)		663		35				698
Cisco (lake herring) including bluefin, blackfin, and chub	17	737		2,108	739			3,601
Cisco (tullibee, Canadian lakes)	9	24		11	184			228
Cod, haddock, hake, and pollock (except filets of cod, haddock, and pollock)	1,268	109	4	129	56	510	587	2,663
Cod filets	6,954	6		101	46		30	7,137
Croaker		357	2,321	26				2,713
Flounders	186	508	2	20	1	2	149	868
Haddock filets	19,394	154	22	286	68		170	20,094
Halibut (all trade sizes)	194	265	29	265	58	4	14,547	15,362
Herring, sea (including alewives and bluebacks)	2,896	621	15	192	14	1	1,234	4,973
Lake trout	24	335	26	713	52	11	6	1,167
Mackerel (except Spanish)	6,348	2,073	82	210	6		154	8,873
Perch, yellow	5	11	6	419	91		3	535
Pike, blue and sauger		243		634			1	878
Pike, yellow or wall-eyed		63		59	17			139
Pike (including pickerel, jacks, and yellow jack)		12		54	110			176
Pollock filets	11,740			251	5			11,996
Rosefish filets	16,565			109				16,664
Sablefish (black cod)		457		9	148		3,178	3,783
Salmon, king or chinook	81	339		9	54		4,137	4,620
Salmon, silver or coho	36	244		19	21	5	7,178	7,603
Salmon, fall and pink	3	825		83	60	1	4,535	5,507
Salmon, steelhead trout		38	13				768	819
Scup (porgies)	43	347						390
Shad and shad roe	33	510	2	10	1	2	114	672
Smelts, eulachon, etc	58	470	7	421	1		127	1,084
Sturgeon and spoonbill cat		496		4	13	3	3	519
Suckers			70	36				108
Swordfish	268	1,057	15	3			433	1,776
Weakfish (including southern "sea trout")		487	336					823
Whitefish	84	995	57	296	66	2	70	1,480
Whiting	15,368	1,222	67	152	214	522	17	17,562
Other fish	2,532	2,480	3,839	2,256	736	3,220	5,142	20,205
Total fish	84,378	18,105	7,024	8,940	2,925	4,508	42,588	168,468
FROZEN SHELLFISH								
Scallops ¹	920	739	16	26	13	3	293	2,010
Shrimp ¹	275	1,168	595	943	738	1,405	911	6,035
Spiny lobster tails ¹		183	8	18			72	281
Squid	1,139	756	1	5			366	2,267
Other shellfish	385	2,001	113	593	160	1,494	2,289	7,035
Total shellfish	2,719	4,847	733	1,585	911	2,902	3,931	17,628
Total fish and shellfish	87,097	22,952	7,757	10,525	3,836	7,410	46,519	186,096

¹ 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; and Pacific—Washington, Oregon, California, and Alaska.

² Prior to July 15, 1938, this item was included with "Other shellfish."

Production of frozen fishery products, 1938—Continued

BY GEOGRAPHICAL SECTIONS AND MONTHS¹

[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.....	5,096	2,328	314	357	178	235	699	9,207
February.....	2,794	1,248	388	135	137	363	704	5,769
March.....	1,995	1,078	59	169	380	404	1,074	5,219
April.....	4,737	863	1,280	566	113	670	953	9,082
May.....	8,446	3,417	1,310	853	147	588	3,487	18,248
June.....	10,855	1,532	1,139	780	119	776	4,166	19,377
July.....	13,495	1,272	676	591	371	638	5,387	22,430
August.....	10,280	1,125	666	674	222	401	7,528	20,896
September.....	10,514	1,858	271	604	215	523	6,639	20,624
October.....	4,912	2,550	279	1,309	195	839	6,909	17,002
November.....	7,727	2,909	679	2,377	638	1,162	7,044	22,536
December.....	6,246	2,713	696	2,140	1,121	851	1,939	16,706
Total.....	87,097	22,952	7,757	10,526	3,836	7,410	46,519	186,096

¹ 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; and Pacific—Washington, Oregon, California, and Alaska.

HOLDINGS

During 1938, monthly holdings of frozen fish and shellfish averaged 67,994,000 pounds, which is an increase of 7 percent as compared with 1937. The holdings during January, amounting to 93,024,000 pounds, were the largest for any month during the year; while those for April, amounting to 37,367,000 pounds were the smallest. During the last 4 months of the year an average of 88,484,000 pounds of fishery products were in storage, as compared with an average of 74,916,000 pounds for the same period in 1937.

Holdings of frozen fishery products, 1938

BY SPECIES AND MONTHS

Species	Month ended the 15th of—					
	January	February	March	April	May	June
FROZEN FISH						
Bluefish (all trade sizes).....	Pounds 740,725	Pounds 690,305	Pounds 562,636	Pounds 401,922	Pounds 387,309	Pounds 268,272
Butterfish (all trade sizes).....	535,091	437,958	347,627	277,282	322,139	443,782
Catfish.....	336,140	309,938	213,801	219,260	285,893	268,388
Cisco (Lake Erie).....	230,005	166,102	134,159	91,483	46,726	55,986
Cisco (lake herring) including bluefin, blackfin, and chub.....	1,626,960	1,196,453	841,963	451,179	362,037	300,492
Cisco (tullibee, Canadian lakes).....	47,636	78,032	90,130	114,065	104,024	91,730
Cod, haddock, hake, and pollock (except filets of cod, haddock, and pollock).....	968,580	906,313	847,468	806,920	882,481	1,070,693
Cod filets.....	2,422,342	2,333,321	1,863,035	2,106,925	2,855,522	2,954,822
Croakers.....	596,698	336,219	154,985	586,518	1,252,152	1,583,894
Flounders.....	546,387	524,495	319,221	330,849	422,755	478,834
Haddock filets.....	5,194,038	4,313,054	3,008,324	4,641,603	5,892,820	5,428,550
Halibut (all trade sizes).....	6,245,177	4,316,869	2,589,022	1,450,414	3,809,953	6,817,386
Herring, sea (including alewives and blue-backs).....	1,672,336	1,509,763	1,224,403	1,094,393	2,165,632	2,899,247
Lake trout.....	458,817	323,028	308,532	174,177	269,166	282,985
Mackerel (except Spanish).....	2,956,591	2,379,583	1,640,001	1,048,032	3,124,617	4,217,046
Perch, yellow.....	284,369	191,693	116,511	75,557	58,575	70,676
Pike, blue and sauger.....	226,536	376,424	353,590	294,448	526,196	293,901
Pike, yellow or wall-eyed.....	155,174	196,408	161,813	113,193	104,702	69,960
Pike (including pickerel, jacks, and yellow jack).....	161,755	180,385	217,528	182,539	133,167	104,940
Pollock filets.....	4,081,904	3,731,436	2,390,310	1,851,799	2,040,138	1,919,238
Rosefish filets.....	3,728,833	3,243,685	2,548,638	1,622,754	1,704,164	2,704,632
Sablefish (black cod).....	2,261,305	1,733,037	1,408,659	1,139,320	854,080	724,348
Salmon, king or chinook.....	2,088,014	2,071,844	1,412,694	940,687	544,016	546,675
Salmon, silver or coho.....	3,000,582	1,841,676	999,601	599,654	428,980	328,034
Salmon, fall and pink.....	3,758,347	3,064,855	2,376,797	1,827,922	1,536,867	1,245,321
Salmon, steelhead trout.....	271,411	239,815	183,669	143,057	134,378	123,107
Scup (porgies).....	272,266	207,169	40,692	37,381	93,903	153,010
Shad and shad roe.....	384,721	299,129	206,336	145,736	427,904	474,664
Smelts, eulachon, etc.....	691,215	1,473,769	1,337,364	852,468	813,926	829,359
Sturgeon and spoonbill cat.....	(1)	819,254	661,978	481,582	458,171	268,374
Suckers.....	101,333	102,043	90,062	88,206	46,295	54,595
Swordfish.....	1,947,437	1,848,702	1,443,769	1,145,514	1,136,258	871,257
Weakfish (including southern "sea trout").....	1,208,940	870,068	614,029	409,430	455,936	466,659
Whitefish.....	1,224,257	1,677,872	1,634,692	1,609,572	1,403,088	1,255,072
Whiting.....	6,621,738	4,391,662	2,280,587	1,126,622	799,404	2,451,273
Other fish.....	7,973,998	6,908,037	5,685,631	5,266,090	6,020,037	7,217,294
Total fish.....	65,581,648	55,280,396	40,370,651	33,751,603	41,904,083	49,333,286
FROZEN SHELLFISH						
Scallops.....	(2)	(2)	(2)	(2)	(2)	(2)
Shrimp.....	(2)	(2)	(2)	(2)	(2)	(2)
Spiny lobster tails.....	(2)	(2)	(2)	(2)	(2)	(2)
Squid.....	1,736,262	1,510,746	1,080,691	601,100	881,745	1,445,763
Other shellfish.....	5,809,661	5,392,658	4,242,581	3,014,020	3,195,304	4,259,842
Total shellfish.....	7,545,923	6,903,404	5,323,272	3,615,720	4,077,049	5,705,605
Total fish and shellfish.....	73,127,671	62,183,800	45,693,923	37,367,323	45,981,132	55,038,891

1 Included with "other fish."

2 Included with "Other shellfish."

Holdings of frozen fishery products, 1938—Continued

BY SPECIES AND MONTHS—Continued

Species	Month ended the 15th of—					
	July	August	September	October	November	December
FROZEN FISH						
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Bluefish (all trade sizes).....	198, 319	106, 934	93, 083	294, 947	319, 675	252, 017
Butterfish (all trade sizes).....	425, 716	614, 866	534, 668	546, 407	736, 105	643, 524
Catfish.....	241, 991	242, 661	227, 902	234, 173	273, 771	306, 058
Cisco (Lake Erie).....	52, 118	116, 778	257, 680	511, 619	546, 585	749, 444
Cisco (lake herring) including bluefin, blackfin, and chub.....	547, 780	902, 579	1, 138, 173	1, 057, 335	1, 537, 137	2, 382, 005
Cisco (tullibee, Canadian lakes).....	81, 307	110, 562	244, 271	193, 440	204, 301	350, 437
Cod, haddock, hake, and pollock (except fillets of cod, haddock, and pollock).....	1, 200, 470	1, 171, 969	1, 156, 502	1, 116, 432	1, 105, 553	1, 139, 670
Cod fillets.....	3, 303, 794	2, 987, 113	2, 325, 832	1, 024, 134	1, 040, 749	1, 876, 035
Croakers.....	1, 908, 359	2, 397, 789	2, 190, 057	1, 555, 805	1, 483, 346	1, 067, 902
Flounders.....	479, 006	455, 694	432, 545	397, 194	624, 091	479, 569
Haddock fillets.....	5, 737, 354	6, 672, 037	8, 760, 988	8, 305, 928	7, 072, 491	6, 166, 938
Halibut (all trade sizes).....	9, 737, 752	13, 099, 319	13, 576, 610	13, 326, 114	12, 042, 653	9, 644, 725
Herring, sea (including alewives and blue- backs).....	2, 602, 211	2, 251, 547	1, 668, 685	1, 709, 883	2, 158, 764	2, 198, 452
Lake trout.....	325, 930	358, 835	440, 285	571, 102	1, 119, 198	1, 195, 155
Mackerel (except Spanish).....	5, 569, 816	6, 121, 121	5, 898, 929	4, 716, 379	5, 026, 684	4, 800, 745
Perch, yellow.....	69, 865	159, 955	351, 681	448, 723	647, 337	561, 172
Pike, blue and sauger.....	147, 523	98, 681	42, 089	237, 093	614, 218	680, 130
Pike, yellow or wall-eyed.....	37, 605	31, 247	44, 065	62, 171	91, 906	91, 683
Pike (including pickerel, jacks, and yellow jack).....	97, 783	85, 572	91, 110	86, 186	110, 160	100, 723
Pollock fillets.....	1, 890, 874	1, 076, 483	808, 928	575, 151	2, 163, 053	4, 738, 427
Rosefish fillets.....	2, 662, 701	3, 211, 384	3, 279, 896	2, 735, 026	2, 363, 086	1, 781, 938
Sablefish (black cod).....	780, 461	1, 009, 656	1, 528, 982	2, 383, 369	2, 698, 573	2, 522, 399
Salmon, king or chinook.....	835, 004	1, 082, 219	1, 927, 962	3, 267, 374	3, 595, 899	3, 187, 585
Salmon, silver or coho.....	344, 880	2, 231, 912	5, 078, 929	6, 288, 278	6, 234, 127	5, 405, 252
Salmon, fall and pink.....	1, 100, 463	1, 203, 316	1, 244, 255	1, 546, 938	4, 450, 648	4, 156, 684
Salmon, steelhead trout.....	205, 072	389, 488	495, 043	559, 465	478, 565	441, 208
Scup (porgies).....	275, 552	348, 334	360, 036	322, 889	318, 708	264, 049
Shad and shad roe.....	557, 369	641, 937	521, 149	551, 609	551, 405	559, 282
Smelts, eulachan, etc.....	799, 112	319, 172	920, 900	837, 265	710, 852	675, 837
Sturgeon and spoonbill cat.....	243, 713	296, 680	327, 136	417, 042	733, 328	896, 528
Suckers.....	64, 084	67, 780	60, 315	64, 086	44, 733	128, 658
Swordfish.....	625, 550	676, 064	891, 752	463, 553	548, 068	741, 859
Weakfish (including southern "sea trout").....	557, 703	684, 091	660, 164	463, 553	453, 622	398, 998
Whitefish.....	1, 237, 119	1, 559, 841	1, 748, 230	1, 596, 226	1, 679, 478	1, 800, 598
Whiting.....	7, 588, 360	9, 151, 206	11, 140, 277	9, 693, 904	8, 905, 985	8, 228, 204
Other fish.....	7, 833, 842	8, 309, 399	8, 750, 634	10, 040, 670	10, 918, 308	10, 702, 718
Total fish.....	60, 366, 554	70, 458, 130	79, 085, 721	79, 159, 605	84, 819, 362	81, 392, 588
FROZEN SHELLFISH						
Scallops.....	1, 232, 310	1, 359, 554	1, 863, 125	1, 733, 093	1, 694, 812	1, 644, 336
Shrimp.....	2, 262, 648	1, 490, 437	1, 063, 549	2, 125, 146	4, 388, 280	5, 547, 548
Spiny lobster tails.....	542, 979	403, 454	470, 036	457, 052	408, 531	360, 715
Squid.....	1, 646, 554	1, 594, 998	1, 395, 448	1, 160, 817	1, 120, 314	1, 078, 795
Other shellfish.....	665, 286	510, 188	650, 357	1, 039, 434	592, 632	687, 329
Total shellfish.....	6, 349, 777	5, 423, 631	5, 451, 515	6, 505, 452	8, 204, 569	9, 318, 725
Total fish and shellfish.....	66, 716, 331	75, 881, 761	84, 537, 236	85, 665, 057	93, 023, 931	90, 711, 313

Holdings of frozen fishery products, 1938—Continued

BY GEOGRAPHICAL SECTIONS AND MONTHS¹

[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 ²	Total
January.....	22,402	15,329	2,734	9,239	5,360	763	17,321	73,128
February.....	19,573	14,204	2,357	8,006	4,445	742	12,267	62,184
March.....	13,334	10,799	1,654	7,089	3,623	578	8,617	45,694
April.....	12,185	8,068	2,333	5,698	3,122	602	5,359	37,367
May.....	16,016	10,298	3,394	5,596	2,737	528	7,413	45,981
June.....	20,783	10,447	4,228	5,924	2,555	1,026	10,076	55,039
July.....	27,754	10,513	4,831	5,960	2,728	1,175	13,765	66,716
August.....	29,958	10,368	5,500	6,129	3,269	744	19,889	75,882
September.....	31,791	10,999	5,110	7,733	3,275	862	24,707	84,537
October.....	28,593	11,759	4,669	9,398	3,888	1,437	28,521	85,665
November.....	26,144	13,860	4,787	11,916	4,182	2,016	30,099	93,024
December.....	25,600	14,545	4,275	12,692	4,964	2,458	26,177	90,711
Average.....	22,678	11,770	3,814	7,998	3,636	1,077	17,021	67,994

¹ 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; and Pacific—Washington, Oregon, California, and Alaska.

² Includes a small amount of fish held in Colorado in the mountain section.

COLD-STORAGE HOLDINGS OF CURED FISH

During 1938 monthly cold-storage holdings of cured herring averaged 15,216,977 pounds, while those of mild-cured salmon averaged 4,426,537 pounds. This is a decrease of 12 percent in the holdings of cured herring and 22 percent in the holdings of mild-cured salmon, as compared with the previous year. Stocks of cured herring were the largest during May, when the holdings amounted to 19,876,405 pounds; while the largest holdings of mild-cured salmon occurred in November, when 7,423,880 pounds were in storage.

Holdings of cured fish, 1938, by species and months

Month ended the 15th of—	Cured herring	Mild-cured salmon	Total
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
January.....	11,525,064	4,801,472	16,326,536
February.....	13,254,354	4,165,890	17,420,244
March.....	13,184,469	3,520,588	16,705,057
April.....	15,082,197	2,719,225	17,801,422
May.....	19,876,405	1,868,542	21,744,947
June.....	10,443,598	1,718,462	21,162,060
July.....	18,231,065	3,362,173	21,593,238
August.....	18,163,544	4,523,797	22,687,341
September.....	16,264,456	5,558,828	21,823,284
October.....	13,785,060	6,892,659	20,677,719
November.....	12,003,249	7,423,880	19,427,129
December.....	11,790,268	6,559,927	18,350,195

FOREIGN FISHERY TRADE

The foreign trade in fishery products of the United States in 1938 amounted to \$53,722,221, of which \$39,307,089 represents the value of these products imported for consumption and \$14,415,132, the value of exports of domestic fishery products. Compared with the previous year there was a decrease of 18 percent in total trade, 22 percent in the value of the imports, and 1 percent in the value of the exports.

Imports consisted of 302,623,795 pounds of edible products valued at \$28,348,602, and nonedible products valued at \$10,958,487. Fishery exports consisted of 118,029,159 pounds of edible products valued at \$13,797,855, and nonedible products valued at \$617,277.

Import duties levied on fishery products imported during 1938 totaled \$5,700,534.

Exports of domestic fishery products, 1938¹

Item	Quantity	Value
EDIBLE FISHERY PRODUCTS		
Fish, fresh or frozen:		
Salmon.....pounds.....	6,345,069	\$706,629
Other.....do.....	1,587,445	139,860
Fish, salted, pickled, or dry-cured:		
Salmon.....do.....	2,162,135	448,796
Cod, haddock, hake, pollock, cusk.....do.....	1,658,221	110,997
Fish, canned:		
Salmon.....do.....	48,290,957	7,269,171
Sardines.....do.....	40,811,807	2,786,163
Shellfish, not canned:		
Oysters, fresh, in the shell, shucked, frozen, or in ice.....do.....	5,322,624	374,355
Shrimp, fresh, frozen, or in ice.....do.....	382,089	55,211
Shrimp, dried.....do.....	1,709,775	304,307
Shellfish, canned:		
Shrimp.....do.....	5,083,489	993,505
Other.....do.....	1,518,475	249,981
Other fish and fish products.....do.....	3,169,073	352,880
Total edible products.....do.....	118,029,159	13,797,855
NONEDIBLE FISHERY PRODUCTS		
Marine-animal oils.....do.....	2,677,318	215,600
Fish meal for feed.....tons.....	1,431	65,061
Furs, fur-seal, dressed.....number.....	5,380	92,500
Oyster shells.....tons.....	36,280	244,116
Total nonedible products.....do.....	2,720,399	617,277
Grand total.....do.....	118,029,159	14,415,132

¹ These statistics have been furnished by the Bureau of Foreign and Domestic Commerce, Department of Commerce.

Imports of fishery products entered for consumption, 1938¹

Item	Pounds	Value
EDIBLE FISHERY PRODUCTS		
Fish, fresh or frozen:		
Whole or beheaded, or eviscerated, or both:		
Fresh-water fish, not elsewhere specified:		
Whitefish.....	12, 104, 864	\$1, 405, 764
Yellow pike.....	7, 686, 110	730, 606
Jacks or grass pike.....	3, 222, 871	150, 529
Lake trout.....	4, 584, 587	512, 277
Yellow perch.....	2, 742, 343	187, 482
Tullibees.....	1, 094, 420	77, 896
Lake herring and ciscoes.....	1, 778, 537	286, 593
Chubs.....	1, 168, 019	147, 833
Mullet (catostomus).....	749, 212	51, 342
Saugers.....	8, 187, 981	453, 701
Fresh-water fish, not elsewhere specified.....	5, 894, 783	348, 970
Eels.....	479, 956	35, 176
Salmon.....	5, 031, 822	605, 212
Cod, haddock, hake, pollock, and cusk.....	1, 521, 699	61, 182
Halibut:		
Fresh.....	4, 549, 801	500, 861
Frozen.....	1, 371, 833	130, 311
Mackerel.....	1, 148, 885	67, 602
Sturgeon.....	1, 183, 556	201, 528
Swordfish:		
Fresh.....	1, 231, 120	195, 168
Frozen.....	2, 965, 623	222, 801
Fish, not specially provided for.....	6, 256, 897	233, 322
Whether or not whole:		
Smelts.....	7, 075, 018	671, 943
Tuna fish.....	13, 693, 727	803, 229
Sea herring:		
Fresh.....	11, 628, 928	124, 870
Frozen.....	2, 171, 538	73, 215
Filleted, skinned, boned, sliced, or divided, not specially provided for.....	9, 454, 880	914, 565
Total.....	110, 658, 249	9, 373, 977
Fish, salted, dried, smoked, pickled, or preserved:		
Dried and unsalted:		
Cod, haddock, hake, pollock, and cusk.....	75, 666	5, 103
Other (including stockfish).....	2, 733, 006	361, 005
In oil or in oil and other substances:		
Sardines:		
Valued not over 9 cents per pound.....	4, 504	388
Valued over 9 cents per pound.....	21, 849, 658	3, 219, 426
Anchovies:		
Valued not over 9 cents per pound.....	50	3
Valued over 9 cents per pound.....	2, 061, 018	896, 924
Tuna fish.....	7, 192, 118	1, 252, 203
Antipasto, valued over 9 cents per pound.....	210, 679	78, 762
Other:		
Valued not over 9 cents per pound.....	60	5
Valued over 9 cents per pound.....	380, 879	79, 979
Not in oil or in oil and other substances:		
In airtight containers weighing, with contents, not over 15 pounds each:		
Anchovies.....	2, 019, 682	230, 627
Salmon.....	697, 645	67, 782
Herring and sardines.....	9, 150, 160	778, 104
Fish cakes, balls, and puddings.....	1, 648, 134	130, 783
Other.....	1, 137, 821	158, 582
Pickled or salted:		
Not in oil, etc., and not in airtight containers weighing, with contents, 15 pounds or less each:		
Salmon.....	224, 872	32, 663
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.....	6, 142, 552	285, 810
Containing more than 43 percent moisture by weight.....	39, 824, 832	1, 533, 499
Cod, haddock, hake, pollock, and cusk, skinned or boned.....	2, 235, 675	201, 291
Herring:		
In containers (not airtight), weighing, with contents, not more than 15 pounds each.....	440	36
In containers containing not more than 10 pounds of herring.....	5, 882, 211	325, 447
Other, in bulk or in containers.....	28, 321, 491	1, 168, 890
Mackerel, in bulk or in containers weighing, with contents, more than 15 pounds each.....	5, 877, 536	301, 292
Alewives, in bulk or in containers weighing, with contents, more than 15 pounds each.....	19, 016	850
Pickled or salted, not specially provided for, in bulk or in containers weighing, with contents, more than 15 pounds each.....	1, 048, 993	83, 071

See footnotes at end of table.

Imports of fishery products entered for consumption, 1938—Continued

Item	Pounds	Value
EDIBLE FISHERY PRODUCTS—continued		
Fish, salted, dried, smoked, pickled, or preserved—Continued.		
Smoked or kippered:		
Not in oil, and not in airtight containers weighing, with contents, 15 pounds or less each:		
Salmon.....	3, 739	\$2, 128
Herring:		
Whole or beheaded:		
Hard, dry-smoked.....	1, 767, 310	54, 714
Other.....	648, 903	27, 766
Boned, whether or not skinned.....	64, 630	5, 777
Eviscerated, split, skinned, or divided (not boned).....	762, 725	63, 203
Cod, haddock, hake, pollock, and cusk:		
Whole, or beheaded, or eviscerated or both.....	741, 439	66, 670
Filleted, skinned, boned, sliced, or divided.....	1, 753, 099	177, 822
Smoked or kippered, not specially provided for.....	3, 268	671
Fish paste and fish sauce.....	81, 677	18, 979
Prepared or preserved, not specially provided for:		
In containers weighing, with contents, not more than 15 pounds each..	92, 379	12, 575
In bulk or in containers weighing, with contents, more than 15 pounds each.....	147, 295	14, 734
Total.....	144, 606, 162	11, 641, 054
Caviar and other fish roe:		
Not boiled:		
Sturgeon.....	107, 085	190, 887
Fish roe, not specially provided for.....	123, 563	25, 873
Boiled, packed in airtight containers.....	77, 449	10, 019
Total.....	308, 097	226, 779
Shellfish:		
Crab meat, crab sauce, and crab paste.....	7, 814, 293	2, 741, 348
Oysters, oyster juice, or either in combination with other substances, in airtight containers.....	166, 130	40, 580
Razor clams, canned.....	4, 036	462
Clams (except razor clams) and clams in combination with other substances (except clam chowder).....	515, 868	105, 431
Clam chowder, clam juice, and clam juice in combination with other substances.....	826	149
Lobsters (including spiny lobsters and crawfish):		
Not canned.....	14, 254, 249	2, 779, 605
Canned.....	727, 398	326, 129
Turtles.....	641, 017	33, 002
Crabs, fresh or frozen (not crab meat).....	2, 177	187
Clams, quahogs, not in airtight containers, fresh or frozen.....	3, 123, 257	52, 904
Shrimps and prawns.....	3, 459, 558	240, 102
Scallops:		
Fresh but not frozen.....	541, 840	90, 632
Other.....	750, 054	102, 244
Oysters, not in airtight containers:		
Fresh or frozen (except seed oysters).....	243, 775	2, 398
Other.....	1, 811, 565	76, 258
Lobster paste and sauce.....	14, 630	4, 665
Pastes and sauces of shellfish, not specially provided for.....	94, 086	0, 200
Shellfish, not specially provided for.....	3, 985, 538	501, 496
Total.....	38, 150, 287	7, 106, 792
Total edible fishery products.....	302, 623, 795	28, 348, 602
NONEDIBLE FISHERY PRODUCTS		
Marine-animal oils:		
Cod oil.....	gallons.....	Quantity
Cod-liver oil.....	do.....	3, 057, 860
Eulachon oil.....	do.....	939, 481
Hallbut-liver oil.....	do.....	5, 228, 637
Herring oil.....	do.....	3, 326, 496
Seal oil.....	do.....	700
Sod oil.....	do.....	450
Whale oil.....	do.....	3, 641
Whale oil:	do.....	12, 635
Sperm:	do.....	3, 964
Crude.....	do.....	982
Refined or otherwise processed.....	do.....	35
Whale oil, not specially provided for.....	do.....	50, 244
Marine-animal and fish oils, not specially provided for.....	do.....	18, 855
Total.....	do.....	1, 200, 733
	do.....	34, 728
	do.....	1, 707, 510
	do.....	10, 167
Total.....	do.....	11, 304, 119
	do.....	5, 310, 055

See footnotes at end of table.

Imports of fishery products entered for consumption, 1938—Continued

Item	Quantity	Value
NONEDIBLE FISHERY PRODUCTS—continued		
Pearls and imitation pearls:		
Pearls and parts, not strung or set:		
Natural		\$247,387
Cultured or cultivated		222,917
Imitation pearls, half pearls, and hollow or filled		8,700
Imitation pearl beads:		
Hollow or filled		41,508
Solid, except iridescent:		
Valued at not more than ¼ cent per inch	102,456,122 inches	118,840
Valued at more than ¼ cent and not more than 1 cent per inch	44,773 inches	219
Total		639,571
Shells and buttons of pearl or shell:		
Shells, unmanufactured:		
Green snail shell, unmanufactured	62,516 pounds	9,429
Mother-of-pearl	8,024,781 do	1,273,995
Shells, not specially provided for, unmanufactured	11,085,310 do	49,634
Tortoise shell, not sawed, cut, flaked, polished, or otherwise manufactured or advanced in value from natural state	1,056 pounds	5,028
Shells and mother-of-pearl, engraved, cut, ornamented, or manufactured		36,044
Pearl or shell buttons:		
Fresh-water	175,743 gross	38,018
Ocean	236,812 do	72,952
Buttons (from Philippine Islands)	522,169 do	196,426
Total		1,681,526
Sponges:		
Sheepswool	147,236 pounds	284,773
Yellow and grass	202,813 do	73,042
Velvet	30,744 do	33,808
Other	47,808 do	83,531
Manufactures of sponges, not specially provided for	63 do	84
Total	428,664 do	476,238
Agar-agar	688,958 do	333,238
Ambergris	70 do	8,251
Cod-liver oil cake and cod-liver oil cake meal	1,085,419 do	21,113
Cuttlefish bone	298,467 do	24,774
Goldfish	229,958 number	2,180
Fish for other than human consumption		17,683
Fish livers	4,931,580 pounds	658,057
Fish sounds	172,821 do	22,461
Fish scrap and fish meal, not fertilizer	32,922 tons	1,253,231
Fish scrap and fish meal, fertilizer	6,965 do	253,231
Isinglass	95,623 pounds	38,146
Kelp	2,719,380 do	9,034
Fish skins, raw or salted	1,680,126 do	74,977
Seal skins, raw (not fur skins)	1,089,141 do	99,081
Spermaceti wax	75,180 do	14,997
Whalebone, unmanufactured		185
Whalebone, manufactures of		957
Aquarium fish, not elsewhere specified		20,801
Total		2,852,097
Total, nonedible fishery products		10,958,487
Grand total		39,307,089

¹ These statistics have been furnished by the Bureau of Foreign and Domestic Commerce, Department of Commerce.

² Including weight of immediate container.

³ Net weight.

FISHERIES OF THE NEW ENGLAND STATES

(Area XXII) ⁶

The yield of the commercial fisheries of the New England States (Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut) during 1938 amounted to 631,520,300 pounds valued at \$18,275,182 to the fishermen, representing a decrease of 6 percent in volume and 8 percent in value as compared with the catch in 1937. These fisheries gave employment to 20,248 fishermen, as compared with 19,624 in 1937.

There were 421 fishery wholesale and manufacturing establishments in the 5 States in 1938, as compared with 400 in 1937. In 1938 these establishments employed 12,162 persons, paid \$6,969,883 in salaries and wages, and produced manufactured products (canned, cured packaged, and byproducts) valued at \$19,967,143. In 1937 the wholesale and manufacturing firms employed 12,122 persons, paid \$7,705,479 in salaries and wages, and produced manufactured products valued at \$24,038,947.

Fisheries of the New England States, 1938

SUMMARY OF CATCH

Product	Maine		New Hampshire		Massachusetts	
	Pounds	Value	Pounds	Value	Pounds	Value
Fish	50,672,500	\$720,207	55,500	\$4,583	518,357,800	\$10,570,387
Shellfish, etc.....	16,534,100	1,791,043	740,200	104,572	19,492,700	2,293,000
Total	67,206,600	2,520,850	795,700	109,135	537,850,500	13,169,387

Product	Rhode Island		Connecticut		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
Fish	5,957,800	\$198,492	6,184,500	\$207,146	591,198,100	\$12,013,795
Shellfish, etc.....	7,871,100	869,082	5,084,100	1,213,090	50,322,200	6,261,357
Total	13,828,900	1,066,574	11,838,600	1,420,236	631,520,300	18,275,182

OPERATING UNITS: BY STATES

Item	Maine	New Hampshire	Massachusetts	Rhode Island	Connecticut	Total
Fishermen:						
On vessels.....	484	-----	4,109	252	278	5,123
On boats and shore:						
Regular.....	2,394	120	3,842	416	265	7,037
Casual.....	3,480	187	3,051	714	656	8,088
Total.....	6,358	307	11,002	1,382	1,199	20,248
Vessels:						
Steam.....	-----	-----	14	3	3	20
Net tonnage.....	-----	-----	2,589	45	581	3,215
Motor.....	122	-----	395	63	65	645
Net tonnage.....	1,175	-----	16,205	731	1,202	19,813
Total vessels.....	122	-----	409	66	68	665
Total net tonnage.....	1,175	-----	18,794	776	1,783	22,528

⁶ 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 whose principal fishing ports are in the area but at times fish elsewhere. Notable examples are the groundfish fishery in area XXI and the mackerel and southern trawl fisheries in area XXIII.

Fisheries of the New England States, 1938—Continued

OPERATING UNITS: BY STATES—Continued

Item	Maine	New Hampshire	Massachusetts	Rhode Island	Connecticut	Total
Boats:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Motor.....	1,947	38	1,920	307	238	4,510
Other.....	1,930	68	1,487	640	365	4,490
Accessory boats.....	174		417	69	11	661
Apparatus:						
Purse seines:						
Mackerel.....	10		68	1	1	80
Length, yards.....	3,070		32,248	120	160	35,588
Other.....	15		4			19
Length, yards.....	4,060		2,110			6,170
Haul seines.....	28		9	16	23	84
Length, yards.....	3,650		409	2,407	3,070	9,545
Stop seines.....	53					53
Length, yards.....	39,430					39,430
Gill nets:						
Anchor.....	1,014		1,768		2	2,784
Square yards.....	318,116		578,055		375	896,546
Drift.....	530		3,399	16	42	3,957
Square yards.....	142,365		1,159,753	17,640	102,843	1,422,601
Runaround.....					1	1
Square yards.....					330	330
Stake.....	97				17	114
Square yards.....	7,338				2,099	10,037
Lines:						
Hand.....	4,741	750	536	230	63	6,320
Hooks.....	5,140	750	1,101	279	80	7,350
Trawl.....	14,984	50	29,064	43		44,141
Hooks.....	832,500	2,500	1,824,640	19,053		2,678,693
Troll.....				64		64
Hooks.....				64		64
Trot with hooks.....					14	14
Hooks.....					1,600	1,600
Pound nets.....			128	21	15	164
Floating traps.....	17		57	37		111
Weirs.....	247		2			249
Fyke nets.....	27		26	38	49	140
Dip nets.....	65		139	20	131	414
Bag nets.....	107	31				138
Push nets.....			84			84
Otter trawls.....	60		351	35	63	609
Yards at mouth.....	1,419		10,463	828	1,463	14,163
Box traps.....	14			2		16
Pots:						
Crab.....	200		5,034			5,234
Eel.....	173		775	1,087	1,894	3,929
Fish.....					24	24
Lobster.....	170,547	3,740	78,886	28,995	20,342	302,510
Periwinkle and oockle.....			104	1,033		1,137
Harpoons.....	62		99	49	13	223
Spears.....	5		38	24	2	69
Dredges:						
Clam.....			90	12		102
Yards at mouth.....			43	12		55
Mussel.....				4		4
Yards at mouth.....				4		4
Oyster.....	1		43	32	74	150
Yards at mouth.....	2		44	48	104	198
Scallop.....	140		2,496	634		3,270
Yards at mouth.....	168		2,327	612		3,007
Tongs:						
Oyster.....			43	57	44	144
Other.....			128	493	93	714
Rakes:						
Oyster.....				36	3	39
Other.....	3		1,130	101	79	1,313
Forks:						
.....			579	39	3	621
Hoes:						
.....	2,146	105	1,599	51	26	3,926

Fisheries of the New England States, 1938—Continued

CATCH: BY STATES

Species	Maine		New Hampshire		Massachusetts		Rhode Island		Connecticut		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
FISH												
Alewives	3,140,100	\$12,160			957,800	\$6,348	180,600	\$1,194	28,300	\$263	4,306,800	\$19,985
Anchovies							61,000	670			61,000	670
Bluefish					71,100	5,692	39,400	3,690	10,100	1,511	120,600	10,893
Bonito					6,100	399	22,300	2,456			28,300	2,555
Butterfish	17,800	976			1,225,800	46,918	446,300	17,445	190,300	3,981	1,880,200	69,320
Carp									35,300	2,094	35,300	2,094
Cod	6,220,600	124,795	1,500	\$45	111,315,200	2,060,590	735,700	21,885	111,800	3,354	118,384,800	2,210,669
Crovalle							900	14			900	14
Croaker					1,729,100	31,927					1,729,100	31,927
Cunner	45,300	802					43,900	439	1,000	10	90,200	1,251
Cusk	1,505,900	27,638	1,000	28	6,037,800	102,571					7,544,700	130,237
Drum, red					1,600	25					1,600	25
Eels:												
Common	85,000	6,771			284,400	10,168	88,300	7,575	55,700	3,444	513,400	27,958
Conger					114,700	2,280	10,200	243	1,100	16	128,000	2,539
Flounders:												
Gray sole	763,200	22,835			7,436,700	291,388					8,199,900	314,223
Lemon sole	13,200	265			3,313,600	214,013					3,326,800	214,278
Yellowtail and dab	397,600	5,853			17,447,100	373,785	358,200	5,885	1,757,700	23,722	19,960,600	409,245
Blackback	590,200	16,493			8,745,800	305,611	419,700	14,028	2,527,200	99,885	12,282,900	436,017
Fluke					1,954,600	141,962	173,300	13,122			2,410,500	175,294
Unclassified	50,700	1,414			603,900	20,891					654,600	22,305
Frigate mackerel							2,000	20			2,000	20
Goosefish					400	7					400	7
Grayfish					42,400	1,065	3,800	46			46,200	1,111
Haddock	2,508,500	76,974	2,000	80	155,424,500	3,375,765					157,935,000	3,452,819
Hake	9,048,000	84,983	3,000	60	14,764,100	235,811	4,000	69	8,000	140	23,827,100	321,063
Hallibut	39,400	5,595			1,932,600	200,608					1,972,000	206,203
Herring, sea	16,055,000	154,768			4,880,700	36,065	111,200	689			21,046,900	191,522
Herring smelt					500	10					500	10
Hickory shad							6,700	148	400	4	7,100	152
King whiting or "kingfish"							2,000	114	100	2	7,300	223
Lamprey									1,900	56	1,900	56
Mackerel	1,980,900	45,435			36,832,900	1,103,273	483,200	14,656	49,900	1,211	39,346,900	1,164,575
Menhaden					39,100	322	131,100	1,197	157,700	393	327,900	1,912
Minnows									600	79	600	79
Pollock	5,919,900	48,843			34,220,800	397,659	100,100	1,498	45,900	676	40,286,700	448,676
Rosefish	569,600	6,276			64,435,700	797,148					65,005,300	803,424
Salmon	16,700	4,720			500	92					16,200	4,812
Scup or porgy	100	2			9,816,600	252,260	1,145,900	20,582	121,090	2,435	11,083,600	275,279
Sea bass					3,603,300	144,067	67,100	56,700	5,620	3,727,100	154,624	
Sea robin					80,500	1,288	288,600	2,686	4,000	80	373,100	4,054
Shad	11,900	512			54,500	2,171	9,600	981	426,800	25,788	502,800	29,452
Sharks	25,900	339			123,100	3,340	3,300	39			152,300	3,718

Fisheries of the New England States, 1938—Continued

CATCH: BY STATES—Continued

Species	Maine		New Hampshire		Massachusetts		Rhode Island		Connecticut		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
FISH—continued												
Skates.....					66,200	994	221,300	1,714	66,000	672	353,600	3,380
Skipper or "billfish".....					800	\$116	600	\$60			1,400	\$176
Smelt.....	692,800	\$58,302	48,000	\$4,350	25,900	5,101					766,700	67,753
Spot.....					8,200	103					8,200	163
Squatagues, or "sea trout," gray.....					271,700	6,050	61,100	3,550	6,200	\$261	339,000	9,861
Striped bass.....					81,600	8,586	210,300	19,867	9,000	943	300,900	29,396
Sturgeon.....	500	28			8,500	797	1,900	240	200	69	11,100	1,134
Suckers.....	30,500	762							93,600	1,831	124,100	2,593
Swordfish.....	59,500	10,325			1,826,100	307,544	167,900	25,097	34,000	7,133	2,087,500	350,100
Tautog.....					37,500	1,547	142,300	5,187	18,700	457	198,500	7,191
Tilfish.....					367,000	14,445					367,000	14,445
Tomcod.....	7,700	204			11,000	578					18,700	782
Tuna.....	181,600	5,146			1,364,900	50,926	20,900	2,054			1,567,400	58,126
White perch.....							2,000	140			2,000	140
Whiting.....	647,500	5,492			24,203,400	265,612	191,200	2,265	52,700	786	25,094,800	274,165
Wolfish.....	47,600	472			2,564,000	47,811					2,611,600	48,283
Yellow perch.....	300	26			18,300	501					18,600	527
Total.....	50,672,500	729,207	55,500	4,563	518,357,800	10,876,387	5,957,800	196,492	6,154,500	207,146	581,198,100	12,013,795
SHELLFISH, ETC.												
Crabs:												
Hard.....	523,300	14,168			1,292,600	30,742	229,000	6,977	2,800	165	2,047,700	52,052
Soft and peelers.....							300	100			300	100
Lobsters.....	7,659,200	1,310,013	170,200	37,272	2,315,100	499,410	709,700	159,876	553,600	136,047	11,407,800	2,142,618
Shrimp.....	82,500	5,691			23,200	1,930					105,700	7,621
Clams:												
Hard, public ¹	55,000	4,000			2,294,500	262,656	2,101,100	176,783	210,500	43,574	4,661,100	487,013
Hard, private ¹					4,200	518	63,100	5,750			67,300	6,268
Razor.....					512,900	13,859					512,900	13,859
Soft, public ²	7,134,300	317,951	570,000	67,300	4,749,700	436,858	237,100	16,515	15,500	2,636	12,706,600	841,260
Soft, private ²					28,000	2,500					28,000	2,500
Surf or skimmer.....					1,300	76					1,300	76
Limpets.....							900	70			900	70
Mussels, sea.....	7,200	175			15,700	441	1,200	180			24,100	796
Oysters, market: ³												
Public, spring.....					7,900	1,430	42,600	7,948	14,700	2,662	65,200	12,040
Public, fall.....							40,300	7,537	29,200	4,803	69,500	12,340
Private, spring.....					219,800	78,315	1,551,100	193,956	1,983,900	431,100	3,754,800	703,371
Private, fall.....							1,950,400	248,084	2,797,400	578,315	4,747,800	826,399
Periwinkles and cockles.....	1,800	150			9,600	747	83,100	4,363			94,500	5,260

Scallops:												
Bay					1,095,300	353,229	64,300	18,382	66,800	13,624	1,226,400	385,235
Sea	792,900	86,477			5,057,200	535,406	400	118			5,850,500	622,001
Squid	5,200	52			1,344,800	16,225	793,400	12,367	9,700	164	2,153,100	28,808
Turtles:												
Green							3,000	75			3,000	75
Loggerhead							100	1			100	1
Sea urchins	97,500	455									97,500	455
Irish moss					177,200	15,714					177,200	15,714
Kelp					120,000	720					120,000	720
Bloodworms	116,400	34,884			26,300	6,289					142,700	41,173
Sandworms	58,800	17,627			197,400	35,935					256,200	53,562
Total	16,534,100	1,791,643	740,200	104,572	19,492,700	2,293,000	7,871,100	859,082	5,684,100	1,213,090	50,322,200	6,261,387
Grand total	67,206,600	2,520,850	795,700	109,135	537,850,500	13,169,387	13,828,900	1,055,574	11,838,600	1,420,236	631,520,300	18,275,182

¹ Statistics on hard clams are based on yields of 11 pounds of meats per standard bushel in Maine; 11.13 pounds in Massachusetts; 15.81 pounds in Rhode Island; and 12.04 pounds in Connecticut.

² Statistics on soft clams are based on yields of 15 pounds of meats per standard bushel in Maine and New Hampshire; 13.93 pounds in Massachusetts; and 20 pounds in Rhode Island and Connecticut.

³ Statistics on oysters are based on yields of 6.57 pounds of meats per standard bushel in Massachusetts; 7 pounds in Rhode Island; and 7.63 pounds in Connecticut.

NOTE.—Data on the yield of shellfish meats per bushel are based on U. S. standard bushels of 2,150.4 cubic inches capacity. The above data includes the catch made by New England craft in the southern trawl fishery.

The seed oyster fishery in the New England States was prosecuted in Rhode Island and Connecticut. In Rhode Island, 24 fishermen, using 1 motorboat, 23 other boats, 4 tongs, and 20 rakes, took 39,050 bushels of seed oysters, valued at \$19,525 from public beds. Twenty-three of these fishermen are duplicated among those fishing for market oysters or other species. Similarly, the following craft and gear are duplicated: 23 rowboats, 3 tongs, and 20 rakes. In Connecticut, 335 fishermen, using 3 steam vessels, 17 motor vessels, 21 sail vessels, 22 motorboats, 81 other boats, 182 dredges, 92 tongs, and 7 rakes, took 80,584 bushels of seed oysters, valued at \$64,784 from public beds, and 353,440 bushels, valued at \$359,224 from private beds. Of the total number of persons fishing for seed oysters in Connecticut, 152 are duplicated among those fishing for market oysters or other species. Similarly, the following craft and gear are duplicated: 6 motor vessels, 18 motorboats, 65 other boats, 12 dredges, 72 tongs, and 3 rakes.

Fisheries of the New England States, 1938—Continued

SUPPLEMENTARY TABLE SHOWING THE PRODUCTION OF CERTAIN SHELLFISH IN NUMBER AND BUSHELS

Product	Maine		New Hampshire		Massachusetts		Rhode Island		Connecticut		Total	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Crabs:												
Hard.....number.....	1,786,400	\$14,168			5,137,200	\$30,742	687,000	\$6,977	8,050	\$165	7,618,650	\$52,052
Soft and peelers.....do.....							1,200	100			1,200	100
Clams:												
Hard, public.....bushels.....	5,000	4,000			206,155	262,656	132,897	176,783	17,483	43,574	361,535	487,013
Hard, private.....do.....					377	518	3,991	5,750			4,368	6,268
Razor.....do.....					17,051	13,859					17,051	13,859
Soft, public.....do.....	475,620	317,951	38,000	\$87,300	340,969	436,858	11,855	16,515	775	2,636	867,219	841,260
Soft, private.....do.....					2,010	2,500					2,010	2,500
Surf or skimmer.....do.....					76	76					76	76
Limpets.....do.....							69	70			69	70
Mussels, sea.....do.....	600	175			1,308	441	92	180			2,000	796
Oysters, market:												
Public, spring.....do.....					1,202	1,430	6,086	7,948	1,927	2,662	9,215	12,040
Public, fall.....do.....							5,757	7,537	3,827	4,803	9,584	12,340
Private, spring.....do.....					33,455	78,315	221,586	193,956	260,013	431,100	515,054	703,371
Private, fall.....do.....							278,629	248,084	386,632	578,315	645,291	826,389
Periwinkles and cockles.....do.....	100	150			533	747	4,617	4,383			5,250	5,260
Scallops:												
Bay.....do.....					182,550	353,229	9,186	18,382	10,277	13,624	202,013	385,235
Sea.....do.....	132,150	86,477			842,867	535,406	57	118			975,074	622,001

NOTE.—Bushels represent U. S. Standard Bushels of 2,150.4 cubic inches capacity.

Industries related to the fisheries of the New England States, 1938

OPERATING UNITS, SALARIES, AND WAGES

Item	Maine and New Hampshire	Massachusetts	Rhode Island	Connecticut	Total
	Number	Number	Number	Number	Number
Transporting:					
Persons engaged:					
On vessels.....	130	68	26	17	241
On boats.....	11	54	-----	-----	65
Total.....	141	122	26	17	306
Vessels, motor.....	65	9	8	9	91
Net tonnage.....	714	332	144	295	1,485
Boats.....	8	27	-----	-----	35
Wholesale and manufacturing:					
Establishments.....	160	212	29	30	431
Persons engaged:					
Proprietors.....	135	254	24	27	440
Salaried employees.....	164	514	39	37	754
Wage earners:					
Average for season.....	5,389	4,788	321	470	10,968
Average for year.....	1,638	3,958	189	253	6,038
Paid to salaried employees.....	\$259,012	\$1,553,622	\$83,190	\$115,205	\$2,011,029
Paid to wage earners.....	\$1,024,765	\$3,494,664	\$172,914	\$286,511	\$4,988,854
Total salaries and wages.....	\$1,283,777	\$5,048,286	\$256,104	\$381,716	\$6,969,883
Fishermen manufacturing.....	1,035	2,101	260	-----	3,396

PRODUCTS MANUFACTURED

Item	Maine		Massachusetts		Rhode Island		Connecticut	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
By manufacturing establishments:								
Alewives, salted pounds.....	747,900							
Cod:								
Fresh filets.....do.....	151,000	15,230	7,979,059	\$692,987	(?)	(?)	-----	-----
Fresh sticks.....do.....	310,900	34,865	-----	-----	-----	-----	-----	-----
Frozen filets.....do.....	128,000	12,480	8,481,443	741,233	-----	-----	-----	-----
Salted:								
Green.....do.....	745,861	32,202	-----	-----	-----	-----	-----	-----
Dry.....do.....	110,000	6,650	1,994,061	148,980	-----	-----	-----	-----
Boneless, including absolutely boneless.....pounds.....	297,294	39,475	7,425,378	1,078,918	-----	-----	-----	-----
Smoked filets.....do.....	93,011	9,760	529,323	59,420	-----	-----	-----	-----
Oil:								
Cod.....gallons.....	4,604	1,308	-----	-----	-----	-----	-----	-----
Cod liver.....do.....	20,565	11,409	240,991	158,577	-----	-----	-----	-----
Cusk:								
Fresh filets.....pounds.....	69,250	7,100	1,022,535	98,432	-----	-----	-----	-----
Fresh sticks.....do.....	636,300	65,788	-----	-----	-----	-----	-----	-----
Frozen filets.....do.....	(?)	(?)	188,916	14,713	-----	-----	-----	-----
Smoked filets.....do.....	64,000	6,550	689,223	68,230	-----	-----	-----	-----
Flounders:								
Fresh filets.....do.....	45,500	5,424	1,551,514	245,681	-----	-----	-----	-----
Frozen filets.....do.....	(?)	(?)	1,677,810	244,401	-----	-----	-----	-----
Haddock:								
Fresh filets.....do.....	148,500	23,635	16,013,963	1,510,178	(?)	(?)	-----	-----
Fresh sticks.....do.....	78,000	11,300	-----	-----	-----	-----	-----	-----
Frozen filets.....do.....	59,000	6,150	21,144,405	1,876,205	-----	-----	-----	-----
Finnan haddie.....do.....	184,900	17,507	505,809	41,551	(?)	(?)	-----	-----
Hake:								
Fresh filets.....do.....	213,000	19,250	2,205,091	177,890	-----	-----	-----	-----
Fresh sticks.....do.....	674,800	65,482	-----	-----	-----	-----	-----	-----
Frozen filets.....do.....	(?)	(?)	301,948	15,385	-----	-----	-----	-----
Salted:								
Green.....do.....	1,872,842	59,642	-----	-----	-----	-----	-----	-----
Dry.....do.....	(?)	(?)	936,059	53,948	-----	-----	-----	-----
Boneless, including absolutely boneless.....pounds.....	207,538	15,696	-----	-----	-----	-----	-----	-----

See footnotes, p. 287.

Industries related to the fisheries of the New England States, 1938—Continued

PRODUCTS MANUFACTURED—Continued

Item	Maine		Massachusetts		Rhode Island		Connecticut	
	Quantity (²)	Value (³)	Quantity 165,500	Value \$7,457	Quantity	Value	Quantity	Value
By manufacturing establishments—Continued:								
Herring, sea:								
Salted:								
Split... pounds..								
Brine salted pounds..	382,000	\$11,870						
Pickled in vine- gar... pounds..	364,200	14,472	(²)	(²)				
Smoked:								
Bloaters:								
Hard... do....	66,150	2,685	(²)	(²)				
Soft... do....	335,140	14,837	156,000	13,101				
Boneless... do..	1,990,214	242,867	(²)	(²)				
Lengthwise pounds..	81,100	4,367						
Medium scaled pounds..	155,438	9,144	(²)	(²)				
Klippered... do..	(²)	(²)	117,179	16,568				
Canned "sardines"								
std. cases..	671,635	2,367,045						
Meal... tons..	1,652	42,974						
Oil... gallons..	56,462	6,132						
Mackerel:								
Fresh fillets								
pounds..			127,302	23,082				
Frozen fillets... do..			485,355	33,439				
Salted, split... do..			1,784,090	167,547				
Smoked... do....			128,720	21,519				
Pollock:								
Fresh fillets... do..								
	135,000	7,310	2,540,468	166,748				
Fresh sticks... do..	49,200	2,570						
Frozen fillets... do..	1,182,000	71,560	9,388,635	490,582				
Salted:								
Green? ... do....	386,611	10,498						
Dry... do....	84,000	3,863	248,225	11,122				
Rosefish:								
Fresh fillets... do..	(²)	(²)	6,051,632	476,397				
Frozen fillets... do..	365,000	32,300	12,720,359	1,057,018				
Whitefish, smoked								
pounds..			240,500	97,450				
Whiting:								
Fresh fillets... do..								
			345,900	25,690				
Frozen fillets... do..	(²)	(²)	530,615	35,752				
Frozen sticks... do..			1,173,794	71,665				
Pan-dressed... do..			5,261,639	192,662				
Wolfish:								
Fresh fillets... do..								
			78,537	7,894				
Frozen fillets... do..	(²)	(²)	123,200	13,004				
Crab meat, packaged, fresh-cooked... pounds..								
	104,250	44,303	229,036	77,272	(²)	(²)		
Lobster meat, packaged, fresh-cooked... pounds..								
	9,450	10,950	200,379	213,844				
Clams, hard, fresh- shucked... gallons..								
			(²)	(²)	3,545	\$5,829		
Clams, soft:								
Fresh-shucked								
gallons..	121,060	135,172	333,154	471,190	7,875	8,665		
Canned:								
Whole								
std. cases..	119,612	439,384						
Juice, bouillon, and cocktail std. cases..	23,151	41,267						
Chowder... do..	42,716	135,028	(²)	(²)				
Oysters, fresh-shucked								
gallons..			(²)	(²)	281,003	530,080	254,421	\$505,848
Unclassified products:								
Fillets, fresh and frozen... pounds..								
	452,000	54,030	(²)	(²)	(²)	(²)		
Steaks, fresh and frozen... pounds..								
			7,289,486	731,753				
Salted... do....	231,058	8,871	2,032,004	148,621				
Smoked... do....	(²)	(²)	10,590,341	10,97,763	(²)	(²)	(²)	(²)
Canned:								
Fish cakes, balls, etc. std. cases..								
	(²)	(²)	81,084	572,946				
Cat and dog food std. cases..								
			61,363	111,065				
Other... do....	57,134	336,488	71,143	506,987	(²)	(²)		

See footnotes, p. 287.

Industries related to the fisheries of the New England States, 1938—Continued

PRODUCTS MANUFACTURED—Continued

Item	Maine		Massachusetts		Rhode Island		Connecticut	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
By manufacturing establishments—Continued.								
Unclassified products—Continued.								
Meal, miscellaneous tons	¹³ 327	¹³ \$20, 610	¹⁴ 12, 987	¹⁴ \$581, 697				
Oil, miscellaneous liver gallons			¹⁵ 11, 900	¹⁵ 501, 960				
Glue do			364, 961	749, 380				
Miscellaneous		¹⁶ 307, 036		¹⁷ 161, 337		¹⁸ \$195, 524	(¹⁹)	(¹⁹)
Total		4, 854, 966		13, 866, 231		740, 098	254, 421	\$505, 848
By fishermen:								
Alewives, smoked pounds	158, 000	8, 255	6, 000	470	1, 100	22		
Cod:								
Salted:								
Green ¹ do	10, 000	375	66, 900	1, 947				
Dry do	2, 000	160						
Roe do					94	19		
Cusk, salted, green ² pounds			600	12				
Hake, salted, green ² pounds			300	5				
Halibut, salted, green ² pounds			4, 900	398				
Mackerel, salted, split pounds			400	14				
Pollock, salted, green ² pounds			2, 300	57				
Crab meat, packaged, fresh-cooked pounds	2, 730	956	200	91				
Lobster meat, packaged, fresh-cooked pounds			700	916				
Clams, hard, fresh-shucked gallons					250	437		
Clams, razor, fresh-shucked gallons			28, 280	11, 443				
Clams, soft:								
Fresh-shucked gallons	⁴ 71, 554	⁴ 63, 685	23, 601	31, 022				

¹ A small quantity of manufactured products which were produced in New Hampshire have been included with those of Maine.

² This item has been included under "Unclassified products."

³ This item is usually an intermediate product, and although included in the total, may be shown in the final stage of processing in this or another State.

⁴ Includes New Hampshire production.

⁵ Includes fresh filets of rosefish; and frozen filets of cusk, flounder, hake, whiting, and wolffish.

⁶ The production of this item has been included under "Miscellaneous."

⁷ Includes fresh steaks of cod; and frozen steaks of cod, haddock, halibut, pollock, salmon, swordfish, and wolffish.

⁸ Includes green salted cusk, and haddock; dry salted cusk, haddock, and hake; salted boneless cusk and pollock; brine salted mackerel, and split sea herring.

⁹ Includes dry salted cusk, and haddock; salted boneless cusk, haddock, and pollock; salted mackerel filets and alewives.

¹⁰ Includes smoked butterfish, alewives, flounders, halibut, lake trout, salmon, shad, and carp; smoked filets of haddock, and pollock; smoked boneless and medium sealed herring, and hard blotters.

¹¹ Includes canned finnan haddie; fish cakes, flakes, and chowder; alewife roe, and crab meat.

¹² Includes canned alewives, tuna, mackerel, finnan haddie, salted cod, groundfish roe, fish flakes, haddock chowder, soft and hard clam chowder, and canned fish for rat-poison bait.

¹³ Includes clam, ground-fish, and miscellaneous fish meals.

¹⁴ Includes rosefish, ground-fish, and miscellaneous fish meals.

¹⁵ Includes halibut, sablefish, tuna, swordfish, shark, and mixed liver oils.

¹⁶ Includes alewives pickled in vinegar; smoked pollock filets, and kippered herring; pearl essence, kelp products; herring dry scrap and pomace; and marine-shell buttons. There also is included in this item a production of smoked butterfish, carp, chub, cisco, salmon, spoonbill cat, and common eels, which was produced in Connecticut.

¹⁷ Includes fresh filets of halibut, red snapper, and striped bass; frozen filets of halibut and salmon; sea herring pickled in vinegar; and fresh-shucked hard clams, oysters, and bay scallops.

¹⁸ Includes fresh filets of cod and haddock; smoked finnan haddie; canned hard clam chowder; fresh-cooked crab and lobster meat; and miscellaneous marine-shell products.

¹⁹ A small production of smoked butterfish, carp, chub, cisco, salmon, spoonbill cat and eels has been included under "Miscellaneous" for Maine.

NOTE.—The total value of manufactured products for the New England States was as follows: By manufacturing establishments, \$19,967,143; and by fishermen, \$1,210,024. Some of the above products may have been manufactured from products imported from another State or a foreign country, therefore, they cannot be correlated directly with the catch within the State. All of the persons engaged in the preparation of fishermen's manufactured products have also been included as fishermen, and 50 of the persons shown on transporting craft have also been included as fishermen. This should be considered when computing the total number of persons in the fishery industries exclusive of duplication.

Industries related to fisheries of the New England States, 1938—Continued

PRODUCTS MANUFACTURED—Continued

Item	Maine		Massachusetts		Rhode Island		Connecticut	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
By fishermen—Continued.								
Clams, soft—Continued.								
Steamed meats								
pounds	272,745	\$21,238						
gallons	80	160						
Pickled								
gallons								
Oysters, fresh-shucked			1,000	\$2,200	1,624	\$3,003		
gallons								
Scallops:								
Bay, fresh-shucked			88,480	289,457	7,041	24,687		
gallons								
Sea, fresh-shucked								
gallons	88,270	86,352	585,580	667,233	46	161		
Total		182,431		1,005,264		28,329		
Grand total		5,037,397		14,871,495		768,427	254,421	\$505,848

MAINE

Fisheries of Maine, 1938

OPERATING UNITS: BY GEAR

Item	Purse seines		Haul seines	Stop seines	Gill nets			Lines	
	Mack-erel	Other			Anchor	Drift	Stake	Hand	Trawl
Fishermen:	Number	Number	Number	Number	Number	Number	Number	Number	Number
On vessels	26	47		127	95	19		10	133
On boats and shore:									
Regular	20	16	47	75	23	41	1	164	308
Casual			39	7	49	5	34	838	64
Total	46	63	86	209	172	65	35	1,012	505
Vessels, motor	5	10		32	18	6		4	23
Net tonnage	40	77		293	167	55		24	296
Boats:									
Motor	5	4	33	22	17	30		160	238
Other	9	7	38	60	33	1	22	2	1
Accessory boats	8	9		90					66
Apparatus:									
Number	10	15	36	53	1,014	530	97	4,741	14,984
Length, yards	3,070	4,060	3,650	39,430					
Square yards					318,116	142,365	7,838		
Hooks, baits, or snoods								5,140	832,500

Item	Float- ing traps	Weirs	Fyke nets	Dip nets	Bag nets	Otter trawls	Box traps	Pots, crab
Fishermen:								
On vessels								
On boats and shore:								
Regular		31	253		9	33	59	4
Casual		3	109	5	73	46	20	
Total		34	362	5	82	79	138	20
Vessels, motor							23	
Net tonnage							241	
Boats:								
Motor	14	31					46	4
Other	28	352	5	18	12		11	1
Apparatus:								
Number	17	247	27	65	107	60	14	200
Yards at mouth						1,419		

Fisheries of Maine, 1938—Continued

OPERATING UNITS; BY GEAR—Continued

Item	Pots—Contd.		Har- poons	Spears	Dredges		Rakes, other than for oysters	Hoes	By hand, other than for oysters	Total, exclu- sive of dupli- cation
	Eel	Lob- ster			Oyster	Scallop				
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Fishermen:										
On vessels.....		30	19		1	27				484
On boats and shore:										
Regular.....	3	1,682	71			95	3	580	3	2,394
Casual.....	9	920	27	5		36		1,566		3,480
Total.....	12	2,641	117	5	1	158	3	2,146	3	6,358
Vessels, motor.....		27	3		1	5				122
Net tonnage.....		165	78		8	72				1,175
Boats:										
Motor.....		1,709	59			89				1,947
Other.....	9	701	2	5			3	735		1,930
Accessory boats.....										174
Apparatus:										
Number.....	173	170,647	62	5	1	140	3	2,146		
Yards at mouth.....					2	166				

CATCH: BY GEAR

Species	Purse seines				Haul seines		Stop seines	
	Mackerel		Other		Pounds	Value	Pounds	Value
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	20,400	\$309	640,400	\$1,763				
Butterfish.....	100	4	1,400	66				
Herring, sea.....	152,700	1,501	647,500	5,325	227,200	\$1,930	10,183,600	\$109,686
Mackerel.....	348,800	8,859	284,000	7,018				
Pollock.....	532,200	3,422	876,400	6,001				
Shad.....	1,800	19						
Smelt.....					207,300	15,563		
Whiting.....					12,000	110		
Total.....	1,062,000	14,114	2,449,700	20,168	446,500	17,603	10,183,600	109,686

Species	Gill nets						Lines	
	Anchor		Drift		Stake		Hand	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	100	\$4	4,200	\$27				
Cod.....	2,231,100	53,354	100	1			413,000	\$6,829
Cusk.....	15,000	235					600	11
Flounders:								
Gray sole.....	700	12						
Yellowtail and dab.....	2,200	16						
Blackback.....	2,400	57						
Unclassified.....	300	4					1,000	85
Haddock.....	527,300	15,630					28,000	881
Hake.....	1,266,700	16,120	300	2			29,600	292
Hallbut.....	200	22					3,500	562
Mackerel.....	200	7	191,000	7,410				
Pollock.....	4,006,200	34,438					183,900	1,605
Rosefish.....	3,400	27						
Shad.....	6,900	329	200	1				
Sharks.....	23,800	302	800	17	500	\$78		
Smelt.....	81,400	3,755	1,300	24				
Sturgeon.....	300	14			10,500	1,165	250,800	21,671
Tuna.....							9,800	295
Whiting.....	6,000	31	4,600	31				
Wolfish.....	2,100	22						
Total.....	8,126,300	123,399	202,300	7,513	17,000	1,243	890,200	32,131

U. S. BUREAU OF FISHERIES

Fisheries of Maine, 1938—Continued

CATCH: BY GEAR—Continued

Species	Lines—Continued		Floating traps		Weirs		Fyke nets	
	Trawl		Pounds	Value	Pounds	Value	Pounds	Value
Alewives			2,800	\$14	535,000	\$2,404		
Butterfish			16,100	896				
Cod	3,076,200	\$52,452						
Cunners	45,300	802						
Cusk	1,459,900	26,985						
Eels, common							300	\$23
Flounders:								
Gray sole	9,200	261						
Yellowtail and dabs	11,400	116						
Blackback	1,600	25						
Unclassified	5,000	110			3,000	40		
Haddock	1,368,500	42,717						
Hake	6,586,500	69,773						
Halibut	31,700	4,929						
Herring, sea			189,000	1,550	4,654,400	34,759		
Mackerel			736,100	17,679	421,800	4,467		
Pollock	339,000	3,389	2,000	11				
Rosefish	16,100	159						
Salmon			5,700	1,451	9,900	3,249		
Shad			1,909	65				
Sharks	600	9						
Smelt					22,100	2,293		
Suckers							30,500	762
Swordfish	100	12						
Tomcod							2,700	54
Tuna	200	5	100	3				
Wolfish	36,500	380					300	26
Yellow perch								
Squid			5,200	52				
Total	12,990,800	192,124	957,800	21,731	5,646,200	47,217	33,800	865

Species	Dip nets		Bag nets		Otter trawls		Box traps	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives	1,931,100	\$7,636			100	\$3		
Butterfish					200	10		
Cod					500,200	12,159		
Cusk					30,400	407		
Eels, common							46,000	\$4,370
Flounders:								
Gray sole					753,300	22,562		
Lemon sole					13,200	265		
Yellowtail and dab					384,000	5,721		
Blackback					580,200	16,411		
Unclassified					41,400	1,175		
Haddock					584,700	17,746		
Hake					1,164,900	9,796		
Halibut					1,000	82		
Herring, sea					600	7		
Pollock					10,200	77		
Rosefish					649,900	6,089		
Salmon	100	20						
Scup					100	2		
Shad					300	4		
Smelt	20,800	2,500	134,900	\$11,350				
Sturgeon					200	14		
Tomcod			5,000	150				
Whiting					624,900	5,300		
Wolfish					9,000	70		
Shrimp					82,500	5,691		
Scallops, sea					400	63		
Sea urchins	97,500	455						
Total	2,058,500	10,611	139,900	11,500	5,337,700	103,654	45,000	4,370

Fisheries of Maine, 1938—Continued

CATCH: BY GEAR—Continued

Species	Pots						Harpoons	
	Crab		Eel		Lobster		Pounds	Value
	Pounds	Value	Pounds	Value	Pounds	Value		
Eels, common.....			37,000	\$2,135			200	\$4
Sharks.....							59,400	10,314
Swordfish.....							171,500	4,843
Tuna.....					430,000	\$12,068		
Crabs, hard.....	93,300	\$2,100			7,659,200	1,310,013		
Lobsters.....								
Total.....	93,300	2,100	37,000	2,135	8,089,200	1,322,081	231,100	15,161

Species	Spears		Dredges		Rakes		Hoes		By hand	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Eels, common.....	2,700	\$243								
Clams:										
Hard, public.....							55,000	\$4,000		
Soft, public.....							7,134,300	317,951		
Mussels, sea.....					7,200	\$175				
Periwinkles and cockles.....									1,800	\$150
Scallops, sea.....			792,500	\$86,414						
Bloodworms.....							116,400	34,884		
Sandworms.....							58,800	17,627		
Total.....	2,700	243	792,500	86,414	7,200	175	7,364,500	374,462	1,800	150

OPERATING UNITS: BY COUNTIES

Item	Cum-ber-land	Han-cock	Ken-nec-bec	Knox	Lin-coln	Pe-nob-scot	Saga-dahoc	Wal-do	Wash-ing-ton	York
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Fishermen:										
On vessels.....	238	39		101	67				24	15
On boats and shore:										
Regular.....	287	514		444	283		81	35	488	262
Casual.....	381	1,014	14	814	462	26	262	76	803	128
Total.....	906	1,567	14	859	812	26	343	111	1,315	405
Vessels, motor.....	43	13		40	17				6	3
Net tonnage.....	521	116		320	150				45	23
Boats:										
Motor.....	296	444		430	244		56	7	301	169
Other.....	238	398	5	204	238	18	73	56	588	112
Accessory boats.....	90	15		24	22				20	3
Apparatus:										
Purse seines:										
Mackerel.....	2	1		2	5					
Length, yards.....	550	250		370	1,900					
Other.....	2	2		1	6				1	3
Length, yards.....	600	400		140	1,830				270	820
Haul seines, common.....	30	1		1	4					
Length, yards.....	3,000	30		100	520					
Stop seines.....	13	11		4	12		1			12
Length, yards.....	11,250	6,950		2,970	8,780		500		8,980	
Gill nets:										
Anchor.....	514	27			271					202
Square yards.....	232,378	1,798			60,640				23,300	
Drift.....	303			16						211
Square yards.....	85,165			3,280						58,920
Stake.....					6	72		19		
Square yards.....					268	5,940		1,140		
Lines:										
Hand.....	69	2,135	54	65	1,017		1,263		136	2
Hooks.....	134	2,209	108	130	1,029		1,268		268	4
Trawl.....	5,304	3,487		1,690	1,415		690		2,198	200
Hooks.....	279,000	206,360		88,500	73,180		62,750		112,750	10,000
Floating traps.....	4	1			4		7	1		
Weirs.....		108		22	2			16	99	

Fisheries of Maine, 1938—Continued

OPERATING UNITS: BY COUNTIES—Continued

Item	Cumber-land	Han-cock	Ken-ne-bee	Knox	Lin-coln	Pe-nob-scot	Saga-dahoc	Wal-do	Wash-ing-ton	York
Apparatus—Continued.	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber
Fyke nets			27							
Dip nets		5		15	18		2		24	1
Bag nets		2						50	55	
Otter trawl, fish	22	19		12	5				1	1
Yards at mouth	505	480		293	115				13	13
Box traps		2		3					9	
Pots:										
Crab	200									
Eel					60			60	53	
Lobster	22, 175	38, 152		41, 315	22, 615		5, 240	810	26, 315	13, 925
Harpoons	41				9		12			
Spears				3	2					
Dredges:										
Oyster	1									
Yards at mouth	2									
Scallop	18	96		16					10	
Yards at mouth	26	98		32					10	
Rakes, other than for oysters	3									
Hoes	285	541		120	217		30	32	771	150

CATCH: BY COUNTIES

Species	Cumberland		Hancock		Kennebec		Knox	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives	20, 600	\$186	556, 400	\$2, 669			413, 900	\$1, 008
Butterfish	4, 800	266					80, 300	1, 436
Cod	3, 111, 800	70, 056	848, 700	12, 056			670, 600	11, 490
Cunners	28, 000	542	17, 300	260				
Cusk	1, 058, 900	20, 778	14, 800	168			54, 300	818
Eels, common			800	80	300	\$23	1, 500	131
Flounders:								
Gray sole	400, 700	12, 914	166, 200	4, 116			90, 200	2, 603
Lemon sole	7, 500	184	200	5				
Yellowtail and dab	175, 500	2, 158	33, 100	437			80, 300	1, 436
Blackback	38, 500	801	428, 600	12, 811			95, 900	1, 917
Unclassified	25, 900	840	10, 000	200			200	5
Haddock	1, 279, 300	40, 451	201, 900	6, 118			600, 900	17, 165
Hake	3, 664, 000	45, 507	2, 185, 500	13, 553			1, 509, 200	10, 858
Hallbut	11, 100	1, 608	8, 200	1, 215			6, 500	923
Herring, sea	4, 449, 900	40, 418	2, 149, 300	18, 310			998, 400	9, 838
Mackerel	438, 500	12, 757	264, 500	3, 135			146, 100	1, 742
Pollock	3, 893, 500	33, 275	720, 300	5, 370			484, 700	3, 467
Rosefish	219, 500	2, 395	231, 100	2, 545			3, 600	45
Salmon	600	149	5, 200	2, 098				
Shad	10, 700	406					800	9
Sharks	24, 700	320					600	12
Smelt	182, 200	13, 477	166, 300	13, 670	6, 000	600	52, 000	4, 238
Sturgeon	500	28						
Suckers					30, 500	762		
Swordfish	59, 500	10, 326						
Tomcod					2, 700	54		
Tuna	91, 400	2, 387						
Whiting	400, 200	3, 179					300	3
Wolfish	27, 800	212	1, 500	20			12, 200	195
Yellow perch					300	26		
Crabs, hard	422, 800	11, 448					28, 000	620
Lobsters	1, 070, 800	181, 672	1, 591, 200	277, 088			1, 999, 500	333, 843
Shrimp	67, 600	4, 467						
Clams:								
Hard, public	55, 000	4, 000						
Soft, public	614, 400	32, 392	489, 900	29, 173			743, 400	23, 120
Mussels, sea	7, 200	175						
Scallops, sea	25, 400	3, 709	316, 500	36, 005			445, 200	45, 950
Squid	5, 200	52						
Bloodworms	58, 100	17, 407					2, 000	608
Sandworms	500	150					2, 000	608
Total	21, 952, 600	571, 072	10, 407, 500	441, 102	39, 800	1, 465	8, 441, 800	472, 645

Fisheries of Maine, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Lincoln		Penobscot		Sagadahoc	
	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	1,052,200	\$3,454			90,000	\$500
Butterfish.....	100	4			11,500	640
Cod.....	555,200	14,928			201,100	3,730
Cusk.....	261,400	3,646			102,600	2,062
Eels, common.....	3,200	288				
Flounders:						
Gray sole.....	104,300	3,151			1,800	51
Lemon sole.....	5,500	96				
Yellowtail and dab.....	107,700	1,810			900	11
Blackback.....	19,200	414				
Unclassified.....	5,600	134				
Haddock.....	137,100	4,177			85,500	8,092
Hake.....	721,000	6,930			371,900	4,355
Halibut.....	1,000	137			900	141
Herring, sea.....	4,009,300	50,175			68,000	1,100
Mackerel.....	687,800	16,354			268,000	7,600
Pollock.....	602,400	4,840			10,300	85
Rosefish.....	114,300	1,255			600	8
Salmon.....	1,000	200			3,300	816
Seep.....	100	2				
Shad.....	800	97				
Sharks.....	4	7				
Smelt.....	48,500	3,555	14,500	\$1,015	51,000	5,900
Tuna.....	25,000	800			65,200	1,959
Whiting.....	247,000	2,310				
Wolfish.....	4	4			5,500	41
Crabs, hard.....	62,500	1,875			10,000	225
Lobsters.....	1,055,400	170,508			245,500	43,302
Shrimp.....	14,900	1,224				
Clams, soft, public.....	413,300	13,448			189,000	8,640
Scallops, sea.....	400	65				
Sea urchins.....	97,500	455				
Bloodworms.....	56,300	16,869				
Sandworms.....	56,800	16,869				
Total.....	10,469,200	340,306	14,500	1,015	1,808,700	84,255

Species	Waldo		Washington		York	
	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....			887,000	\$3,745	120,000	\$600
Butterfish.....					1,400	66
Cod.....			819,500	12,268	13,700	267
Cusk.....			8,500	78	4,400	89
Eels, common.....	30,000	\$1,500	49,200	4,749		
Flounders:						
Yellowtail and dab.....					100	1
Blackback.....			3,000	50	5,000	500
Unclassified.....			9,000	235		
Haddock.....			191,900	5,586	11,900	385
Hake.....			584,100	8,671	12,300	209
Halibut.....			11,800	1,557	100	14
Herring, sea.....	81,000	675	4,800,800	34,257		
Mackerel.....	25,400	212	8,200	104	115,400	3,331
Pollock.....			174,100	1,552	34,600	254
Salmon.....	5,400	1,428	200	30		
Smelt.....	71,000	4,980	100,500	10,767	800	100
Tomcod.....	5,000	150				
Lobsters.....	24,900	5,035	874,900	147,312	796,900	151,255
Clams, soft, public.....	54,000	7,000	3,128,700	104,888	1,501,000	90,290
Periwinkles and cockles.....			1,800	150		
Scallops, sea.....			5,400	750		
Total.....	296,700	20,080	11,158,200	331,649	2,617,600	256,361

NEW HAMPSHIRE

Fisheries of New Hampshire, 1938¹

OPERATING UNITS: BY GEAR

Item	Lines		Bag nets	Pots, lobster	Hoes	Total, exclusive of duplication
	Hand	Trawl				
Fishermen, on boats and shore:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Regular.....	125	1	20	35	95	120
Casual.....		1		49	10	187
Total.....	125	2	20	84	105	307
Boats:						
Motor.....		2		38		38
Other.....				35	36	68
Apparatus:						
Number.....	750	50	31	3,740	105	
Hooks.....	750	2,500				

CATCH: BY GEAR

Species	Lines				Bag nets		Pots		Hoes	
	Hand		Trawl		Pounds	Value	Pounds	Value	Pounds	Value
	Pounds	Value	Pounds	Value						
Cod.....			1,500	\$45						
Cusk.....			1,000	28						
Haddock.....			2,000	80						
Hake.....			3,000	60						
Smelt.....	40,000	\$3,600			8,000	\$750				
Lobsters.....							170,200	\$37,272		
Clams, soft, public.....									570,000	\$67,300
Total.....	40,000	3,600	7,500	213	8,000	750	170,200	37,272	570,000	67,300

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

MASSACHUSETTS

Fisheries of Massachusetts, 1938

OPERATING UNITS: BY GEAR

Item	Purse seines		Haul seines, common	Gill nets		Lines		Pound nets
	Mackereel	Other		Anchor	Drift	Hand	Trawl	
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	642	39		211	227	35	675	
On boats and shore:								
Regular.....	53		13	64	72	162	572	211
Casual.....	1		7	5	8	258	8	3
Total.....	696	39	20	280	307	455	1,255	214
Vessels, motor.....	59	4		28	30	8	51	
Net tonnage.....	2,142	140		636	538	120	1,878	
Boats:								
Motor.....	9		2	28	30	158	185	51
Other.....	7		4	4		60	24	92
Accessory boats.....	57	1			1		310	
Apparatus:								
Number.....	68	4	9	1,768	3,369	536	29,064	128
Length, yards.....	32,248	2,110	409					
Square yards.....				578,056	1,169,763			
Hooks, baits, or snoods.....						1,101	1,824,640	

Fisheries of Massachusetts, 1938—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Float- ing traps	Wells	Fyke nets	Dip nets	Push nets	Otter trawl, fish	Pots	
							Crab	Eel
	Num- ber	Num- ber	Num- ber	Num- ber	Num- ber	Num- ber	Num- ber	Num- ber
Fishermen:								
On vessels.....						2,780		
On boats and shore:								
Regular.....	79	4	18	126	45	187	55	18
Casual.....			9	107	72	1	33	20
Total.....	79	4	27	238	117	2,968	88	38
Vessels:								
Steam.....						14		
Net tonnage.....						2,589		
Motor.....				1		278		
Net tonnage.....				8		12,059		
Total vessels.....				1		292		
Total net tonnage.....				8		15,248		
Boats:								
Motor.....	35			80		59	69	14
Other.....	21		9	52	71			14
Apparatus:								
Number.....	57	2	26	189	84	351	5,634	775
Yards at mouth.....						10,453		

Item	Pots—Continued		Harpoons	Spears	Dredges		
	Lobster	Per- winkle and cockle			Clam	Oyster	Scallop
	Number	Number	Number	Number	Number	Number	Number
Fishermen:							
On vessels.....			601		10		285
On boats and shore:							
Regular.....	1,010	5	111	38	107	41	705
Casual.....	114	4	9		18	4	720
Total.....	1,124	9	721	38	135	45	1,690
Vessels, motor:							
Net tonnage.....			64		3		36
Total.....			1,889		40		828
Boats:							
Motor.....	914	1	35		63	22	518
Other.....	53	3	1				336
Accessory boats:							
Number.....	78,886	104	99	38	90	43	2,496
Yards at mouth.....					43	44	2,327

Item	Tongs		Rakes, other than for oysters	Forks	Hoes	By hand, other than for oysters	Total, ex- clusive of duplica- tion
	Oyster	Other					
	Number	Number	Number	Number	Number	Number	Number
Fishermen:							
On vessels.....							4,109
On boats and shore:							
Regular.....	30	49	455	120	714	2	3,842
Casual.....	13	81	675	459	885	89	3,051
Total.....	43	130	1,130	579	1,599	91	11,002
Vessels:							
Steam.....							14
Net tonnage.....							2,589
Motor.....							395
Net tonnage.....							16,205
Total vessels.....							409
Total net tonnage.....							18,794
Boats:							
Motor.....	2	25	67	1	16		1,920
Other.....	37	77	572	37	228	2	1,487
Accessory boats:							
Number.....	43	128	1,130	579	1,599		417
Yards at mouth.....							

Fisheries of Massachusetts, 1938—Continued

CATCH: BY GEAR

Species	Purse seines				Haul seines		Gill nets	
	Mackerel		Other		Pounds	Value	Anchor	
	Pounds	Value	Pounds	Value			Pounds	Value
Alewives	72,000	\$520	76,500	\$571	246,000	\$1,270		
Butterfish	160,300	5,341					800	\$23
Cod	200	3					2,191,000	53,274
Cusk							4,000	45
Eels, common					220,900	2,827		
Flounders:								
Gray sole	900	15					100	7
Yellowtail and dab	37,600	544					29,300	379
Blackback	200	4			1,000	20	4,100	106
Fluke	100	6						
Unclassified							100	1
Haddock	700	12					698,000	16,909
Hake	100	1					1,198,400	14,126
Hallbut	300	40					600	78
Herring, sea			100,000	700			1,700	11
Mackerel	28,858,500	854,270					227,800	6,917
Pollock	2,800	14					8,532,500	82,075
Rosefish							14,100	211
Scup	600	36						
Shad	900	22	3,700	48	3,000	56	20,300	1,119
Sharks	6,000	250					16,000	433
Skates							200	3
Sturgeon			200	47			800	57
Tuna	7,900	311	969,900	36,270				
Whiting							300	8
Wolfish							900	25
Total	29,149,100	881,389	1,150,300	37,636	470,900	4,173	12,941,000	175,802

Species	Gill nets—Con.		Lines				Pound nets	
	Drift		Hand		Trawl		Pounds	Value
	Pounds	Value	Pounds	Value	Pounds	Value		
Alewives	2,500	\$19					2,000	\$9
Bluefish	2,600	297	40,100	\$3,187	2,000	\$300	4,300	440
Bonito							5,000	344
Butterfish	7,400	323			200	5	348,500	14,889
Cod	100	2	174,300	4,173	14,589,300	334,849	21,900	424
Cusk					4,723,600	81,630		
Eels:								
Common							300	33
Conger					1,000	8	1,900	84
Flounders:								
Gray sole					2,300	141		
Lemon sole					47,000	3,802		
Yellowtail and dab			100	2	168,600	5,482	100	2
Blackback			600	24	189,000	6,981	16,100	161
Fluke							11,400	552
Unclassified							100	7
Grayfish							42,400	1,065
Haddock			20,900	587	15,574,100	450,950		
Hake	1,200	18	5,000	91	6,132,200	112,113		
Hallbut					1,256,200	131,132		
Herring, sea	600	4					2,618,900	14,199
Mackerel	780,900	41,354	8,800	338	1,600	13	5,906,100	172,127
Menhaden							36,500	296
Pollock	100	2	199,200	1,863	1,057,100	15,940	883,700	7,925
Rosefish					3,100	40		
Salmon							100	11
Scup	100	3	28,800	856			131,500	1,461
Sea bass			8,300	616			7,700	747
Sea robin							400	8
Shad	300	8					25,500	884
Sharks	12,200	398	1,200	60	500	13	40,300	1,353
Skates					200	4	400	4
Skipper or "billfish"							800	116
Smelt			22,200	4,970				
Squeteagues or "sea trout," gray							180,500	1,863
Striped bass			33,800	2,993	600	120	18,200	2,115
Sturgeon							2,300	196
Swordfish	1,400	205			1,000	224		

Fisheries of Massachusetts, 1938—Continued

CATCH: BY GEAR—Continued

Species	Gill nets—Con.		Lines				Pound nets	
	Drift		Hand		Trawl		Pounds	Value
	Pounds	Value	Pounds	Value	Pounds	Value		
Tautog.....			15,000	\$732	366,600	\$14,430	21,400	\$755
Tilefish.....							11,000	578
Tomcod.....							306,500	11,327
Tuna.....	500	\$8	3,500	140	53,500	471	10,090,700	85,522
Whiting.....			100	2	316,700	6,382	993,900	10,182
Wolfish.....	100	3						
Squid.....								
Total.....	810,000	42,642	561,900	20,614	44,484,400	1,165,096	21,730,400	329,529

Species	Floating traps		Weirs		Fyke nets		Dip nets	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	56,000	\$615	123,800	\$1,091			320,200	\$1,599
Bluefish.....	100	11						
Butterfish.....	55,400	2,648						
Cod.....	72,300	1,338						
Eels, common.....					12,200	\$1,741		
Flounders:								
Blackback.....	16,100	160			1,800	72		
Fluke.....	200	9						
Hake.....	14,300	61						
Herring, sea.....	352,500	2,577					1,799,600	18,470
Maskerel.....	988,600	26,182			2,000	80		
Menhaden.....	2,000	26						
Pollock.....	266,200	2,280						
Salmon.....	400	81						
Scup.....	100	3						
Sea bass.....	400	44						
Shad.....	500	10						
Squeteagues or "sea trout,"								
gray.....	17,700	190						
Striped bass.....	16,200	1,552			13,800	1,600		
Sturgeon.....	1,600	188						
Tautog.....	100	4						
Tuna.....	21,000	773						
Whiting.....	1,856,200	13,114					46,700	16,250
Scallops, bay.....								
Squid.....	52,700	1,063						
Total.....	3,791,000	52,927	123,800	1,091	29,800	3,693	2,166,500	36,319

Species	Push nets		Otter trawls		Pots			
	Pounds	Value	Pounds	Value	Crab		Eel	
					Pounds	Value	Pounds	Value
Alewives.....			83,800	\$654				
Bluefish.....			22,000	1,467				
Bonito.....			1,100	55				
Butterfish.....			653,200	23,689				
Cod.....			94,266,100	1,666,527				
Croaker.....			1,728,100	31,927				
Cusk.....			1,310,200	20,896				
Drum, red.....			1,600	25				
Eels:							42,200	\$4,728
Common.....								
Conger.....			111,800	2,238				
Flounders:								
Gray sole.....			7,433,400	291,225				
Lemon sole.....			3,266,600	210,151				
Yellowtail and dab.....			17,213,400	367,376				
Blackback.....			8,518,900	298,083				
Fluke.....			1,942,900	141,595				
Unclassified.....			603,700	20,883				
Goosefish.....			400	7				
Haddock.....			130,130,800	2,907,327				
Hake.....			7,412,900	109,401				
Halibut.....			675,500	69,358				
Herring, sea.....			7,400	104				

Fisheries of Massachusetts, 1938—Continued

CATCH: BY GEAR—Continued

Species	Push nets		Otter trawls		Pots			
	Pounds	Value	Pounds	Value	Crab		Eel	
Herring smelt.....			500	\$10				
King whiting or "kingfish".....			5,200	107				
Mackerel.....			58,700	1,992				
Pollock.....			23,279,200	287,560				
Rosefish.....			64,418,500	796,897				
Scup.....			9,655,500	249,901				
Sea bass.....			3,586,900	142,650				
Sea robin.....			80,100	1,280				
Shad.....			300	24				
Sharks.....			46,900	833				
Skates.....			65,400	983				
Smelt.....			3,700	131				
Spot.....			8,200	163				
Squeteagues or "sea trout," gray.....			73,500	3,997				
Sturgeon.....			3,600	311				
Swordfish.....			1,000	317				
Tautog.....			1,000	56				
Tilefish.....			400	15				
Tuna.....			18,500	769				
Whiting.....			12,202,200	166,496				
Wolfish.....			2,246,300	41,402				
Yellow perch.....			18,300	501				
Crabs, hard.....					1,178,100	\$27,473		
Lobsters.....			10,400	1,818				
Shrimp.....			23,200	1,930				
Scallops: Bay.....	49,100	\$14,624						
Sea.....			9,900	1,049				
Squid.....			298,100	4,977				
Total.....	49,100	14,624	400,474,200	7,868,944	1,178,100	27,473	42,200	\$4,728

Species	Pots—Continued				Harpoons		Spears	
	Lobster		Periwinkles and cockles					
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Eels, common.....							8,800	\$839
Swordfish.....					1,821,800	\$306,798		
Tuna.....					36,700	1,439		
Crabs, hard.....	114,500	\$3,269						
Lobsters.....	2,304,700	497,692						
Periwinkles and cockles.....			9,600	\$747				
Total.....	2,419,200	500,861	9,600	747	1,858,500	308,237	8,800	839

Species	Dredges		Tongs		Rakes	
	Pounds	Value	Pounds	Value	Pounds	Value
Clams: Hard, public.....	445,400	\$45,923	106,500	\$12,462	1,573,900	\$186,670
Hard, private.....					4,200	518
Soft, public.....	26,000	2,344				
Surf or skimmer.....					1,300	76
Oysters, market: Public, spring.....			6,100	1,150	1,800	280
Private, spring.....	78,000	26,061	141,800	52,264		
Scallops: Bay.....	885,300	281,388			114,200	40,967
Sea.....	5,047,300	534,357				
Total.....	6,482,000	890,063	254,400	65,876	1,695,400	228,511

Fisheries of Massachusetts, 1938—Continued

CATCH: BY GEAR—Continued

Species	Forks		Hoos		By hand	
	Pounds	Value	Pounds	Value	Pounds	Value
Clams:						
Hard, public.....	400	\$40	168,300	\$17,561		
Razor.....			512,900	13,859		
Soft, public.....	285,800	26,191	4,437,900	408,323		
Soft, private.....			28,000	2,500		
Mussels, sea.....					15,700	\$441
Irish moss.....					177,200	15,714
Kelp.....					120,000	720
Bloodworms.....	21,900	5,249	4,400	1,040		
Sandworms.....	180,500	31,965	16,900	3,970		
Total.....	488,600	63,445	5,168,400	447,263	312,900	16,875

OPERATING UNITS: BY COUNTIES

Item	Barn-	Bristol	Dukes	Essex	Nan-	Nor-	Ply-	Suffolk
	stable				tucket	folk	mouth	
	Number	Number	Number	Number	Number	Number	Number	Number
Fishermen:								
On vessels.....	120	262	63	1,529	59		5	2,071
On boats and shore:								
Regular.....	1,063	288	302	1,001	117	84	445	542
Casual.....	629	501	375	500	32	297	424	293
Total.....	1,812	1,051	740	3,030	208	381	874	2,906
Vessels:								
Steam:				1				13
Net tonnage.....				184				2,408
Motor:				140	14		1	158
Net tonnage.....	332	739	201	5,160	184		21	9,568
Total vessels.....	28	43	11	141	14		1	171
Total net tonnage.....	332	739	201	5,344	184		21	11,973
Boats:								
Motor.....	515	228	150	470	81	61	266	149
Other.....	427	189	498	212	10	5	84	62
Accessory boats.....	5	11	5	278				118
Apparatus:								
Purse seines:								
Mackarel.....	3	1		44				20
Length, yards.....	1,200	540		21,358				9,150
Other.....				4				
Length, yards.....				2,110				
Hall seines, common.....			1	7				1
Length, yards.....			4	380				25
Gill nets:								
Anchor.....	300			1,464		4		
Square yards.....	51,200			528,095		160		
Drift.....	158	212		2,043	36		125	705
Square yards.....	61,280	62,541		718,354	10,200		50,860	250,518
Lines:								
Hand.....	95	125	31	102	28	150	5	2
Hooks.....	127	250	62	446	52	150	10	4
Trawl.....	3,340			12,876	70		200	12,578
Hooks.....	166,900			735,840	2,800		100,000	819,100
Pound nets.....	118	2	6				2	
Floating traps.....	4	1		51			1	
Wells.....			1					
Fyke nets.....	25			38				6
Dip nets.....	126		10				9	
Push nets.....			84					
Otter trawls, fish.....	47	40	14	75	19		6	160
Yards at mouth.....	1,220	1,088	408	2,412	499		175	4,651
Pots:								
Crab.....	37			1,039		376	355	3,827
Eel.....	174	94	220	180	100		27	
Lobster.....	9,829	4,813	7,677	27,127	875	3,682	14,430	10,463
Portwinkle and cockle.....	27			50	18		9	
Harpoons.....	12	16	17	43	1			10
Spears.....		9	29					

Fisheries of Massachusetts, 1938—Continued

OPERATING UNITS: BY COUNTIES—Continued

Item	Barnstable	Bristol	Dukes	Essex	Nantucket	Norfolk	Plymouth	Spffolk
	Number	Number	Number	Number	Number	Number	Number	Number
Apparatus—Continued.								
Dredges:								
Clam	25	60	5		8		2	
Yards at mouth	11	25	3		2		2	
Oyster	13						30	
Yards at mouth	14						30	
Scallop	774	588	844	10	212		66	4
Yards at mouth	661	639	746	35	177		55	14
Tongs:								
Oyster	32	11						
Other	6	56					64	
Rakes, other than for oysters	554	309	173		2		74	
Forks		21	4	114		98		342
Hoes	362	43	11	653	20	44	466	

CATCH: BY COUNTIES

Species	Barnstable		Bristol		Dukes		Essex	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives	195,100	\$1,197			6,000	\$50	269,100	\$2,353
Bluefish	11,200	800	11,600	\$714	6,500	507	18,100	1,042
Bonito	2,500	216			2,500	128	1,100	55
Butterfish	292,200	12,883	205,500	7,388	54,400	1,973	458,100	16,264
Cod	1,823,300	44,113	991,200	21,361	22,300	503	12,928,900	265,239
Croaker			25,500	520			1,397,500	25,777
Cusk	16,900	240	2,400	20			3,564,500	60,785
Drum, red							1,600	25
Bels:								
Common	19,200	2,457	13,300	1,509	21,800	2,585	224,800	3,062
Conger	1,100	22	1,400	19	800	12	94,700	1,992
Flounders:								
Gray sole	36,800	2,988	184,500	10,465	14,400	1,217	1,495,300	68,009
Lemon sole	120,100	9,358	465,500	28,480	1,900	166	378,300	21,515
Yellowtail and dab	1,808,500	46,607	3,545,000	69,430	1,600,100	29,712	2,082,900	44,147
Blackback	1,140,200	38,330	1,703,800	76,973	672,600	13,343	593,200	24,778
Fluke	38,200	2,305	128,800	10,629	6,100	313	1,383,900	99,464
Unclassified	33,400	2,089	171,200	4,887	100	7	92,300	2,532
Goosefish							400	7
Grayfish	18,600	153			23,800	912		
Haddock	1,078,800	28,249	1,154,600	25,700	2,300	64	17,442,400	408,958
Hake	183,800	2,772	52,700	587	800	18	5,734,800	89,953
Halibut	45,400	5,611	2,800	303			699,800	71,220
Herring, sea	2,858,900	15,258	3,300	39	24,000	200	1,199,500	14,140
King whiting or "kingfish"			100	5			5,100	102
Mackerel	6,567,900	191,894	65,100	2,352	118,300	3,692	21,900,000	665,923
Menhaden	14,900	71	11,200	69	13,000	182		
Pollock	1,152,700	11,189	21,100	292	2,500	24	12,171,000	121,385
Rosefish	7,400	89	1,076,500	10,821			28,230,600	333,381
Salmon	100	11					400	81
Scup or porgy	48,200	521	106,000	2,965	69,600	1,335	7,964,200	202,131
Sea bass	5,900	620	29,400	1,112	9,400	730	1,846,200	76,927
Sea robu	400	8					55,000	908
Shad	25,000	824	800	39	200	21	28,400	1,271
Sharks	2,800	101	38,400	1,282			73,900	1,651
Skates			700	8			15,600	309
Skinner or "billfish"	800	116						
Spot							1,200	245
							8,200	163
Squeteagues or "sea trout," gray	194,800	1,968	2,800	110	1,900	29	61,500	3,145
Striped bass	20,100	2,500	600	72	38,900	3,912	14,000	1,421
Sturgeon	2,400	207	200	28	100	16	3,500	354
Swordfish	25,100	3,923	147,800	23,916	112,400	18,049	1,326,100	225,859
Tautog	18,100	588	13,000	580	4,800	282	300	5
Tilefish							360,800	14,438
Tomcod	11,000	578						
Tuna	330,000	12,066	100	5	7,600	352	1,018,800	38,245
Whiting	11,095,400	95,561	101,600	1,305			3,339,000	37,927
Wolfish	48,100	1,194	4,000	67			181,600	3,226
Yellow perch							500	8
Crabs, hard	25,700	999	4,900	190			252,400	5,860
Lobsters	108,100	33,189	70,800	16,142	140,900	31,501	821,600	173,685
Shrimp							400	27

Fisheries of Massachusetts, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Barnstable		Bristol		Dukes		Essex	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Clams:								
Hard, public	914,800	\$108,634	1,004,500	\$118,842	55,900	\$6,465		
Hard, private	4,200	518						
Razor	439,800	11,004						
Soft, public	375,500	37,110	19,700	2,448	4,700	800	3,307,000	\$301,444
Surf or skimmer					1,300	76		
Mussels, sea	1,300	90	4,000	193			700	10
Oysters, market:								
Public, spring	1,800	280	6,100	1,150				
Private, spring	193,500	69,315						
Periwinkles and cockles	300	50					1,500	240
Scallops:								
Bay	700,000	219,867	102,300	39,020	288,300	75,048		
Sea	161,000	20,677	3,204,400	336,904	821,800	84,811	682,100	75,163
Squid	957,500	9,713	44,500	634	21,700	235	301,400	5,123
Irish moss							5,500	300
Kelp							120,000	720
Bloodworms							5,200	1,240
Sandworms			41,300	6,608			21,400	3,811
Total	33,238,600	1,051,123	14,784,600	825,579	4,143,700	278,270	184,152,000	3,618,645

Species	Nantucket		Norfolk		Plymouth		Suffolk	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives					480,700	\$2,698	6,900	\$50
Bluefish	23,000	\$1,956					700	73
Butterfish	22,400	642			1,200	118	191,800	7,650
Cod	461,900	9,016			177,300	4,152	94,910,300	1,716,206
Croaker							306,100	5,630
Cusk					700	24	2,453,300	41,602
Eels:								
Common	4,800	505			500	50		
Conger	300	4					16,400	231
Flounders:								
Gray sole	8,700	685			124,600	5,039	5,572,400	203,005
Lemon sole	102,900	8,899			3,400	159	2,241,500	147,436
Yellowtail and dab	2,698,600	51,916			355,200	7,030	5,296,800	124,948
Blackback	2,463,100	71,790			224,600	5,571	1,948,300	74,826
Fluke	122,400	10,649					275,200	18,602
Unclassified	20,400	1,098			14,400	847	272,100	9,431
Haddock	286,300	6,043			162,600	4,796	135,297,600	2,901,955
Hake	15,800	164			142,300	1,996	8,634,200	140,321
Halibut	600	77					1,214,000	123,397
Herring, sea					493,400	4,111	301,600	2,317
Herring, smelt							500	10
Mackerel	8,000	240	7,000	\$210	68,600	3,249	8,098,000	235,713
Pollock	6,100	98			26,800	399	20,840,600	264,272
Rosefish					194,700	2,544	34,928,500	450,313
Scup or porgy	1,400	19			700	14	1,616,500	45,875
Sea bass					1500	28	11,790	64,640
Sea robin							25,100	372
Shad							600	16
Sharks							8,000	306
Skates							49,900	677
Smelt			21,000	4,725			3,700	131
Squeteagues or "sea trout," gray							10,700	792
Striped bass	7,000	531			1,000	150		
Sturgeon	100	14					2,200	178
Swordfish	37,800	7,500					177,200	28,297
Tautog	300	11			1,000	81		
Tilefish							200	7
Tuna					500	13	7,900	245
Whiting	21,800	218			1,609,400	15,635	8,036,200	115,096
Wolfish					3,300	47	2,327,000	48,287
Yellow perch							17,800	493
Crabs, hard			107,500	2,699	67,800	2,731	834,800	18,293
Lobsters	16,800	4,912	192,500	41,949	600,500	121,713	364,400	76,319
Shrimp							22,800	1,908
Clams:								
Hard, public	178,300	16,421			141,000	13,294		
Razor					78,600	2,855		
Soft, public	10,700	2,225	83,900	5,278	972,400	85,003	25,800	2,580
Soft, private					28,000	2,500		

Fisheries of Massachusetts, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Nantucket		Norfolk		Plymouth		Suffolk	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Mussels, sea							9,700	\$148
Oysters, market, private, spring					26,300	\$9,000		
Periwinkles and cockles	7,000	\$290			800	167		
Scallops:								
Bay	43,300	14,430			11,400	4,864		
Sea	1,300	164					186,000	17,687
Squid					1,300	63	18,400	467
Irish moss			1,800	\$160	169,900	15,254		
Bloodworms					4,200	1,000	16,900	4,049
Sandworms			100	12	14,300	3,450	120,300	22,064
Total	6,570,200	208,407	363,800	55,033	6,198,400	320,545	338,399,400	6,911,695

RHODE ISLAND

Fisheries of Rhode Island, 1938

OPERATING UNITS: BY GEAR

Item	Purse seines, mack-orel	Haul seines	Gill nets, drift	Lines			Pound nets	Floating traps
				Hand	Trawl	Troll		
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels			7	43	2	2		87
On boats and shore:								
Regular	2	18		70	14	26	13	46
Casual		47		20	2	3	7	
Total	2	65	7	133	18	31	20	133
Vessels:								
Steam								2
Net tonnage								20
Motor			2	22	1	1		5
Net tonnage			18	161	10	8		69
Total vessels			2	22	1	1		7
Total net tonnage			18	161	10	8		89
Boats:								
Motor	1			42	8	20	1	
Other		20		25	1		14	27
Accessory boats	1		2	15	1			17
Apparatus:								
Number	1	16	16	230	43	64	21	37
Length, yards	120	2,407						
Square yards			17,640					
Hooks, baits, or snoods				279	19,063	64		

Item	Fyke nets	Dip nets	Otter trawls	Box traps	Pots			Harpoon	Spears	Dredges, clam
					Eel	Lobster	Periwinkle and cockle			
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	
On vessels			44			35		62		15
On boats and shore:										
Regular	2	8	18	2	8	173	14	37	20	12
Casual	1	21	2	3	19	77	8	6	4	
Total	3	29	64	5	27	285	22	105	24	27
Vessels, motor			23			16		28		5
Net tonnage			184			114		214		52
Boats:										
Motor	2		12		15	156	17	21	1	6
Other	1	27		4	11	8	1		23	
Accessory boats								37		
Apparatus:										
Number	38	29	35	2	1,087	28,995	1,033	49	24	12
Yards at mouth			828							12

Fisheries of Rhode Island, 1938—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Dredges—Con.			Tongs		Rakes		Forks	Hoes	By hand, other than for oyster	Total, exclusive of duplication
	Mus-sel	Oys-ter	Scal-lop	Oys-ter	Other	Oys-ter	Other				
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Fishermen:											252
On vessels.....		76	3								
On boats and shore:											
Regular.....	4		103	32	121	25	42	16	9	1	416
Casual.....			115	25	372	11	59	23	42	11	714
Total.....	4	76	221	57	493	36	101	39	51	12	1,382
Vessels:											
Steam.....		1									3
Net tonnage.....		25									45
Motor.....		15	1								63
Net tonnage.....		331	11								731
Total vessels.....		16	1								66
Total net tonnage.....		366	11								776
Boats:											
Motor.....	3		125	9	63	1	13		2		367
Other.....			2	47	425	32	70	13	14	4	640
Total.....											59
Accessory boats.....											
Apparatus:											
Number.....	4	32	634	57	493	36	101	39	51		
Yards at mouth.....	4	48	512								

CATCH: BY GEAR

Species	Purse seines		Haul seines		Gill nets, drift		Lines, hand	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....			103,600	\$530				
Bluefish.....			4,100	330	3,700	\$270		
Cod.....							612,000	\$18,808
Eels, common.....			8,500	994			9,400	932
Flounders, blackback.....			400	20			200	10
Herring, sea.....			70,000	350				
Mackerel.....	600	\$9			25,000	750		
Pollock.....							58,200	708
Scup or porgy.....							1,000	22
Sea bass.....							1,800	90
Squeteagues or "sea trout," gray.....			6,900	572				
Striped bass.....			49,700	4,480				
Tautog.....			1,300	55			68,200	2,576
White perch.....			2,000	140				
Squid.....			1,000	20				
Total.....	600	9	247,500	7,491	28,700	1,020	750,800	22,946

Species	Lines—Continued				Pound nets		Floating traps	
	Trawl		Troll		Pounds	Value	Pounds	Value
	Pounds	Value	Pounds	Value				
Alewives.....					44,300	\$277	13,700	\$137
Anchovies.....							61,000	670
Bluefish.....			6,400	\$477	800	52	24,400	2,561
Bonito.....							22,200	2,455
Butterfish.....					102,100	3,621	344,100	13,820
Cod.....	93,800	\$2,571					13,300	301
Orevalle.....							900	14
Cunners.....							9,400	94
Eels:								
Common.....					8,800	642		
Conger.....							10,200	243
Flounders:								
Blackback.....					8,200	250	8,500	283
Fluke.....	1,000	100			4,300	373	42,600	3,216

Fisheries of Rhode Island, 1938—Continued

CATCH: BY GEAR—Continued

Species	Lines—Continued				Pound nets		Floating traps	
	Trawl		Troll					
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Frigate mackerel							2,000	\$20
Grayfish	3,700	\$45					100	1
Hake					15,000	\$75	2,200	40
Herring, sea							26,200	204
Hickory shad							6,700	148
King whiting or "kingfish"							2,000	114
Mackarel			81,300	\$2,424	30,600	2,018	345,700	9,455
Menhaden					78,500	687	52,600	510
Pollock							41,900	790
Scup or porgy					9,400	222	1,135,500	20,338
Sea bass							65,300	4,857
Sea robin					10,000	50	181,900	1,819
Shad					200	20	2,500	184
Sharks							2,500	21
Skates	200	1					18,600	128
Skipper or "billfish"							600	60
Squeteagues or "sea trout," gray					10,900	592	43,300	2,350
Striped bass			16,900	1,449	1,800	159	141,900	13,779
Sturgeon							1,900	240
Swordfish							1,300	156
Tautog					36,100	1,430	31,400	928
Tuna			2,800	63			17,600	1,959
Whiting					10,400	89	117,600	1,178
Squid					59,400	1,050	727,800	11,193
Turtles:							3,000	75
Green							100	1
Loggerhead								
Total	98,700	2,717	107,400	4,418	430,800	11,807	3,522,500	94,445

Species	Fyke nets		Dip nets		Otter trawls		Box traps	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives					100	\$4	19,000	\$250
Butterfish					16,600	405		
Cod					34,500	345		
Cunners							600	48
Eels, common								
Flounders:								
Yellowtail and dab					358,200	5,885		
Blackback	2,000	\$80			400,400	13,405		
Fluke					125,400	9,433		
Hake					1,300	29		
Sea robin					96,700	817		
Shad						18	6,500	777
Sharks					800	18		
Skates					202,600	1,555		
Tautog	4,000	160			1,100	36	200	4
Whiting					63,200	1,000		
Crabs:								
Hard			600	\$75				
Soft and peelers			800	100				
Lobsters					300	75		
Scallops:								
Bay			5,500	1,662				
Sea					400	118		
Squid					5,200	104		
Total	6,000	240	6,400	1,787	1,307,200	33,259	26,700	1,079

Fisheries of Rhode Island, 1938—Continued

CATCH: BY GEAR—Continued

Species	Pots						Harpoons	
	Eel		Lobster		Periwinkle and cockle			
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Eels, common.....	52,700	\$4,121					166,600	\$24,911
Swordfish.....							500	32
Tuna.....								
Crabs, hard.....			228,400	\$6,902				
Lobsters.....			709,400	159,801				
Periwinkles and cockles.....					83,100	\$4,363		
Total.....	52,700	4,121	937,800	166,703	83,100	4,363	167,100	24,948

Species	Spears		Dredges		Tongs		Rakes	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Eels, common.....	8,300	\$838						
Clams:								
Hard, public.....			122,500	\$10,955	1,545,100	\$129,822	387,300	\$31,382
Hard, private.....			56,300	5,150	2,000	225	4,800	375
Limpets.....			900	70				
Mussels, sea.....			1,200	180				
Oysters, market:								
Public, spring.....					6,700	969	35,900	6,979
Public, fall.....					12,600	1,737	27,700	5,800
Private, spring.....			1,549,400	193,581	1,700	375		
Private, fall.....			1,948,600	247,709	1,800	875		
Scallops, bay.....			58,800	16,820				
Total.....	8,300	838	3,737,700	474,465	1,569,900	133,603	465,700	44,536

Species	Forks		Hoos		By hand	
	Pounds	Value	Pounds	Value	Pounds	Value
Clams:						
Hard, public.....	900	\$72	45,300	\$4,552		
Soft, public.....	169,900	11,996	58,000	3,942	9,200	\$577
Total.....	170,800	12,068	103,300	8,494	9,200	577

OPERATING UNITS: BY COUNTIES

Item	Bristol	Kent	Newport	Provi- dence	Washing- ton
	Number	Number	Number	Number	Number
Fishermen:					
On vessels.....	41	6	189	25	21
On boats and shore:					
Regular.....	36	103	147	7	123
Casual.....	67	296	145	62	144
Total.....	144	405	451	94	288
Vessels:					
Steam.....	1		2		
Net tonnage.....	25		20		
Motor.....	8	2	40	5	8
Net tonnage.....	144	23	340	146	78
Total vessels.....	9	2	42	5	8
Total net tonnage.....	169	23	360	146	78
Boats:					
Motor.....	28	91	135	13	100
Other.....	62	339	71	49	119
Accessory boats.....			51	1	7
Apparatus:					
Purse seines, mackerel.....			1		
Length, yards.....			120		
Haul seines.....	3		1	5	9
Length, yards.....	185		280	192	1,820
Gill nets, drift.....			16		
Square yards.....			17,640		

Fisheries of Rhode Island, 1938—Continued

OPERATING UNITS: BY COUNTIES—Continued

Item	Bristol	Kent	Newport	Providence	Washington
Apparatus—Continued					
Lines:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Hand.....	4	24	165	2	35
Hooks and baits.....	8	24	185	2	60
Trawl.....	2		29		12
Hooks.....	2,000		11,785		5,268
Troll.....			37		27
Hooks.....			37		27
Pound nets.....		2	15		4
Floating traps.....			22		15
Fyke nets.....		5	20		
Dip nets.....		18			24
Otter trawl.....			21		14
Yards at mouth.....			617		311
Box traps.....	2				
Pots:					
Eel.....	50	265	182	145	445
Lobster.....	2,000	1,088	16,195	150	9,582
Periwinkle and cockle.....	396	50	327		260
Harpoons.....	1		89	1	8
Spears.....	1	20		3	
Dredges:					
Clam.....	3		9		
Yards at mouth.....	3		9		
Mussel.....	3	1			
Yards at mouth.....	3	1			
Oyster.....	16	4		8	4
Yards at mouth.....	24	6		12	6
Scallop.....	34	255	152	14	170
Yards at mouth.....	27	211	119	11	144
Tongs:					
Oyster.....		40	4	9	4
Other.....	60	290	34	52	57
Rakes:					
Oyster.....		18	1		17
Other.....		61	27		13
Forks.....	3	27	1	3	5
Hoes.....	12		8	8	23

CATCH: BY COUNTIES

Species	Bristol		Kent		Newport		Providence		Washington	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	19,000	\$250			47,400	\$308			114,200	\$836
Anchovies.....					61,000	670				
Bluefish.....					28,400	2,936			11,000	754
Bonito.....					20,000	2,276			2,200	180
Butterfish.....			2,500	\$125	350,900	14,223			92,900	3,097
Cod.....			1,800	38	664,500	19,983			69,400	1,864
Crevaille.....					700	10			200	4
Cunners.....					33,500	335			10,400	104
Eels:										
Common.....	4,000	374	23,200	2,320	19,600	1,193	14,700	\$1,692	26,800	1,996
Conger.....					7,600	192			2,600	51
Flounders:										
Yellowtail and dab.....					284,600	5,141			73,600	744
Blackback.....	600	30	600	20	219,900	6,364			198,700	7,614
Fluke.....					94,000	7,011			79,300	6,111
Frigate mackerel.....					2,000	20				
Grayfish.....	3,700	45							100	1
Hake.....					2,200	40			1,800	29
Herring, sea.....					26,200	189			85,000	600
Hickory shad.....					5,300	141			1,400	7
King whiting or "kingfish".....					1,800	106			200	8
Mackerel.....					422,800	13,050			60,400	1,600
Menhaden.....					3,400	34			127,700	1,163
Pollock.....					96,300	1,427			3,800	71
Scup or porgy.....	200	6			1,114,700	20,231			31,000	345
Sea bass.....					66,900	4,934			200	13
Sea robin.....					220,000	2,150			68,600	636
Shad.....	6,900	777			2,100	146			600	58
Sharks.....					1,200	22			2,100	17
Skates.....	200	1			181,100	1,463			40,000	250

Fisheries of Rhode Island, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Bristol		Kent		Newport		Providence		Washington	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Skipper or "billfish"										
Squeteague or "sea trout," gray	2,700	\$200	300	\$21	39,000	1,998			19,100	\$1,331
Striped bass					124,400	12,342			85,900	7,525
Sturgeon					1,400	200			500	40
Swordfish	1,600	300			144,300	21,046	2,900	\$390	19,100	3,355
Tautog	1,000	44	3,000	150	85,500	3,132	500	15	52,300	1,846
Tuna					20,900	2,054				
White perch					2,000	140				
Whiting					186,200	2,216			5,000	50
Crabs:										
Hard	192,000	5,760	4,300	178	22,900	688			9,800	351
Soft and peelers									300	100
Lobsters	20,100	5,014	30,800	6,658	427,400	97,352	1,700	809	229,700	50,543
Clams:										
Hard, public	198,900	18,584	1,417,400	110,737	193,200	17,636	74,800	9,320	216,800	20,506
Hard, private	57,100	5,225	4,800	375			1,200	150		
Soft, public	17,800	1,274	104,000	7,650	16,700	1,254	42,000	2,650	56,600	3,687
Limpets	900	70								
Mussels, sea			1,200	180						
Oysters, market:										
Public, spring			9,800	1,400	6,900	908			25,900	5,550
Public, fall			6,000	862	7,100	999	1,200	106	28,000	5,570
Private, spring	900,500	103,080	49,000	7,000			500,400	66,920	101,200	16,956
Private, fall	967,500	112,585					881,600	118,542	101,300	16,957
Periwinkles and cockles	31,900	1,770	900	25	28,300	1,468			22,000	1,100
Scallops:										
Bay	1,800	528	18,300	5,238	15,600	4,446	1,500	440	27,100	7,730
Sea					200	54			200	64
Squid	1,000	20			380,400	6,471			412,000	5,876
Turtles:										
Green					3,000	75				
Loggerhead									100	1
Total	2,429,400	255,937	1,677,800	142,977	5,684,100	279,229	1,522,500	200,540	2,515,100	176,891

CONNECTICUT

Fisheries of Connecticut, 1938

OPERATING UNITS: BY GEAR

Item	Purse seines, mack-orel	Haul seines	Gill nets				Lines	
			Anchor	Drift	Run-around	Stake	Hand	Trot with hooks
Fishermen:								
On vessels							11	
On boats and shore:								
Regular	3	2		14	2	8	40	
Casual		66	5	98		14	12	5
Total	3	68	5	112	2	22	63	5
Vessels, motor							4	
Net tonnage							38	
Boats:								
Motor	1	3	1	22	1	7	29	2
Other		18	1	20		3	3	2
Accessory boats	1							
Apparatus:								
Number	1	23	2	42	1	17	63	14
Length, yards	150	3,079						
Square yards			375	102,843	330	2,699		
Hooks, baits, or snoods							80	1,600

Fisheries of Connecticut, 1938—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Pound nets	Fyke nets	Dip nets	Otter trawls	Pots			Harpoons	Spears
					Eel	Fish	Lobster		
Fishermen:	Number	Number	Number	Number	Number	Number	Number	Number	Number
On vessels.....				77			8	28	
On boats and shore:									
Regular.....	9	3	7	51	14	2	158	7	
Casual.....	9	28	131	9	66	1	191		2
Total.....	18	31	138	137	80	3	357	35	2
Vessels, motor.....				33			4	10	
Net tonnage.....				374			26	127	
Boats:									
Motor.....	8	6		30	16	2	168	3	
Other.....	1	12	130		35		38		2
Accessory boats.....								10	
Apparatus:									
Number.....	15	49	131	63	1,894	24	20,342	13	
Yards at mouth.....				1,463					2

Item	Dredges, oyster	Tongs		Rakes		Forks	Hoes	By hand, other than for oysters	Total, exclusive of duplication
		Oyster	Other	Oyster	Other				
Fishermen:	Number	Number	Number	Number	Number	Number	Number	Number	Number
On vessels.....	194								278
On boats and shore:									
Regular.....	8	34	27	3	16		7		265
Casual.....		10	66		63	3	18	20	656
Total.....	202	44	93	3	79	3	25	20	1,199
Vessels:									
Steam.....	3								3
Net tonnage.....	581								581
Motor.....	30								65
Net tonnage.....	809								1,202
Total vessels.....	33								68
Total net tonnage.....	1,390								1,783
Boats:									
Motor.....	4	4	3			1			238
Other.....		37	90	3	79	2	4		365
Accessory boats.....									11
Apparatus:									
Number.....	74	44	93	3	79	3	25		
Yards at mouth.....	104								

CATCH: BY GEAR

Species	Purse seines		Haul seines		Gill nets						
					Anchor		Drift		Runaround		
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	
Alewives.....			4,000	\$40							
Carp.....			28,200	1,692			2,500	\$150			
Mackerel.....	2,000	\$40									
Menhaden.....									1,000	\$5	
Minnows.....			600	79							
Shad.....			161,800	6,567	1,200	\$114	247,700	18,239			
Striped bass.....							600	55			
Suckers.....			16,600	328							
Total.....	2,000	40	211,200	8,706	1,200	114	250,700	18,444	1,000	5	

Fisheries of Connecticut, 1938—Continued

CATCH: BY GEAR—Continued

Species	Gill nets—Continued		Lines				Pound nets		Fyke nets	
	Stake		Hand		Trot with hooks		Pounds	Value	Pounds	Value
	Pounds	Value	Pounds	Value	Pounds	Value				
Alwolves.....							10,300	\$103	14,000	\$140
Bluefish.....			10,100	\$1,511						
Butterfish.....							33,100	769	100	2
Carp.....									4,100	222
Cod.....			11,400	342						
Eels:										
Common.....			3,200	291	6,800	\$408	400	24	3,800	228
Conger.....							100	6		
Flounders:										
Blackback.....			400	16			1,900	76	3,100	124
Fluke.....							500	25		
Hickory shad.....							400	4		
Kingfish or "king mackerel".....									100	2
Lamprey.....									1,900	56
Mackerel.....			47,900	1,171						
Menhaden.....	30,200	\$151					126,000	234	500	3
Pollock.....			45,900	676						
Scup or porgy.....			3,800	76			400	8		
Sea bass.....			10,200	970			300	80		
Shad.....	7,300	376					6,700	347		
Skates.....							1,800	22	200	2
Squeteagues or "sea trout".....							6,200	261		
Striped bass.....			200	28			8,300	860		
Sturgeon.....									200	69
Suckers.....									77,000	1,503
Tautog.....			11,300	280			6,100	144	200	4
Squid.....							6,700	134		
Total.....	37,500	527	144,400	5,361	6,800	408	209,200	3,047	105,200	2,855

Species	Dip nets		Otter trawls		Pots					
	Pounds	Value	Pounds	Value	Eel		Fish		Lobster	
					Pounds	Value	Pounds	Value	Pounds	Value
Butterfish.....			157,100	\$3,210						
Carp.....					500	\$30				
Cod.....			100,400	3,012						
Cunners.....			1,000	10						
Eels:										
Common.....					41,000	2,463				
Conger.....			1,000	10						
Flounders:										
Yellowtail and dab.....			1,757,700	23,722						
Blackback.....			2,521,800	96,669						
Fluke.....			282,100	20,185						
Hake.....			8,000	140						
Scup or porgy.....			116,800	2,351						
Sea bass.....			46,200	4,620						
Sea robin.....			4,000	80						
Shad.....	2,100	\$145								
Skates.....			64,000	648						
Tautog.....			500	13			600	\$16		
Whiting.....			52,700	786						
Crabs, hard.....	2,800	165								
Lobsters.....									553,600	\$136,047
Scallops, bay.....	66,800	13,624								
Squid.....			3,000	30						
Total.....	71,700	13,934	5,116,300	158,486	41,500	2,493	600	16	553,600	136,047

Fisheries of Connecticut, 1938—Continued

CATCH: BY GEAR—Continued

Species	Harpoons		Spears		Dredges		Tongs	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Eels, common			500	\$30				
Swordfish	34,000	\$7,133						
Clams, hard, public							97,200	\$20,047
Oysters, market:								
Public, spring							14,700	2,662
Public, fall					1,500	\$350	27,700	4,453
Private, spring					1,980,100	430,336	3,600	702
Private, fall					2,792,700	577,293	4,500	980
Total	34,000	7,133	500	30	4,774,300	1,007,979	147,700	28,824

Species	Rakes		Forks		Hoes		By hand	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Clams:								
Hard, public	93,900	\$19,011	3,400	\$650			16,000	\$3,860
Soft, public					16,500	\$2,636		
Oysters, market:								
Private, spring	200	62						
Private, fall	200	62						
Total	94,300	19,135	3,400	650	16,500	2,636	16,000	3,860

OPERATING UNITS: BY COUNTIES

Item	Fairfield	Hartford	Middlesex	New Haven	New London
	Number	Number	Number	Number	Number
Fishermen:					
On vessels	74		4	134	66
On boats and shore:					
Regular	62		52	55	96
Casual	112	69	151	48	276
Total	248	69	207	237	438
Vessels:					
Steam	1			2	
Net tonnage	51			530	
Motor	17		2	20	26
Net tonnage	274		22	589	317
Total vessels	18		2	22	26
Total net tonnage	325		22	1,119	317
Boats:					
Motor	36	1	51	36	114
Other	96	23	47	39	165
Accessory boats			1	1	9
Apparatus:					
Purse seines, mackerel					1
Length, yards					150
Haul seines		12	7	2	2
Length, yards		1,859	947	40	233
Gill nets:					
Anchor			1		1
Square yards			111		264
Drift	1	2	31		8
Square yards	2,200	4,440	82,877		13,320
Runaround	1				
Square yards	380				
Stake		7	7	1	2
Square yards		777	1,600	100	222
Lines:					
Hand	0		13	10	34
Hooks	0		17	15	42
Trot with hooks	2			12	
Hooks	400			1,200	
Pound nets			1	3	11
Fyke nets		28	6	1	14
Dip nets	3	7			121
Otter trawls	0		5	5	47
Yards at mouth	124		98	112	1,129

Fisheries of Connecticut, 1938—Continued

OPERATING UNITS: BY COUNTIES—Continued

Item	Fairfield	Hartford	Middlesex	New Haven	New London
Apparatus—Continued.					
Pots:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Eel.....	51	112	510	72	1,149
Fish.....	24				
Lobster.....	3,563		2,061	4,761	9,967
Harpoons.....			2	1	10
Spears.....					2
Dredges, oyster.....	30			42	2
Yards at mouth.....	40			62	2
Tongs:					
Oyster.....	11		18	12	3
Other.....	79			10	4
Rakes:					
Oyster.....	3				
Other.....	79				
Forks.....					3
Hoes.....	10		2	4	

CATCH: BY COUNTIES

Species	Fairfield		Hartford		Middlesex		New Haven		New London	
	Lbs.	Value	Lbs.	Value	Lbs.	Value	Lbs.	Value	Lbs.	Value
Alewives.....			15,900	\$159					12,400	\$124
Bluefish.....	300	\$41			3,200	\$480	400	\$80	6,200	\$930
Butterfish.....							3,700	129	186,600	3,852
Carp.....			21,000	1,272	6,800	408			6,900	414
Cod.....							1,000	30	110,800	3,324
Cunners.....									1,000	10
Eels:										
Common.....	2,800	186	3,500	210	14,200	852	10,700	642	24,500	1,554
Conger.....									1,100	16
Flounders:										
Yellowtail and dab.....					42,300	423	4,400	88	1,711,000	23,211
Blackback.....	87,400	3,072			12,200	472	83,500	2,890	2,344,100	93,461
Fluke.....					4,100	335	5,000	250	273,500	19,625
Hako.....									8,000	140
Hickory shad.....									400	4
Kingfish or "king mackerel".....									100	2
Lampry.....			1,900	56						
Mackerel.....					900	20	5,000	100	44,000	1,091
Menhaden.....	1,000	5			23,400	117	19,200	96	114,100	175
Minnows.....							600	79		
Pollock.....					20,900	286			25,000	390
Scup or porgy.....					400	8	1,000	20	119,600	2,407
Sea bass.....					1,200	120			55,500	5,500
Sea robin.....									4,000	80
Shad.....	7,500	543	110,600	3,902	229,000	14,391	200	10	78,600	6,942
Skates.....							1,200	12	64,800	660
Squeteagues or "sea trout," gray.....							1,300	65	4,900	196
Striped bass.....					500	55	100	12	8,400	876
Sturgeon.....									200	69
Suckers.....			71,000	1,383	13,700	270			8,900	178
Swordfish.....					9,300	1,970	4,000	600	20,700	4,563
Tautog.....	900	25			8,800	205	200	6	8,800	221
Whiting.....									52,700	786
Crabs, hard.....	2,100	96							700	67
Lobsters.....	73,300	18,389			58,100	14,513	122,100	27,496	300,100	75,649
Clams:										
Hard, public.....	189,100	39,988					14,500	2,325	6,900	1,261
Soft, public.....	12,100	1,995			1,000	150	2,400	491		
Oysters, market:									2,000	438
Public, spring.....	3,800	800			8,900	1,424				
Public, fall.....	4,700	875			3,300	528	21,200	3,400		
Private, spring.....	714,000	142,897			1,200	102	1,251,800	284,301	16,900	3,710
Private, fall.....	1,761,300	344,098					1,023,700	231,607	12,400	2,610
Scallops, bay.....									66,800	13,624
Squid.....									9,700	164
Total.....	2,860,300	553,012	224,500	6,982	464,300	37,219	2,577,200	554,709	6,712,300	268,314

VESSEL FISHERIES AT PRINCIPAL NEW ENGLAND PORTS

Due to the importance of the ports of Boston and Gloucester, Mass., and Portland, Maine, as landing points for fishery products, detailed monthly statistics are collected for these landings which are published in the following section. These landings are included in the catch by States appearing elsewhere in this document, but are presented here for their value in detailed form.

ECONOMIC ASPECT

The landings of fishery products at the three principal New England ports (Boston, Gloucester, and Portland), by vessels of 5 net tons capacity or more, during 1938, amounted to 400,611,381 pounds as landed, valued at \$8,956,523. This is an increase of 3 percent in the quantity of the catch as compared with 1937, but a decrease of 9 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 318,745,176 pounds, valued at \$7,623,465, or 79 percent of the total volume; the landings at Gloucester amounted to 63,009,136 pounds, valued at \$971,986, or 16 percent of the total; and the landings at Portland amounted to 18,857,069 pounds, valued at \$361,072, or 5 percent of the total.

Among the landings of fresh fish, haddock far outranked other species in volume landed, the landings of all sizes in 1938 amounting to 134,876,845 pounds, or 34 percent of the total fresh fish.

Landings by fishing vessels at the three principal New England ports, 1938

BOSTON: BY MONTHS

Species	January		February		March		April		May		June		July	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Cod, fresh:														
Large.....	2,540,785	\$77,186	3,538,775	\$88,610	5,197,020	\$122,664	3,377,170	\$66,569	3,018,180	\$45,913	1,583,675	\$38,120	1,534,555	\$36,755
Market.....	3,226,449	69,572	2,140,785	66,730	4,107,010	98,657	4,518,485	67,016	5,926,568	69,862	4,451,455	64,562	4,897,015	72,818
Scrod.....	135,645	3,371	29,360	728	19,000	464	63,750	981	77,200	783	209,500	2,654	222,475	3,016
Haddock, fresh:														
Large.....	6,282,965	251,591	9,987,970	318,896	13,600,330	366,675	13,151,450	242,154	7,648,845	173,020	6,625,325	151,860	5,422,415	142,451
Scrod.....	1,143,870	36,217	1,832,320	50,670	2,367,900	54,543	3,061,070	49,606	1,812,463	28,930	2,928,465	46,030	3,757,835	59,284
Hake, fresh:														
Large.....	1,061,565	34,335	612,795	22,819	420,885	16,358	409,330	12,192	305,505	5,561	343,110	5,412	343,325	4,927
Small.....	24,150	728	25,600	895	31,700	1,055	32,060	781	63,300	1,249	99,019	1,723	169,200	2,903
Pollock, fresh.....	3,603,295	60,313	1,355,345	25,595	1,451,650	27,574	1,676,645	20,715	1,459,285	15,586	518,285	7,184	609,410	9,804
Cusk, fresh.....	575,530	16,089	232,680	6,208	533,755	11,705	334,055	5,292	293,390	3,869	114,225	1,877	139,335	2,176
Halibut, fresh.....	36,800	6,359	85,420	13,785	198,418	31,887	200,351	23,697	176,646	17,176	239,411	23,140	147,359	16,139
Mackerel, fresh.....	15,075	1,276					287,250	5,582	4,185,730	80,696	2,741,510	72,841	3,205,535	76,116
Flounders, fresh:														
Gray sole.....	1,295,365	41,260	1,344,290	36,156	794,180	23,852	342,440	19,334	630,115	17,659	471,405	16,345	217,090	9,286
Lemon sole.....	143,845	11,190	95,370	8,912	146,448	11,376	79,531	5,423	266,760	7,455	163,075	7,923	127,720	9,023
Yellowtail.....	305,250	7,946	128,930	3,841	177,675	4,571	138,749	4,772	283,640	4,902	146,895	3,671	294,285	6,343
Blackback.....	79,150	3,908	43,215	2,298	30,180	1,569	30,475	1,050	81,270	1,664	75,675	2,381	72,630	2,417
Dab.....	69,610	1,669	104,865	2,166	155,095	3,755	232,965	5,365	365,265	5,072	463,905	8,370	204,805	4,578
Other.....	38,500	1,170	21,830	591	32,860	1,173	25,630	1,226	70,745	1,549	31,235	790	7,413	228
Swordfish, fresh.....											41,801	13,553	267,478	69,450
Whiting, fresh.....	141,685	1,766	905	28	6,740	193	40,795	1,434	656,857	12,917	2,345,329	35,526	774,900	10,284
Wolfish, fresh.....	136,965	4,013	144,895	4,321	302,105	7,413	385,805	7,757	428,965	6,998	213,340	4,037	68,945	1,530
Rosefish, fresh.....	6,037,861	82,995	2,261,156	34,852	3,038,676	43,314	1,258,425	17,996	3,392,771	40,626	2,280,679	23,131	1,895,824	21,161
Other, fresh.....	5,930	438	10,245	436	9,855	249	36,298	2,355	7,920	82	41,640	2,858	83,377	5,487
Total, fresh.....	26,900,293	743,390	23,815,761	688,537	32,621,482	839,047	29,682,669	561,297	31,141,330	541,469	26,128,952	533,988	24,462,926	566,176
Landed in 1937, fresh.....	21,194,272	630,144	24,425,442	672,570	30,523,765	771,813	26,866,266	602,120	28,687,024	623,694	29,994,985	639,796	28,703,736	673,982

FISHERY INDUSTRIES OF THE UNITED STATES, 1939 313

Landings by fishing vessels at the three principal New England ports, 1938—Continued

BOSTON: BY MONTHS—Continued

Species	August		September		October		November		December		Total, 1938		Total, 1937	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Cod, fresh:														
Large	1,108,565	\$32,613	1,059,410	\$43,329	1,902,396	\$60,267	2,016,090	\$51,092	2,360,860	\$58,175	29,038,471	\$721,293	29,337,065	\$901,135
Market	3,234,980	56,895	2,472,915	62,108	3,572,020	83,371	4,796,245	99,686	3,425,640	86,878	46,789,467	928,155	53,595,693	1,078,298
Scrod	195,575	2,379	121,955	1,971	330,380	5,415	462,420	7,272	215,380	4,060	2,082,640	33,094	2,944,710	46,518
Cod, salted:														
Large													6,000	255
Market			14,300	536							14,300	536	400	14
Haddock, fresh:													96,818,320	2,889,068
Large	5,406,515	143,948	4,817,805	156,829	4,436,140	173,512	3,831,055	162,984	4,221,515	180,208	85,432,330	2,464,128	96,818,320	2,889,068
Scrod	9,050,285	107,076	7,372,210	82,883	3,758,220	66,001	3,517,781	66,899	2,419,524	56,728	43,621,943	704,867	33,103,115	762,164
Hake, fresh:													8,111,045	184,814
Large	499,685	6,060	477,600	9,842	994,910	14,227	642,285	10,830	440,485	13,453	6,551,490	156,016	8,111,045	184,814
Small	231,700	3,858	217,550	4,794	308,670	4,924	265,310	4,743	82,170	2,604	1,560,362	30,255	1,614,335	36,800
Pollock, fresh	427,210	7,227	404,680	8,327	1,188,060	19,043	4,144,705	48,715	3,524,495	38,579	20,363,065	288,662	16,857,310	310,518
Cusk, fresh	245,727	3,788	237,570	5,085	733,085	12,465	490,530	7,810	381,705	8,065	4,311,497	84,429	5,556,732	114,915
Halibut, fresh	160,602	17,395	80,855	9,738	75,930	9,183	16,105	2,629	20,770	3,782	1,438,667	174,890	1,937,638	286,694
Mackerel, fresh	2,026,365	72,531	676,960	26,402	1,046,095	43,699	200,345	11,094	1,648,830	83,366	16,032,686	473,523	7,486,218	377,251
Flounders, fresh:													6,561,939	268,377
Gray sole	213,650	10,345	111,935	7,704	414,085	19,871	158,695	9,594	322,025	17,680	6,322,185	239,086	6,561,939	268,377
Lemon sole	278,900	12,949	398,735	24,095	278,645	20,672	345,050	20,501	269,960	21,519	2,534,029	161,038	2,436,399	150,968
Yellowtail	127,320	3,386	107,580	2,946	462,105	9,048	361,615	8,399	479,960	10,865	3,011,994	70,670	3,862,180	86,702
Blackback	159,620	4,363	320,990	12,489	376,420	12,733	230,160	6,861	121,680	6,364	1,631,405	58,097	1,032,290	37,969
Dab	154,915	4,243	149,845	4,778	178,370	4,861	66,140	1,690	82,375	1,982	2,234,155	48,439	2,081,135	44,401
Other	18,510	554	23,415	964	34,070	1,007	20,145	913	18,475	767	342,628	10,932	715,639	21,220
Swordfish, fresh	481,517	88,054	486,388	102,146	36,267	8,256		56		12	1,313,507	281,471	1,090,618	225,569
Whiting, fresh	2,267,645	30,528	1,172,315	15,707	254,635	3,951	50,321	937	27,075	544	7,739,402	113,815	6,213,064	100,192
Wolfish, fresh	27,280	704	21,885	666	47,495	1,657	25,875	1,020	47,075	1,735	1,850,590	41,851	1,838,906	42,751
Rosefish, fresh	3,706,533	40,706	2,929,380	34,364	3,468,289	41,260	1,801,309	24,938	2,050,568	37,107	34,141,474	442,450	41,176,252	641,011
Herring, fresh													1,400	18
Other, fresh	128,487	11,815	197,649	18,864	206,825	25,001	114,766	13,825	192,888	14,358	1,035,880	95,768	234,004	11,488
Total, fresh	30,151,366	661,417	23,859,607	636,031	24,103,312	640,424	23,556,857	562,422	22,306,331	648,731	318,730,876	7,622,929	324,593,127	8,467,716
Total, salted			14,300	536							14,300	536	6,400	269
Grand total	30,151,366	661,417	23,873,907	636,567	24,103,312	640,424	23,556,857	562,422	22,306,331	648,731	318,745,176	7,623,465	324,599,527	8,467,985
Landed in 1937:														
Fresh	27,224,462	723,563	26,474,171	754,754	28,285,456	869,036	29,335,270	844,498	22,878,278	661,746			324,593,127	8,467,716
Salted					0,400	269							6,400	269
Total	27,224,462	723,563	26,474,171	754,754	28,291,856	869,305	29,335,270	844,498	22,878,278	661,746			324,599,527	8,467,985

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 over 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.

GLOUCESTER: BY MONTHS

Species	January		February		March		April		May		June		July	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Cod, fresh:														
Large	178,166	\$5,654	89,915	\$3,346	533,370	\$10,910	1,034,402	\$20,012	596,661	\$11,615	258,211	\$6,714	182,530	\$3,917
Market	159,665	4,516	84,115	2,419	287,345	5,572	1,505,929	20,034	1,014,704	9,474	214,425	2,423	204,824	2,888
Scrod	17,120	437	7,020	127	36,290	646	26,925	503	34,535	223	1,225	13	10,320	125
Cod, salted:														
Large					23,750	714	5,050	99	251,820	7,594	33,445	1,107	26,075	838
Market					2,875	67	830	19	2,720	36	10,175	144	265,401	6,053
Scrod											210	3		
Haddock, fresh:														
Large	184,668	6,636	161,200	5,083	494,065	12,369	890,455	17,303	386,270	6,758	73,405	1,477	124,156	2,741
Scrod	32,725	846	16,395	331	27,700	645	125,875	1,782	60,950	872	20,210	261	132,295	2,156
Hake, fresh:														
Large	55,460	1,438	13,380	337	46,935	1,144	19,110	276	27,615	286	14,440	206	62,090	789
Small	15,340	334	14,105	440	9,300	180	13,375	196	95,605	969	96,935	1,003	89,535	950
Hake, salted, large					280	7			860					
Pollock, fresh	933,882	12,548	46,055	743	125,495	2,038	127,425	1,540	150,460	1,322	86,644	764	190,694	2,134
Pollock, salted											170	3		
Cusk, fresh	1,540	34	1,015	19	4,605	105	1,945	20	32,365	325	23,610	260	52,815	714
Cusk, salted									160	2				
Halibut, fresh	785	76	7,995	996	4,000	406	2,752	199	43,138	3,364	34,088	1,810	1,907	144
Halibut, salted									4,935	398				
Mackerel, fresh							54,000	999	272,070	3,877	843,760	13,090	2,204,485	38,446
Flounders, fresh:														
Gray sole	41,615	1,132	41,860	1,244	44,625	1,588	29,070	1,055	39,325	833	24,055	663	40,560	1,321
Lemon sole					86	191	6,080	7	345	6	50	2	685	18
Yellowtail	32,935	608	4,895	86	9,680	191	245	7	5,165	50	6,275	100	7,695	130
Blackback	1,200	48	650	28	1,325	61	605	14	1,570	31	695	16	2,630	75
Dab	4,185	78	7,275	91	9,950	129	30,280	465	32,465	293	23,639	204	14,780	135
Other			580	52	125	11	210	3						
Swordfish, fresh											255	69		
Whiting, fresh			700	7	1,183	30	6,097	76	23,046	327	291,480	3,948	335,385	3,943
Wolfish, fresh	7,395	166	3,935	111	31,840	630	21,015	308	20,195	249	4,355	62	3,680	46
Rosefish, fresh	1,018,500	13,462	180,050	2,498	860,094	12,632	654,129	8,942	5,777,040	63,340	4,124,305	38,829	3,450,520	35,405
Other, fresh	1,745	43	4,833	55	11,043	1,052	15,136	2,980	18,572	1,619	25,060	2,054	246,457	9,491
Total, fresh	2,686,906	46,056	685,973	18,013	2,539,590	50,339	4,458,980	76,713	8,632,096	105,823	6,167,122	73,968	7,358,043	105,568
Total, salted					26,905	788	5,880	118	200,595	8,044	44,000	1,257	328,215	6,894
Grand total	2,686,906	46,056	685,973	18,013	2,566,495	51,127	4,464,860	76,831	8,892,691	113,867	6,211,122	75,225	7,649,739	112,462
Landed in 1937:														
Fresh	1,290,136	28,978	716,790	18,440	719,623	17,925	1,948,924	37,363	3,484,931	54,682	4,622,952	68,180	4,673,021	75,753
Salted	203,684	6,689			80,356	2,412	33,855	985	13,025	360	44,765	1,229	328,215	10,591
Total	1,493,820	35,667	716,790	18,440	799,979	20,337	1,982,779	38,348	3,497,956	55,022	4,667,717	69,409	5,001,236	86,344

FISHERY INDUSTRIES OF THE UNITED STATES, 1939

Landings by fishing vessels at the three principal New England ports, 1938—Continued

GLOUCESTER: BY MONTHS—Continued

Species	August		September		October		November		December		Total, 1938		Total, 1937	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Cod, fresh:														
Large	115,410	\$3,005	107,435	\$4,694	253,210	\$7,514	156,041	\$3,904	157,655	\$3,672	3,663,006	\$85,257	3,615,563	\$102,979
Market	192,385	2,645	100,065	2,300	257,564	5,676	220,820	4,136	167,886	3,513	4,299,716	65,696	4,410,266	85,693
Scrod	415	3	650	7	8,070	132	23,050	368	23,875	414	189,495	2,998	184,945	2,931
Cod, salted:														
Large	607,610	18,199			376,140	11,475					1,431,890	43,266	923,093	30,155
Market	298,050	8,923			186,190	5,404			108,000	3,240	821,241	22,241	327,301	9,739
Scrod									55,000	1,595	210	3	28,628	713
Haddock, fresh:														
Large	224,705	4,814	57,411	1,747	151,680	5,129	29,170	1,012	67,635	2,211	2,844,840	67,280	3,157,101	82,594
Scrod	353,400	4,417	5,435	72	28,940	466	95,380	908	23,085	490	922,390	13,246	1,049,615	22,559
Hake, fresh:														
Large	53,690	577	282,345	4,637	293,890	3,424	138,349	2,343	88,053	2,457	1,095,357	17,914	1,733,028	26,916
Small	136,855	1,418	64,720	891	56,835	673	22,115	263	21,755	416	636,475	7,733	1,111,022	1,644
Hake, salted, large	320	5									1,560	26	6,413	113
Pollock, fresh	581,055	6,886	473,720	5,738	1,704,961	18,777	3,163,358	31,676	1,405,027	13,411	8,988,776	97,577	9,614,949	145,095
Pollock, salted											390	6	2,130	39
Cusk, fresh	27,660	305	9,595	132	53,390	792	1,820	17	10,270	161	220,630	2,884	300,478	4,273
Cusk, salted											160	2	400	9
Hallbut, fresh	466	45	457	50	966	30	50	5	131	33	96,715	7,148	40,433	3,354
Hallbut, salted											4,935	398		
Mackerel, fresh	444,505	12,745	141,595	4,757	187,630	6,610	157,740	11,544	350,305	17,701	4,656,090	109,769	1,262,163	71,761
Mackerel, salted	400	14			49,800	3,750					50,200	3,764	251,170	15,613
Flounders, fresh:														
Gray sole	71,450	2,032	41,720	1,677	64,350	2,240	49,620	1,795	38,555	2,017	526,805	17,597	847,753	32,476
Lemon sole	7,975	241			210	11	9,600	306	70	6	18,935	590	29,190	1,292
Yellowtail	1,820	30	1,395	24	29,610	479	6,225	95	2,235	39	108,175	1,839	237,135	4,371
Blackback	1,410	42	5,550	18	3,480	101	2,700	60	750	24	17,565	518	32,740	1,214
Dab	26,988	291	24,330	349	24,075	353	15,035	171	17,125	226	230,127	2,785	300,768	4,819
Other					110	7	1,465	27			2,490	100	8,310	656
Swordfish, fresh	2,289	339	621	125							3,165	533	11,185	2,060
Whiting, fresh	544,628	6,826	334,092	4,236	23,265	426	8,447	150	900	16	1,569,223	19,984	325,653	7,174
Wolfish, fresh	3,195	38	605	7	410	7	65	1	435	9	97,125	1,634	102,415	1,663
Rosefish, fresh	4,666,876	47,586	3,043,325	32,300	2,254,830	26,038	2,120,820	28,301	1,256,875	20,813	29,407,964	330,146	17,022,740	245,732
Herring, fresh			1,600	10	100	1					1,700	11	4,875	45
Other, fresh	512,342	22,928	232,233	7,335	5,811	180	21,719	1,080	6,835	324	1,101,786	49,141	297,489	10,528
Total, fresh	7,959,519	117,213	4,923,869	71,106	5,403,387	79,366	6,243,589	88,102	3,639,466	67,953	60,698,550	902,280	44,669,836	861,728
Total, salted	906,380	27,141			612,130	20,629			163,000	4,835	2,310,586	69,706	1,589,135	56,280
Grand total	8,865,899	144,354	4,923,869	71,106	6,015,517	99,995	6,243,589	88,162	3,802,456	72,788	63,009,136	971,986	46,238,971	918,008
Landed in 1937:														
Fresh	4,630,303	82,889	3,322,567	69,899	4,317,599	102,376	9,072,088	190,300	5,900,872	114,963			44,669,836	861,728
Salted	425,685	16,026	210,870	9,658	196,685	8,038			1,995	92			1,539,135	56,280
Total	5,055,988	98,915	3,533,467	79,757	4,514,284	110,414	9,072,088	190,300	5,902,867	115,055			46,238,971	918,008

PORTLAND: BY MONTHS

Species	January		February		March		April		May		June		July	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Cod, fresh:														
Large	52,390	\$1,916	45,386	\$1,389	80,243	\$2,034	1,184,600	\$21,403	506,971	\$10,265	328,043	\$8,931	348,169	\$9,059
Market	43,495	1,138	35,742	965	57,654	1,284	1,066,828	18,753	582,183	10,593	38,284	600	22,320	359
Scrod	1,555	24	2,217	29	2,370	23	82,940	1,411	8,895	91	7,885	78	2,461	18
Haddock, fresh:														
Large	89,928	4,400	75,936	3,109	84,924	3,425	1,306,293	22,831	480,642	10,497	73,611	2,423	37,207	1,469
Scrod	8,445	200	11,471	213	6,694	139	3,726	43	3,025	28	4,995	66	3,667	43
Hake, fresh:														
Large	29,260	955	11,715	386	73,420	2,382	24,310	666	68,322	1,074	50,485	683	27,673	400
Small	76,515	2,531	80,888	2,703	29,735	914	58,837	1,288	155,618	2,367	219,711	2,725	230,980	3,047
Pollock, fresh	38,920	620	18,395	288	124,257	1,662	131,797	1,265	302,271	2,398	165,334	1,252	83,485	728
Quak, fresh	88,276	2,636	212,542	5,952	184,048	4,408	181,897	3,103	170,435	2,734	60,417	1,157	7,602	150
Halibut, fresh	1,960	369	3,806	746	2,992	545	13,594	1,696	8,138	675	1,117	162	109	15
Mackerel, fresh									650	26	18,810	727		
Flounders, fresh:														
Gray sole	9,550	380	11,875	446	31,620	1,559	29,748	1,459	82,735	1,714	124,808	3,088	140,709	4,778
Lemon sole							2,065	48			5,615	95	5,090	141
Yellowtail	715	14	755	16	1,215	40	375	6	9,740	98	1,625	17	3,315	50
Blackback	3,210	108	4,315	78	2,360	68	6,235	183	8,605	124	3,079	46	3,615	63
Dab	3,335	73	3,920	82	19,897	432	37,005	409	26,737	206	44,135	451	25,485	256
Other							6,360	322	2,230	27	592	10	1,578	17
Swordfish, fresh													1,886	225
Whiting, fresh							20		4,785	89	66,381	1,109	299,010	2,302
Wolfish, fresh	425	7	555	10	2,090	28	18,810	204	6,255	50	2,385	19	2,665	21
Rosefish, fresh	110,130	1,913	10,540	142	146,681	2,054	43,320	499	74,435	865	134,900	1,264	401,150	4,168
Herring, fresh					645	7								
Other, fresh	95	3	12,227	1,170	59,213	4,186	2,354	157	717	20	3,622	91	11,399	161
Total, fresh	558,204	17,287	542,284	17,732	910,038	25,190	4,201,134	75,756	2,502,389	43,961	1,355,634	25,004	1,659,055	27,470
Landed in 1937, fresh	969,739	32,827	939,261	28,127	995,057	26,252	3,666,284	69,177	3,374,261	61,549	1,196,702	25,615	1,037,424	25,448

Landings by fishing vessels at the three principal New England ports, 1938—Continued

PORTLAND: BY MONTHS—Continued

Species	August		September		October		November		December		Total, 1938		Total, 1937	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Cod, fresh:														
Large	300,136	\$3,892	129,657	\$5,530	114,962	\$4,717	67,638	\$2,265	47,294	\$1,553	3,205,529	\$77,954	2,821,115	\$86,962
Market	36,021	546	39,046	680	58,389	1,197	50,701	1,055	42,384	752	2,073,047	37,952	2,999,130	57,456
Scrod	2,140	21	1,100	10	2,575	22	860	7	1,030	9	116,028	1,743	21,199	285
Haddock, fresh:														
Large	57,397	2,074	47,753	2,117	86,850	4,377	119,041	5,430	96,951	4,197	2,556,533	66,249	2,933,748	89,115
Scrod	6,755	69	7,620	144	13,966	219	16,730	276	11,715	206	98,809	1,636	113,370	2,105
Hake, fresh:														
Large	65,077	742	91,900	1,597	80,849	1,386	14,790	316	10,695	305	548,496	10,892	2,398,911	50,132
Small	241,504	2,726	229,723	3,491	225,875	3,413	225,785	4,103	104,930	3,049	1,880,101	32,367	2,23,035	3,792
Pollock, fresh	134,293	1,090	375,741	3,103	689,013	7,037	679,091	6,630	151,361	1,326	2,893,958	27,999	2,198,101	26,644
Cusk, fresh	29,862	570	37,073	908	45,999	1,128	151,704	2,725	63,135	1,679	1,232,890	27,150	2,170,017	49,180
Halibut, fresh	305	40	490	44	2,423	357	1,437	227	1,507	342	37,877	5,218	32,292	4,621
Mackerel, fresh	30,220	871	60,703	1,850	1,613	137	84,975	1,659			190,971	5,270	216,160	8,466
Flounder, fresh:														
Gray sole	86,468	3,154	32,800	2,095	24,730	1,049	8,874	605	9,083	502	593,000	20,829	436,093	14,379
Lemon sole	2,810	52	160	3	1,168	21	540	20	20	1	17,988	381	835	18
Yellowtail	2,830	47	2,276	37	7,050	150	620	9	15,630	277	46,145	761	54,370	745
Blackback	6,849	135	3,243	60	1,100	32	120	4	845	31	43,576	930	41,394	1,040
Dab	11,037	137	10,095	204	7,835	123	5,780	94	5,705	113	200,966	2,580	190,366	2,205
Other	13,001	300	4,445	136	4,690	96	1,170	39	2,145	74	36,211	1,021	2,830	138
Swordfish, fresh			5,119	872			68	12			6,653	1,109	22,617	3,833
Whiting, fresh	1,037,111	11,271	306,995	3,764	4,778	62					1,719,080	18,587	85	2
Wolfish, fresh	340	1	80		845	21	910	9	20		34,380	370	64,079	635
Rosefish, fresh	119,570	1,249	46,095	464	23,230	282	17,855	193	26,995	313	1,154,891	13,426	129,227	822
Herring, fresh							12,000	180			12,645	187	237	2
Other, fresh	23,987	477	5,693	152	8,665	186	33,728	348	290	10	151,895	6,961	82,801	1,609
Total, fresh	2,207,713	34,464	1,437,851	27,261	1,406,605	26,002	1,484,427	26,206	591,735	14,739	18,857,069	361,072	17,121,512	403,886
Landed in 1937, fresh	940,817	32,063	1,015,358	26,533	1,292,820	31,724	1,100,403	28,786	603,386	15,785			17,121,512	403,886

SUMMARY: BY PORTS

Species	Boston		Gloucester		Portland		Total, 1938		Total, 1937	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Cod, fresh:										
Large	29,038,471	\$721,293	3,663,006	\$85,257	3,205,529	\$77,954	35,907,006	\$884,504	35,773,763	\$991,076
Market	46,769,467	923,155	4,299,716	65,596	2,073,047	37,952	53,142,230	1,031,703	61,005,109	1,221,847
Scrod	2,082,640	33,094	189,495	2,998	116,028	1,743	2,388,163	37,835	3,150,854	49,729
Cod, salted:										
Large							1,431,890	43,266	929,083	30,410

Market.....	14,300	536	821,241	22,241			835,541	22,777	327,701	9,753
Scrod.....			210	3			210	3	28,628	713
Haddock, fresh:										
Large.....	85,432,330	2,464,128	2,844,840	67,280	2,556,533	66,349	90,833,703	2,597,757	102,909,169	3,060,777
Scrod.....	43,021,943	704,867	922,390	13,246	98,809	1,636	44,043,142	719,749	34,266,100	786,828
Hake, fresh:										
Large.....	6,551,490	156,016	1,095,357	17,914	548,496	10,892	8,105,343	184,822	12,242,984	261,861
Small.....	1,450,362	30,255	636,475	7,733	1,880,101	32,367	4,066,938	70,355	1,948,442	41,236
Hake, salted, large.....			1,560	26			1,560	26	6,413	113
Pollock, fresh.....	20,363,065	288,662	8,988,776	97,577	2,893,958	27,399	32,245,799	413,638	28,670,360	482,167
Pollock, salted.....			390	6			390	6	2,130	39
Cusk, fresh.....	4,311,497	84,429	220,630	2,884	1,232,890	27,150	5,765,017	114,463	8,026,277	168,368
Cusk, salted.....			160	2			160	2	400	8
Halibut, fresh.....	1,438,667	174,890	96,715	7,148	37,877	5,218	1,573,259	187,266	2,010,363	244,559
Halibut, salted.....			4,935				4,935			
Mackerel, fresh.....	16,033,695	473,523	4,656,090	109,769	196,971	5,270	20,886,756	588,562	8,963,541	457,478
Mackerel, salted.....			50,200	3,764			50,200	3,764	251,170	15,513
Flounders, fresh:										
Gray sole.....	6,322,185	239,086	526,805	17,597	593,000	20,829	7,441,990	277,512	7,945,785	315,132
Lemon sole.....	2,534,029	161,038	18,935	590	17,988	381	2,570,952	162,009	2,465,924	152,378
Yellowtail.....	3,011,994	70,670	108,175	1,839	46,146	761	3,166,314	73,270	4,143,685	91,818
Blackback.....	1,621,405	58,097	17,565	518	43,576	930	1,682,546	59,545	1,106,424	40,213
Dab.....	2,224,155	48,439	230,127	2,785	200,966	2,580	2,655,248	63,804	2,672,269	51,425
Other.....	342,628	10,932	2,490	100	36,211	1,021	381,329	12,053	728,779	22,014
Swordfish, fresh.....	1,313,507	281,471	3,165	533	6,053	1,109	1,322,725	283,113	1,124,420	231,462
Whiting, fresh.....	7,739,402	113,515	1,569,223	19,984	1,719,080	18,587	11,027,705	152,386	6,538,802	107,368
Wolfish, fresh.....	1,850,590	41,851	97,125	1,634	34,380	370	1,982,095	43,855	2,005,400	45,049
Rosefish, fresh.....	34,141,474	442,450	29,407,964	330,146	1,154,891	13,426	64,704,329	786,022	58,327,219	887,565
Herring, fresh.....			1,700	11			12,645	198	6,512	65
Other, fresh.....	1,035,880	95,768	1,101,786	49,141	151,895	6,961	1,289,581	151,870	584,294	23,525
Total, fresh.....	318,730,876	7,622,929	60,698,550	902,280	18,857,069	361,072	308,286,495	8,886,281	386,414,475	9,733,330
Total, salted.....	14,300	536	2,310,586	69,706			2,324,896	70,242	1,545,535	56,549
Grand total.....	318,745,176	7,623,465	63,009,136	971,986	18,857,069	361,072	400,611,381	8,956,523	387,960,010	9,789,879
Landed in 1937:										
Fresh.....	324,593,127	8,467,716	44,699,836	861,728	17,121,512	403,886			386,414,475	9,733,330
Salted.....	6,400	269	1,539,135	56,280					1,545,535	56,549
Total.....	324,599,527	8,467,985	46,238,971	918,008	17,121,512	403,886			387,960,010	9,789,879

1 The items under "Other, fresh" include alewives, 216,739 pounds, value \$1,761; butterfish, 179,813 pounds, value \$8,045; eels, 5,873 pounds, value \$99; herring smelt, 4,600 pounds, value \$146; salmon, 53 pounds, value \$13; scup or porgy, 13,725 pounds, value \$320; sea bass, 205 pounds, value \$14; shad, 31,888 pounds, value \$1,513; sharks, 50,994 pounds, value \$1,534; skates, 57,575 pounds, value \$814; striped bass, 5 pounds; sturgeon, 2,295 pounds, value \$182; tautog, 55 pounds, value \$2; tuna, 805,101 pounds,

value \$37,615; mixed fish, 16,725 pounds, value \$142; lobsters, 18 pounds, value \$2; scallops, 828,886 pounds, value \$94,143; shrimp, 73,491 pounds, value \$5,489; and squid, 1,520 pounds, value \$36.

NOTE.—In addition to the above the following also were landed during 1938: Livers, 4,864,218 pounds, value \$137,484; spawn, 348,074 pounds, value \$10,314; tongues, 3,149 pounds, value \$21.

BIOLOGICAL ASPECT

In 1938 the fishing fleet landing fares at Boston, Gloucester, and Portland, and operating on the fishing banks of the North Atlantic, numbered 389 steam, motor, and sail vessels of 5 net tons capacity or greater, as measured by the United States Customs Service. The catch of edible fish landed at the three ports amounted to 402,710,099 pounds when the salted fish had been converted to the basis of fresh-gutted or round weight as usually landed. This, however, does not represent the entire catch of edible fish of these vessels, for landings were also made at ports in New England other than these three; at New York City, and at more southern ports in connection with the southern winter trawl and mackerel fisheries.

Otter trawls on all sizes of vessels accounted for 319,195,082 pounds, or 79 percent of the total landings. Line trawls were next in importance, accounting for 42,026,955 pounds, or 10 percent of the total.

The catch taken off New England and landed at the three ports amounted to 249,185,412 pounds, or 62 percent of the total; that off Nova Scotia, 145,241,037 pounds, or 36 percent of the total; that off the east coast of Newfoundland, 5,028,681 pounds; and that off the Middle Atlantic States, 3,254,969 pounds; each representing about 1 percent of the total.

Landings by fishing vessels at the three principal New England ports, 1938

BY GEAR AND AREA

Gear and area	Vessels fishing	Trips	Days absent	Cod			Haddock		Hake		Pollock	Cusk	Halibut
				Large	Market	Scrod	Large	Scrod	Large	Small			
	Number	Number	Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	
Line trawls:													
Treaty Coast	2	4	81	845,500	362,592								
Magdalen Islands	2	5	95	1,639,700	1,191,369								
Gulf of St. Lawrence, unclassified	3	3	60	6,783	7,343				135			108,484	
Grand Bank	4	9	175	59,871	7,536				6,397	1,170		213,850	
St. Pierre Bank	3	3	63	32,395	4,704				1,762			2,952	
Newfoundland Banks, unclassified	1	2	16	2,765	436				554			25	
Northeast Cape Breton	2	2	36	3,952	456							16,949	
Misaine Bank	1	1	7	330	100		60		1,145	3,600		19,480	
Banqueresau	3	10	201	47,310	15,001				23,366			8,367	
Canso	1	1	26	3,952	456							280,099	
Middle Ground	1	1	10	33,700	11,800		34,000	800			600	100	
Northeast Sable Island Bank	3	4	21	79,400	52,808	2,480	39,010	1,400	4,949		1,530	8,988	
Horseshoe Ground	1	1	15	6,175	1,600				2,075		400	7,500	
Southwest Sable Island Bank	2	2	16	7,310	3,500	400	3,610		250		16,530	230	
Emerald Bank	8	12	113	129,512	135,234	1,200	199,520	20,790	38,680		7,290	75,795	
Central Nova Scotia	1	1	20	3,100	1,900			250	34,100		150	12,625	
La Have Bank (including Sambro Bank)	8	20	234	108,692	101,235	11,186	179,810	19,275	53,516	5,705	8,901	111,912	
Southern Nova Scotia	15	40	322	203,503	273,757	16,525	642,720	111,831	159,400	1,265	28,690	281,103	
Browns Bank	21	195	1,850	1,872,444	1,824,962	51,315	5,402,520	606,805	779,360	42,115	197,003	1,386,156	
Western Nova Scotia	18	65	562	364,196	535,727	9,990	1,002,306	194,799	360,280	29,618	50,674	504,191	
Southern Bay of Fundy	3	4	43	13,675	12,545		99,800	8,700	33,515		400	2,100	
Nova Scotia, unclassified	6	7	75	54,699	20,165		64,950	7,420	17,960		1,800	19,760	
Eastern Maine	9	32	257	60,230	43,095	175	120,131	9,625	27,690	214,306	12,669	191,612	
Central Maine	15	104	493	104,067	63,951	852	69,260	6,418	276,927	318,923	17,271	516,590	
Western Maine	30	319	408	71,958	44,145	5,308	86,388	5,152	146,510	125,444	22,268	113,964	
Eastern Massachusetts	24	683	1,362	313,675	399,445	61,225	349,245	4,595	55,850	634,060	46,600	90,180	
Inner Grounds	36	269	962	303,444	288,400	8,055	957,227	44,775	657,593	330,202	79,828	1,165,939	
Western Side South Channel	16	91	592	874,680	963,722	3,490	2,219,725	185,745	330,865	5,570	240,615	71,152	
Eastern Side South Channel	15	45	246	138,377	142,155	250	804,680	23,830	433,065		34,070	459,956	
Northern Edge of Georges	6	9	59	183,450	72,560		165,745	2,100	48,540		9,440	94,430	
Northeast Peak of Georges	10	19	161	339,035	321,990	150	573,410	42,290	21,685		44,720	39,005	
Off No Man's Land	3	3	15	4,580	4,300	50	22,395	2,145		3,120		45,268	
Total	187	1,966	8,596	7,910,460	6,908,989	172,651	13,043,587	1,298,995	3,545,474	1,715,098	808,474	5,251,468	1,144,914

Landings by fishing vessels at the three principal New England ports, 1938—Continued

BY GEAR AND AREA—Continued

Gear and area	Vessels fishing	Trips	Days absent	Cod			Haddock		Hake		Pollock	Cusk	Halibut
				Large	Market	Scrod	Large	Scrod	Large	Small			
	Number	Number	Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	
Hand lines:													
Eastern Massachusetts.....	1	1	1	35	70					30			
Northern edge of Georges.....	1	1	6	25,900	21,100		50			1,000			
Total.....	2	2	7	25,935	21,170		50			1,030			
Harpoons:													
Northeast Cape Breton.....	13	13	256										
La Have Bank (including Sambro Bank).....	1	1	12										
Browns Bank.....	21	35	521										
Western Nova Scotia.....	1	1	3										
Western Maine.....	1	15	15										
Eastern Massachusetts.....	1	2	2										
Western Side South Channel.....	2	2	6										
Eastern Side South Channel.....	1	1	11										
Northern edge of Georges.....	23	30	416										
Northeast peak of Georges.....	22	37	446										
Central Georges.....	1	1	20										
Southeast Georges.....	13	16	136										
Southwest Georges.....	15	18	229										
Lightship Grounds.....	11	11	92										
Off No Man's Land.....	1	1	12										
Southern New England, unclassified.....	6	6	117										
South.....	7	7	116										
Total.....	140	197	2,410										
Otter trawls, large:													
Newfoundland Banks, unclassified.....	3	5	37	60,328	245,890	4,570	68,550	11,204	1,550	120	2,188	857	
Banquereau.....	30	114	1,035	2,235,056	9,809,592	592,288	1,383,188	559,739	13,242	970	262,296	662	
Canso.....	1	2	12	3,925	4,800		86,875	6,000	6,835		4,350	1,448	
Middle Ground.....	23	48	341	723,131	1,397,429	117,037	1,117,482	220,810	19,883	400	198,558	1,903	
Northeast Sable Island Bank.....	27	70	507	1,484,772	3,459,113	35,605	1,828,488	602,970	40,075	2,000	362,896	1,205	
Southeast Sable Island Bank.....	14	16	114	258,919	593,285	680	406,190	253,144	14,366	3,100	94,028	4,502	
Horseshoe Grounds.....	41	201	1,302	2,659,123	2,804,697	86,406	6,115,560	641,700	294,066	994	1,970,055	25,290	
Southwest Sable Island Bank.....	37	112	877	4,111,474	4,573,019	94,860	4,395,769	431,936	59,370	9,193	1,388,691	3,639	
Eastern Nova Scotia.....	3	4	22	35,750	30,950	225	16,428	3,708	2,910		21,120	243	
Emerald Bank.....	39	183	1,075	2,250,907	3,222,976	77,381	7,094,503	761,597	109,380	281	2,097,093	23,844	
Total.....													

La Have Bank (including Sambro Bank)	7	8	32	36,269	69,366	2,720	234,048	26,580	6,760		28,853	1,490	2,027
Southern Nova Scotia	18	54	261	73,615	84,595	1,780	111,970	47,030	20,270	1,450	59,370	220	136
Browns Bank	40	267	1,697	1,430,423	2,180,306	44,826	11,089,319	2,815,783	111,423	5,467	1,564,427	37,239	60,600
Western Nova Scotia	4	4	33	41,500	40,500		186,500	14,000		3,000	10,075		1,105
Nova Scotia, unclassified	16	27	203	365,879	484,232	16,663	748,237	185,557	29,210		168,942		2,075
Central Maine	1	1											
Western Maine	3	3	36	150,770	95,700	26,500	265,430		180	400	58,800		1,970
Eastern Massachusetts	2	2	10								89,100		
Inner Grounds	11	30	145	37,840	46,180	220	160,346	69,400	16,490	939	165,763	4,094	240
Western Side South Channel	33	238	1,352	542,560	1,236,956	38,649	2,855,149	3,925,243	435,889	3,053	744,443	46,695	6,782
Eastern Side South Channel	33	217	1,169	609,552	973,340	36,813	3,353,154	2,076,589	467,432		1,240,890	26,423	13,571
Northern Edge of Georges	36	257	1,555	1,238,461	4,326,928	279,062	5,030,228	5,488,412	5,930,121	3,227	1,052,594	29,682	35,342
Northeast peak of Georges	42	453	3,307	4,485,010	6,566,890	493,666	12,705,078	14,167,388	314,047	8,755	2,917,173	66,191	53,200
Central Georges	31	98	553	412,013	527,440	42,605	2,054,947	2,483,975	42,972	845	190,877	4,042	9,214
Southeast Georges	31	104	604	1,638,230	1,001,671	12,267	3,942,342	1,724,151	50,130	1,290	371,645	2,974	22,833
Southwest Georges	11	13	73	62,498	59,282	210	453,772	196,480	9,504		23,765	40	1,291
Lightship Grounds	6	6	40	14,964	42,672	1,564	89,167	128,374	5,875	1,512	4,401	225	
Nantucket Shoals	4	5	15	9,108	22,954	2,003	45,844	61,018	4,090	189	2,314	30	44
Southern New England, unclassified	15	24	168	155,816	199,925	11,630	425,256	225,585	31,650		245,318	6,805	2,434
Total	168	2,568	16,836	25,117,898	44,100,677	2,020,130	66,263,820	37,128,643	2,305,230	47,185	15,340,925	290,320	412,587
Otter trawls, medium:													
Southwest Sable Island Bank	1	1	9	3,455	1,835		44,150	10,080	500	290	410	20	
Emerald Bank	1	1	8	100	200		9,000	31,400					
Southern Nova Scotia	19	53	386	103,773	81,470	6,358	177,093	73,517	58,377	23,555	17,107	60,956	46
Browns Bank	26	162	1,257	376,031	195,155	12,556	925,697	251,615	50,978	44,077	83,800	8,080	2,471
Western Nova Scotia	1	2	12	3,870	4,325		520	9,045			3,910	925	
Eastern Maine	10	30	185	7,903	2,600	5	9,299	3,889	2,600	136,257	7,083	537	120
Central Maine	13	40	194	18,170	8,718		24,662	8,175	141,695	13,060	29,380	8,995	100
Western Maine	12	60	237	20,240	9,428		34,585	6,820	49,315	18,900	2,405	1,025	142
Eastern Massachusetts	34	157	698	34,885	33,980	3,475	40,290	40,360	96,100	65,950	3,235,490	3,935	58
Inner Grounds	33	125	675	64,312	43,622	1,190	75,947	27,481	33,145	75,450	202,545	40,188	390
Western Side South Channel	43	332	2,127	405,865	501,857	13,267	1,513,440	1,080,637	204,915	160,764	191,453	29,836	3,644
Eastern Side South Channel	30	181	1,181	263,179	308,973	1,275	3,094,029	1,237,527	168,202	17,497	142,138	6,168	5,579
Northern Edge of Georges	15	43	239	77,890	137,425	50	585,785	544,093	2,906		13,596		1,527
Northeast Peak of Georges	36	25	157	334,935	258,355		403,694	303,270	3,240		23,890	140	1,338
Central Georges	15	87	593	399,343	300,195	7,880	1,281,895	1,123,310	7,105	1,100	77,855		4,198
Southeast Georges	5	14	77	159,150	55,920		223,390	106,040	7,362		13,302	200	489
Southwest Georges	9	28	179	20,380	72,267		719,355	276,430	1,590		6,270	150	2,891
Lightship Grounds	7	7	27	2,930	14,570		137,310	17,620	1,500		9,475	3,400	63
Nantucket Shoals	2	2	17	1,920	11,260	1,500	33,200	14,650	1,800		2,480		
Off No Man's Land	4	7	30		165			400			1,325		
Southern Massachusetts	1	1	3		65						100		
Southern New England, unclassified	6	7	37	10,555	25,975		67,645	56,050	1,330		1,566		88
South	6	6	22	2,240	1,410		23,520	40,610	150	645	1,255		
Total	185	1,371	8,260	2,310,936	2,070,670	48,200	9,344,798	5,265,655	843,220	561,425	4,056,350	160,230	23,144

See footnotes at end of table.

Landings by fishing vessels at the three principal New England ports, 1938—Continued

BY GEAR AND AREA—Continued

Gear and area	Vessels fishing	Trips	Days absent	Cod			Haddock		Hake		Pollock	Cusk	Halibut
				Large	Market	Scrod	Large	Scrod	Large	Small			
	Number	Number	Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Otter trawls, small:													
Missine Bank	3	3	17	11,800	8,320		10,530	270					
Southern Nova Scotia	1	1	4							100			
Browns Bank	1	1	7	685	335		265				6,825	30	10,740
Western Nova Scotia	1	1	3										
Northern Bay of Fundy	2	2	13	1,035	140		1,135	20			1,475		910
Eastern Maine	12	77	451	26,005	14,272	195	39,439	7,690	36,490	233,268	5,440	3,290	29
Central Maine	18	142	622	80,575	51,827	1,295	100,888	8,565	67,030	134,995	4,560	16,776	312
Central Maine (occasional)							7		4,300	25			
Western Maine	38	459	1,010	91,527	70,784	11,185	106,299	17,210	80,615	216,301	6,960	7,196	514
Eastern Massachusetts	46	1,389	4,368	396,655	462,523	70,688	571,875	192,484	104,780	527,887	916,425	2,230	487
Inner Grounds	12	14	41	4,135	2,410	300	3,875	675	4,000	7,745	62,665	1,000	
Western Side South Channel	37	171	557	114,130	212,135	27,985	314,275	92,580	56,995	21,445	43,760	800	17
Eastern Side South Channel	7	8	45	2,885	10,100	540	44,490	9,125	100	160	725		284
Central Georges	3	4	29	714			7,600		5,900		280		70
Southwest Georges	4	4	17	3,200	2,475		22,450	8,650					
Lightship Grounds	4	6	22	1,056	4,445			400		180			
Nantucket Shoals	3	5	28		750	35	185			1,205	25	105	
Off No Man's Land	5	14	50	30	715		90			3,085		50	135
Southern Massachusetts	5	8	31	1,495	305		2,525	1,075		405		300	
Total	197	2,309	7,315	735,927	846,736	112,223	1,225,928	338,844	364,885	1,150,839	1,042,490	42,032	1,828
Sink gill nets:													
Browns Bank	1	1	6	725		175		115		500			
Eastern Maine	1	1	1	2,000						500			
Central Maine	13	562	554	480,619	64,354	3,620	61,282	2,285	66,243	225,452	1,071,781	3,283	39
Western Maine	15	1,490	1,482	911,973	164,035	25,715	342,944	6,730	190,293	321,069	1,632,994	14,508	152
Eastern Massachusetts	24	3,100	3,104	1,109,553	586,358	6,030	493,974	1,195	874,352	42,635	7,780,093	3,255	165
Inner Grounds	10	112	112	21,420	19,905		56,535	95	7,185	1,335	294,205	225	
Total	148	5,246	5,259	2,526,290	814,527	35,365	954,860	10,805	1,138,073	590,991	10,779,073	21,271	356
Drift gill nets:													
Western Maine	2	20	20	50	55	10				325			
Eastern Massachusetts	25	199	411		75					1,100		800	
Inner Grounds	1	1	3										
Western Side South Channel	4	5	14	100	100		300			1,500		200	

Off No Man's Land.....	3	3	10										
South.....	3	3	13										
Total.....	1 31	231	471	\$ 150	\$ 230	\$ 10	\$ 300		\$ 1,425	\$ 1,500	\$ 1,000		
Purse seines:													
Canso.....	2	2	16										
Eastern Nova Scotia.....	4	4	27										
Central Nova Scotia.....	4	4	21										
Eastern Maine.....	1	1	1										
Central Maine.....	8	25	60								186,429		
Western Maine.....	7	13	24								6,600		
Eastern Massachusetts.....	42	686	1,888		180						24,169		
Inner Grounds.....	2	2	6										
Western Side South Channel.....	34	223	796				400	200					300
Eastern Side South Channel.....	1	1	3										
Southwest Georges.....	1	1	3										
Lightship Grounds.....	2	2	6										
Off No Man's Land.....	29	81	289										
Rhode Island Shore.....	3	3	7										
South.....	31	80	351										
Total.....	1 71	1,128	3,507		\$ 180		\$ 400	\$ 200			\$ 217,198		\$ 300
Scallop drags:													
Western Side South Channel.....	6	10	94										
Eastern Side South Channel.....	14	23	223										
Northern Edge of Georges.....	10	23	212										
Northeast Peak of Georges.....	2	4	24										
Central Georges.....	1	1	3										
Southwest Georges.....	1	1	8										
Lightship Grounds.....	4	4	38										
Total.....	1 19	66	602										
Grand total.....	1 389	15,084	53,263	38,627,596	54,763,179	2,388,579	90,833,703	44,043,142	8,198,307	4,066,938	32,246,540	5,765,321	1,583,129

¹ Exclusive of duplication.

² Incidental catch.

NOTE.—The three principal New England ports are Boston and Gloucester, Mass., and Portland, Maine. Otter 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 tabula-

tion. "Occasional" after the name of a bank or area indicates that the 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 type of gear used. The statistics of landings shown in this bulletin do not correspond exactly with the total of the monthly bulletins since some of the monthly figures have been revised.

Landings by fishing vessels at the three principal New England ports, 1938—Continued
BY GEAR AND AREA—Continued

Gear and area	Mack- erel	Flounders						Sword- fish	Whit- ing	Wolfish	Rosefish	Other	Total
		Gray sole	Lemon sole	Yellow- tail	Black- back	Dab	Other						
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Line trawls:													
Treaty Coast.....													1,208,092
Magdalen Islands.....													2,831,069
Gulf of St. Lawrence, unclassified.....													122,745
Grand Bank.....													289,852
St. Pierre Bank.....													87,201
Newfoundland Banks, unclassified.....													20,729
Northeast Cape Breton.....													21,897
Misaine Bank.....													24,715
Banquereau.....								840					374,988
Causo.....													12,744
Middle Ground.....										400			86,582
Northeast Sable Island Bank.....										736			196,322
Horseshoe Ground.....													32,954
Southwest Sable Island Bank.....										35			53,376
Emerald Bank.....								382		1,858			629,302
Central Nova Scotia.....													52,304
La Have Bank (including Sambro Bank).....								3,728		3,264			735,309
Southern Nova Scotia.....								66		16,968			1,740,161
Browns Bank.....								1,504		54,380		525	12,410,316
Western Nova Scotia.....	1,500							68		13,150			3,086,672
Southern Bay of Fundy.....													170,913
Nova Scotia, unclassified.....										60			234,907
Eastern Maine.....		2,695		5,990	1,350	1,145	340			800		10	694,733
Central Maine.....					15	75				135		72	1,377,454
Western Maine.....	650	24,430			45	3,265				950	19,565	434	673,373
Eastern Massachusetts.....		300	500	9,300	3,000	5,180			9,000	16,775	345	3,308	2,003,493
Inner Grounds.....						172				1,182			3,846,852
Western Side South Channel.....										4,508			4,906,192
Eastern Side South Channel.....										279			2,038,384
Northern Edge of Georges.....										400			578,810
Northeast Peak of Georges.....										1,500			1,396,515
Off No Man's Land.....										90			87,664
Total.....	1 2,150	27,425	500	15,290	4,410	9,837	340	1 6,678	12,213	117,350	20,507	10,245	42,026,985
Hand Lines:													
Eastern Massachusetts.....													135
Northern Edge of Georges.....													48,050
Total.....													48,185

Harpoons:													
Newfoundland Banks, unclassified										547		547	
Northeast Cape Breton										95,146		95,146	
Banquereau (occasional)										546		546	
La Have Bank (including Sambro Bank)										5,212		5,212	
La Have Bank (including Sambro Bank, occasional)										2,313		2,313	
Browns Bank										289,000		289,000	
Browns Bank (occasional)										4,884		4,884	
Western Nova Scotia										866		866	
Western Maine											7,332	7,332	
Eastern Massachusetts											849	849	
Western Side South Channel										5,304		5,304	
Western Side South Channel (occasional)										639		639	
Eastern Side South Channel										2,650		2,650	
Eastern Side South Channel (occasional)										503		503	
Northern Edge of Georges										285,398		285,398	
Northeast Peak of Georges										338,928		338,928	
Northeast Peak of Georges (occasional)										182		182	
Central Georges										5,119		5,119	
Southeast Georges										88,316		88,316	
Southwest Georges										110,985		110,985	
Lightship Grounds										34,992		34,992	
Off No Man's Land										1,510		1,510	
Southern New England, unclassified										18,536		18,536	
South										23,569		23,569	
Total										1,315,145		8,181	1,323,326
Otter trawls, large:													
Newfoundland Banks, unclassified	1,500			4,053								406	401,216
Banquereau	1,870	10,674	4,655	129,048	5,360	21,150	3,028			23,558	149,595	920	15,222,629
Canso		54,750				250				1,450		70	171,803
Middle Ground		158,132	14,024	127,595		21,045	2,050			28,311	35,340	70	4,192,852
Northeast Sable Island Bank	40	43,934	10,129	47,465	750	22,155				56,140	20,460	100	8,029,841
Southeast Sable Island Bank		8,342	7,700	346		9,095				16,232	19,025		1,696,965
Horseshoe Grounds	2,000	2,484,371	60,964	195,038	1,770	34,059	53,832			151,736	94,207	2,290	17,732,062
Southwest Sable Island Bank		82,139	10,148	16,049	600	19,216	4,310			322,330	8,137	1,360	15,587,788
Eastern Nova Scotia		120,350				400				1,210			23,295
Emerald Bank	200	67,712	36,522	81,423	596	26,248	27,300			200,840	13,778	1,110	16,132,867
La Have Bank (including Sambro Bank)		18,204		10	15	1,390	50			7,184	12,500		447,466
Southern Nova Scotia		25,483	3,128	6,775	228	7,620	1,900	62,283		2,175	3,030,765	120	3,540,013
Browns Bank	170	92,648	34,386	25,576	6,091	88,129	4,165	62,562		350,256	3,858,328	668	23,862,762
Western Nova Scotia		32,000			400	100				4,100	135,545		473,325
Nova Scotia, unclassified	40	34,625	1,961	11,172		16,769	11,600			32,880	12,900		2,129,723
Central Maine											2,750		2,750
Western Maine		775								16,200			616,735
Eastern Massachusetts													89,100
Inner Grounds		14,234	3,940	2,112	2,785	3,423	1,720			999	1,780,067		2,310,792
Western Side South Channel	400	140,784	394,427	20,086	601,297	38,726	13,260		4,055	47,599	6,727,622	1,864	17,825,539
Eastern Side South Channel	80	196,414	138,975	22,655	50,498	485,545	13,125		6,910	69,395	4,861,125	11,706	14,654,462

* Incidental catch.

Landings by fishing vessels at the three principal New England ports, 1938—Continued

BY GEAR AND AREA—Continued

Gear and area	Mackerel	Flounders						Swordfish	Whiting	Wolfish	Rosefish	Other	Total
		Gray sole	Lemon sole	Yellow-tail	Black-back	Dab	Other						
Otter trawls, large—Continued.	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Northern Edge of Georges	632	65,209	338,956	76,366	62,408	150,423	16,660		6,302	83,416	267,990	10,651	18,754,070
Northeast Peak of Georges	10,518	57,461	328,995	72,621	33,157	46,272	18,218	129	3,539	158,021	175,055	11,931	42,693,304
Central Georges	220	19,689	268,960	124,999	61,089	17,125	7,390		600	18,290	36,074	1,924	6,325,300
Southeast Georges	25	33,330	47,933	26,380	1,577	22,627	4,835			28,949	8,360	7,676	8,949,115
Southwest Georges		3,745	15,585	15,115	7,370	4,580	275		45	4,410	16,811	608	865,386
Lightship Grounds		80	18,245	550	49,373		480			395	68,246		426,128
Nantucket Shoals		170	12,720	80	26,311		180			165	6,150		193,370
Southern New England, unclassified		18,745	12,183	4,670	2,280	6,393			960	10,288	103,497		1,463,335
Total	17,695	3,784,010	1,762,436	1,010,184	913,955	1,042,820	184,198	129	147,246	1,638,935	21,444,317	53,068	225,024,408

Gear and area	Mackerel	Flounders						Swordfish	Whiting	Wolfish	Rosefish	Herring	Other	Total
		Gray sole	Lemon sole	Yellow-tail	Black-back	Dab	Other							
Otter trawls, medium:	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Southwest Sable Island Bank		890		200	200	540				565				62,835
Emerald Bank			2,050	300	200									45,160
Southern Nova Scotia	51,748		2,475	950	400	8,627	995	193	585	1,643	2,486,163			3,156,028
Browns Bank	143,516		1,820	275	32	59,356	2,650	311	2,500	22,685	9,476,140			11,659,614
Western Nova Scotia		810				735				125	106,000			131,955
Central Maine	153,681			195		29,409	2,925		22,800	1,950	1,171,920			1,553,134
Emerald Bank	346,978		41,245	950	500	88,453	30,550		94,120	335	302,492		450	1,169,038
Western Maine	273,175		2,000	19,870	3,895	53,050	16,495		40,355	2,530	467,375		3,833	1,025,568
Eastern Massachusetts	262		106,195	150	28,785	12,025	6,465		391,614	2,865	728,799		3,989	4,903,177
Inner Grounds		72,354		3,995	970	3,654	26,826	2,050		5,060	7,391,712		460	8,073,755
Western Side South Channel		1,395		139,775	83,995	9,098	136,364	71,197	6,135	369	141,369		21,245	14,620,063
Eastern Side South Channel			71,195	130,058	38,247	43,465	164,768	7,530		57,515	45,152	3,787,019	3,234	9,503,750
Northern Edge of Georges		1,806		104,264	19,662	20,016	5,108	2,710		6,091	110,600		980	1,633,479
Northeast Peak of Georges		1,570		24,803	4,550	3,800	4,275	250		5,235				1,373,235
Central Georges	88		7,698	209,975	75,080	69,316	9,105	5,800		350	3,030		4,540	3,587,863
Southeast Georges		700		15,125	3,210	1,786	600			1,680				592,944

Southwest Georges.....	1,300	1,525	71,758	19,953	10,963	2,245	4,050	450	1,300	1,100	1,212,887		
Lightship Grounds.....		3,680		4,100	2,150		30		90	15,666	211,254		
Nantucket Shoals.....			2,040		4,490	2,170			1,155		76,965		
Off No Mans Land.....		175		176,900			95				12,800		
Southern Massachusetts.....				7,400	350						300		
Southern New England, unclassified.....		604				1,210	1,890		1,905		3,375		
South.....	295	440	7,530	2,260	4,774	3,155	680	3,240			20,045		
Total.....	* 3,340	1,378,515	703,633	412,460	318,375	598,514	91,300	* 873	759,958	120,985	40,664,949	60,570	69,798,070
Otter trawls, small:													
Misaine Bank.....		15,065		1,215	1,900	2,625			335	125			52,975
Southern Nova Scotia.....	100			100			275	3,500	66		6,005		10,145
Browns Bank.....													18,880
Western Nova Scotia.....				18,500									18,500
Northern Bay of Fundy.....		12,765				1,422		3,900		40,000			62,802
Eastern Maine.....		220,048	9,010	10,060	5,730	34,955	7,190	56,195	2,615	578,870	215		1,289,004
Central Maine.....		306,732	14,265	19,420	15,050	115,110	17,837	207,750	3,540	447,406	2,851		1,616,784
Central Maine (occasional).....		45				25							4,402
Western Maine.....	1,023	727,178	5,488	59,825	31,659	202,862	40,944	1,319,090	19,757	793,678	645	77,546	3,888,284
Eastern Massachusetts.....	995	795,700	4,505	897,965	327,790	561,088	29,373	7,480,938	45,710	460,699		47,187	13,897,962
Inner Grounds.....		12,110	600	10,175	2,805	6,850		4,200		2,425			125,970
Western Side South Chan- nel.....		156,655	7,445	124,330	34,655	56,110	7,405	1,022,595	31,645	226,538		4,100	2,556,600
Eastern Side South Chan- nel.....		48	23,320	9,750	3,655	500	500		100				106,162
Central Georges.....		3,350	25,585	3,175	3,775	500	720	2,500		9,300			68,789
Southwest Georges.....		47	11,950	1,900	1,925	500			100				53,097
Lightship Grounds.....			1,470	116,500	3,890		110						127,851
Nantucket Shoals.....			140	61,225	5,500				390				69,560
Off No Mans Land.....		340		278,000	100							3,020	285,665
Southern Massachusetts.....		350	25	106,700	815		735		625			4,837	120,192
Total.....	* 2,118	2,250,431	103,803	1,718,640	439,249	982,547	105,089	10,100,666	104,882	2,557,041	645	145,761	24,372,604
Sink gill nets:													
Browns Bank.....		135				30				13,900			15,580
Eastern Maine.....					147		62	5,229	345	705	12,238		2,500
Central Maine.....		340		350									1,999,321
Western Maine.....	148	239	30	20	1,880	1,178	255	723	1,138	2,740			3,650,667
Eastern Massachusetts.....	3,315			9,370	4,260	19,240	85	250	425	70	1,700	36,088	10,952,313
Inner Grounds.....				30		135			35	100		748	401,653
Total.....	* 3,463	714	30	9,740	6,317	21,530	402	6,202	1,943	17,515	1,700	60,967	17,002,024

* Incidental catch.

Landings by fishing vessels at the three principal New England ports, 1938—Continued

BY GEAR AND AREA—Continued

Gear and area	Mackerel	Flounders						Swordfish	Whiting	Wolffish	Rosefish	Herring	Other	Total
		Gray sole	Lemon sole	Yellow-tail	Black-back	Dab	Other							
Drift gill nets:	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Western Maine.....	13,420				40				710				754	15,364
Western Maine (occasional).....	90													90
Eastern Massachusetts.....	209,035								710				9,175	310,895
Eastern Massachusetts (occasional).....	155													155
Inner Grounds.....	4,370													4,370
Western Side South Channel.....	31,585												350	34,115
Off No Mans Land.....	9,915												455	10,370
South.....	11,815												1,770	13,585
Total.....	370,365				40				1,420				12,504	388,944
Purse seines:														
Magdalen Islands (occasional).....	67,230													67,230
Canso.....	89,650													89,650
Eastern Nova Scotia.....	122,960													122,960
Central Nova Scotia.....	143,640													143,640
Eastern Maine.....														
Central Maine.....	175,455												2,700	2,700
Western Maine.....	14,415										12,000		13,845	387,729
Eastern Massachusetts.....	7,836,175	895											5,700	26,715
Inner Grounds.....	21,230												994,976	8,856,305
Western Side South Channel.....	5,735,335													21,230
Eastern Side South Channel.....	25,000												1,850	5,738,085
Southwest Georges.....	52,000												200	25,200
Lightship Grounds.....	26,100													52,000
Off No Mans Land.....	3,009,650													26,100
Rhode Island Shore.....	26,700													875
South.....	3,119,855												89,650	3,100,525
Total.....	20,555,395	895										12,000	1,110,071	21,896,639

Scallops drags:														
Western Side South Channel													158,917	158,917
Eastern Side South Channel			275										338,011	338,286
Northern Edge of Georges			275										216,395	216,670
Northeast Peak of Georges													32,553	32,553
Central Georges													900	900
Southwest Georges													13,550	13,550
Lightship Grounds					200								67,868	68,068
Total			550		200								828,194	828,944
Grand total	20,954,526	7,441,900	2,570,952	3,166,314	1,682,546	2,655,248	381,329	1,322,725	11,027,705	1,982,095	64,704,329	14,345	2,289,561	402,710,099

SUMMARY: BY AREA

Area	Vessels fishing	Trips	Days absent	Cod			Haddock		Hake		Pollock	Cusk	Halibut
				Large	Market	Scrod	Large	Scrod	Large	Small			
Gulf of St. Lawrence (area XIX):	Number	Number	Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Treaty Coast	2	4	81	845,500	362,592								
Magdalen Islands	2	5	95	1,639,700	1,191,369								
Gulf of St. Lawrence, unclassified	3	3	60	6,783	7,343				135				108,484
Newfoundland Banks (area XX):													
Grand Bank	4	9	175	59,871	7,536				6,397	1,170		1,028	213,850
St. Pierre Bank	3	3	63	32,395	4,704				1,762			2,952	45,388
Newfoundland Banks, unclassified	4	7	53	63,093	246,326	4,570	68,550	11,204	2,104	120	2,188	25	17,806
Total	11	31	527	2,647,342	1,819,870	4,570	68,550	11,204	10,398	1,290	2,188	4,005	385,528
Off Nova Scotia (area XXI):													
Northeast Cape Breton	15	15	292	3,952	456								17,489
Missina Bank	4	4	24	12,130	8,420		10,590	270	1,145	4,110	280		19,480
Banquereau	31	124	1,236	2,262,366	9,824,593	592,288	1,383,188	559,739	36,608	970	262,296	9,029	295,837
Canso	4	5	54	7,877	5,256		86,875	6,000	6,835		4,350	1,050	9,784
Middle Ground	24	49	351	756,831	1,409,229	117,037	1,151,482	221,610	19,883	400	199,158	2,003	14,834
Northeast Sable Island Bank	28	74	528	1,504,172	3,511,921	38,085	1,867,498	604,370	45,024	2,000	304,420	10,183	16,565
Southeast Sable Island Bank	14	18	114	258,919	593,285	680	406,190	253,144	14,366	3,100	94,928	4,502	7,111
Horseshoe Ground	41	202	1,377	2,665,303	2,806,297	88,406	6,117,635	641,700	307,266	994	1,970,455	32,790	56,003
Southwest Sable Island Bank	38	115	902	4,122,239	4,578,454	95,260	4,443,529	442,266	76,400	9,483	1,389,331	25,049	55,059
Eastern Nova Scotia	7	8	49	35,750	30,950	226	16,428	3,708	2,910		21,120		243
Emerald Bank	42	196	1,196	2,380,519	3,358,409	78,581	7,803,023	813,787	148,060	281	2,104,383	99,639	57,718
Central Nova Scotia	4	5	41	3,100	1,900			250	34,100		150	12,625	179

1 Exclusive of duplication.

1 Incidental catch.

Landings by fishing vessels at the three principal New England parts, 1938—Continued

SUMMARY: BY AREA—Continued

Area	Vessels fishing	Trips	Days absent	Cod			Haddock		Hake		Pollock	Cusk	Halibut
				Large	Market	Scrod	Large	Scrod	Large	Small			
Off Nova Scotia—Continued.													
La Have Bank (including Sambro Bank)	Number	Number	Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Southern Nova Scotia	13	29	278	144,961	170,601	13,906	413,858	45,855	60,276	5,705	37,754	113,402	130,112
Browns Bank	44	149	973	380,891	439,822	24,663	931,780	232,378	238,147	26,270	105,167	342,279	4,515
Western Nova Scotia	69	661	5,338	3,680,308	4,200,933	108,696	17,417,816	3,674,703	941,761	98,454	1,845,260	1,442,215	254,288
Southern Bay of Fundy	24	73	613	409,566	580,552	10,510	1,197,851	210,489	364,780	36,528	61,674	504,191	15,146
Nova Scotia, unclassified	3	4	43	13,675	12,545	—	99,800	8,700	33,515	—	400	2,100	178
	21	34	273	420,578	504,397	16,663	813,187	192,977	47,170	—	170,742	21,835	55,074
Total	159	1,764	13,687	19,143,137	32,038,020	1,183,001	43,660,730	7,911,946	2,378,246	183,295	8,631,874	2,642,382	990,755
Off New England (area XXII):													
Northern Bay of Fundy	2	2	13	1,035	140	—	1,135	20	—	1,475	910	—	—
Eastern Maine	30	141	895	96,138	59,967	375	168,819	21,195	66,780	584,329	25,192	195,439	3,019
Central Maine	48	864	1,933	683,431	188,850	5,767	256,129	25,443	556,195	692,455	1,309,421	545,644	3,146
Western Maine	61	2,369	3,232	1,246,518	384,147	68,843	836,646	35,912	467,248	682,114	1,730,027	136,593	4,062
Eastern Massachusetts	80	6,219	11,754	1,854,603	1,462,631	141,418	1,455,384	238,634	1,132,162	1,270,432	12,092,707	99,600	1,590
Inner Grounds	70	553	1,944	431,151	400,217	9,765	1,253,934	142,426	718,413	415,671	805,006	1,211,446	9,407
Western Side South Channel	80	1,072	5,538	1,935,335	2,914,770	83,391	6,903,289	5,294,405	1,028,664	192,332	1,220,471	148,483	20,883
Eastern Side South Channel	67	476	2,878	1,013,993	1,434,568	38,878	7,206,353	3,347,341	1,069,099	17,657	1,417,823	492,547	21,116
Northern Edge of Georges	59	363	2,487	1,525,691	4,558,013	279,112	5,781,788	6,034,605	244,567	3,227	1,076,630	124,112	38,514
Northeast Peak of Georges	60	538	4,095	5,158,980	7,147,225	493,815	13,697,072	14,512,948	338,972	8,755	2,985,783	105,336	60,888
Central Georges	42	191	1,198	812,070	832,835	50,485	3,344,442	3,607,385	55,977	1,945	269,012	4,042	13,482
Southeast Georges	42	134	1,017	1,797,380	1,058,591	12,287	4,168,722	1,830,191	57,492	1,200	384,947	3,174	23,322
Southwest Georges	36	65	509	76,078	134,024	210	1,194,577	481,460	11,004	—	30,035	190	4,182
Lightship Grounds	30	36	231	18,970	61,497	1,561	226,477	146,394	15,450	1,692	7,801	225	63
Nantucket Shoals	9	12	54	11,028	34,964	3,538	79,229	75,668	7,095	214	4,899	30	44
Off No Man's Land	38	109	406	4,610	5,180	50	22,485	2,645	6,310	3,120	3,375	45,268	626
Rhode Island Shore	6	9	34	1,495	370	—	—	—	1,075	—	300	—	—
Southern New England unclassified	3	3	7	—	—	—	—	—	—	—	—	—	—
	26	37	322	166,371	225,900	11,530	492,901	281,635	32,980	—	246,894	6,805	2,522
Total	1386	13,193	38,547	16,834,877	20,903,879	1,201,008	47,080,903	36,079,382	5,809,513	3,876,708	23,611,223	3,118,934	206,846
Off Middle Atlantic States (area XXIII):													
South	56	96	502	2,240	1,410	—	23,320	40,610	150	645	1,255	—	—
Grand total	1389	15,084	53,263	38,627,596	54,703,179	2,398,579	90,833,703	44,043,142	8,198,307	4,066,938	32,246,540	5,785,321	1,583,129

Area	Mackerel	Flounders						Swordfish	Whiting	Wolfish	Rosofish	Herring	Other	Total
		Gray sole	Lemon sole	Yellow-tail	Black-back	Dab	Other							
Gulf of St. Lawrence (area XIX):	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Treaty Coast														
Magdalen Islands	67,230													1,208,092
Gulf of St. Lawrence, unclassified														2,898,299
Newfoundland Banks (area XX):														122,745
Grand Bank														289,852
St. Pierre Bank														87,201
Newfoundland Banks, unclassified	1,500			4,053				547		406				422,492
Total	68,730			4,053				547		406				5,028,681
Off Nova Scotia (area XXI):														
Northeast Cape Breton								95,146						117,043
Misaine Bank		15,065		1,215	1,900	2,625				335	125			77,690
Banquereau	1,870	10,674	4,655	129,048	5,360	21,150	3,028	1,396		23,558	149,595		920	15,598,158
Canso	89,650	54,750				250				1,450			70	274,197
Middle Ground		158,132	14,024	127,595		21,045	2,050			28,711	35,340		70	4,279,434
Northeast Sable Island Bank	40	43,934	10,129	47,465	750	22,155				56,876	20,460		100	8,228,163
Southeast Sable Island Bank		8,342	7,700	348		9,095				16,232	19,025			1,696,965
Horseshoe Ground	2,000	2,484,371	60,864	195,038	1,770	34,059	53,832			151,736	94,207		2,290	17,765,016
Southwest Sable Island Bank		83,029	10,148	16,049	600	19,756	4,310			322,630	8,137		1,360	15,703,999
Eastern Nova Scotia	122,960	120,350				400				1,210				355,255
Emerald Bank	200	67,712	38,572	81,623	796	26,248	27,300	382		202,698	13,778		1,110	16,804,819
Central Nova Scotia	143,640													195,944
La Have Bank (including Sambro Bank)		18,204		10	15	1,390	50	11,253		10,448	12,500			1,190,300
Southern Nova Scotia	100	77,231	5,603	7,825	628	16,247	3,170	249	66,368	20,851	5,516,928		6,125	8,447,237
Browns Bank	170	236,299	36,206	25,851	6,123	147,515	6,815	295,699	65,052	427,321	13,348,893		668	48,261,056
Western Nova Scotia	1,500	32,810		18,500	400	835		934		17,375	241,545		6,032	3,711,218
Northern Bay of Fundy														170,913
Nova Scotia, unclassified	40	34,625	1,961	11,172		16,769	11,600			32,940	12,900			2,364,630
Total	362,170	3,445,528	189,862	661,737	18,342	339,539	112,155	405,049	131,420	1,314,671	19,473,433		18,745	145,241,037

1 Exclusive of duplication.

Landings by fishing vessels at the three principal New England ports, 1938—Continued

SUMMARY: BY AREA—Continued

Area	Mackerel	Flounders						Swordfish	Whiting	Wolfish	Rosefish	Herring	Other	Total
		Gray sole	Lemon sole	Yellow-tail	Black-back	Dab	Other							
Off New England (area XXII):	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Northern Bay of Fundy	12,765	12,765				1,422			3,900		40,000			62,802
Eastern Maine	376,424	376,424	9,010	16,050	7,275	65,509	10,455		78,995	5,365	1,748,790		2,925	3,542,051
Central Maine	175,455	654,095	55,510	20,720	15,712	204,590	48,449		307,099	4,355	753,425	12,000	29,587	6,547,478
Western Maine	29,748	1,025,795	7,518	79,715	37,519	280,355	57,694		1,362,591	40,575	1,283,358	645	107,492	9,894,113
Eastern Massachusetts	8,139,937	903,000	5,155	945,420	347,075	653,213	35,923		7,882,510	65,775	1,189,913	1,700	1,095,572	41,014,444
Inner Grounds	25,600	98,698	8,535	13,257	9,274	37,406	3,770		9,260	4,620	9,174,304		1,466	14,783,622
Western Side South Channel	5,768,695	437,214	485,867	153,514	772,316	166,033	26,800	6,312	1,168,019	104,997	21,574,223		173,345	50,579,338
Eastern Side South Channel	25,080	267,657	292,628	70,652	97,618	650,813	21,155	3,153	64,425	114,926	8,648,144		353,151	26,669,377
Northern Edge of Georges	632	67,015	441,495	96,028	82,424	155,531	19,370	285,398	6,302	88,907	378,590		228,026	21,515,977
Northeast Peak of Georges	10,518	59,031	353,798	77,171	36,957	50,547	18,468	339,239	5,039	164,636	175,055		44,484	45,834,717
Central Georges	308	30,747	604,520	203,254	134,180	26,730	13,910	5,119	3,450	21,320	45,374		7,364	9,987,951
Southeast Georges	25	34,030	63,058	29,590	3,363	23,127	4,835	88,316		30,629	8,350		7,676	9,630,375
Southwest Georges	53,300	5,317	99,293	36,968	20,258	7,325	4,325	110,985	495	5,810	17,911		14,158	2,307,905
Lightskip Grounds	26,100	3,760	20,065	120,950	55,613		620	3,992		485	83,812		67,868	894,388
Nantucket Shoals		170	14,900	61,305	36,301	2,350				1,710	6,150		300	339,895
Off No Man's Land	3,109,565	515		454,900	100		95	1,510		90			17,150	3,677,594
Southern Massachusetts		350	25	114,100	1,165		735			625			5,137	123,407
Rhode Island Shore	26,700												89,650	116,350
Southern New England, unclassified		19,349	19,713	6,930	7,054	7,603	1,890	18,536	960	12,193	103,497		3,375	1,668,628
Total	17,391,661	3,996,022	2,381,090	2,500,524	1,664,204	2,312,554	268,494	893,560	10,893,045	667,018	45,230,896	14,345	2,248,726	249,185,412
Off Middle Atlantic States (area XXIII):														
South	3,131,965	440				3,155	690	23,569	3,240				22,090	3,254,969
Grand total	20,954,526	7,441,990	2,570,952	3,166,314	1,682,546	2,655,248	381,329	1,322,725	11,027,705	1,982,095	64,704,329	14,345	2,289,561	402,710,099

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 regions by the North American Council on Fishery Investigations.

**SALES OF FISHERY PRODUCTS THROUGH THE NEW ENGLAND FISH EXCHANGE,
BOSTON, MASS.**

Fishery products landed at the Boston Fish Pier and sold through the New England Fish Exchange in Boston during 1939 aggregated 274,983,112 pounds. Sales through the Exchange reached a peak of 27,760,726 pounds in May, and their lowest level of 17,512,586 pounds in January. The average price for sales of all species of fish through the Exchange during 1939 amounted to \$2.79 per hundred pounds; the highest average price being \$3.34 per hundred pounds in October and the lowest \$2.05 in May.

The data covering sales through the New England Fish Exchange are collected through the Division's Fishery Market News Service and the figures vary from those shown for Boston in the section of this report entitled "Vessel Fisheries at the Principal New England Ports." The reason for this variation is that sales through the New England Fish Exchange include craft smaller than vessels, that is, craft of less than five net tons capacity, and further do not include landings elsewhere in Boston which are not sold through the Exchange.

Sales of fishery products through the New England Fish Exchange, Boston, Mass., 1939

VOLUME: BY SPECIES AND MONTHS

Month	Total fares	Cod						Cusk			Flounders ¹		
		Large ¹			Market ¹			Offshore vessels	Inshore craft	Total	Offshore vessels	Inshore craft	Total
		Offshore vessels	Inshore craft	Total	Offshore vessels	Inshore craft	Total						
	<i>Number</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
January	388	1,338,745	77,420	1,416,165	1,410,845	255,360	1,666,205	215,825	5,675	221,500	877,205	469,610	1,346,815
February	373	2,969,975	98,774	3,068,749	1,995,445	176,100	2,171,545	160,420	4,830	165,250	812,890	285,815	1,098,705
March	469	3,314,040	136,863	3,450,903	2,715,975	139,565	2,855,540	249,175	13,780	262,955	1,224,670	417,727	1,642,397
April	461	3,002,595	176,724	3,179,319	5,039,590	186,855	5,226,445	256,375	19,670	276,045	786,440	670,910	1,457,350
May	610	2,503,400	213,835	2,717,235	3,631,255	99,155	3,730,410	313,025	64,890	377,905	.....	813,275	813,275
June	646	1,318,500	133,505	1,452,005	3,613,645	94,573	3,708,218	85,575	45,035	130,610	.....	668,570	668,570
July	722	1,721,085	71,212	1,792,297	3,263,455	66,922	3,330,377	101,640	47,960	149,500	.....	645,325	645,325
August	780	1,362,500	27,420	1,389,920	2,783,975	42,735	2,826,710	248,140	43,740	291,880	.....	556,220	556,220
September	714	1,063,095	33,263	1,096,358	1,711,420	37,525	1,748,945	408,375	77,505	485,880	.....	697,985	697,985
October	623	1,360,505	45,706	1,406,213	1,949,825	62,975	2,012,800	596,420	55,255	651,675	.....	.....	.....
November	538	1,890,270	75,087	1,965,357	5,139,245	136,437	5,275,682	462,285	40,860	503,145	.....	.....	.....
December	532	1,857,405	125,465	1,982,870	2,642,290	263,230	2,905,520	532,425	21,465	553,890	.....	.....	.....
Total	6,856	23,692,115	1,215,276	24,907,391	35,896,965	1,561,432	37,458,397	3,629,680	440,555	4,070,235	3,701,205	5,225,437	8,926,642

Month	Blackbacks ⁴			Dabs ⁴			Sole ⁴						
	Offshore vessels	Inshore craft	Total	Offshore vessels	Inshore craft	Total	Gray			Lemon			
							Offshore vessels	Inshore craft	Total	Offshore vessels	Inshore craft	Total	
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
January	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
February	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
March	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
April	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
May	63,705	.....	63,705	135,362	.....	135,362	83,475	.....	83,475	435,425	.....	435,425	435,425
June	56,095	.....	56,095	179,950	.....	179,950	28,030	.....	28,030	267,970	.....	267,970	267,970
July	130,470	.....	130,470	27,200	.....	27,200	20,645	.....	20,645	228,470	.....	228,470	228,470
August	207,455	.....	207,455	7,700	.....	7,700	9,860	.....	9,860	396,550	.....	396,550	396,550
September	222,935	.....	222,935	13,200	.....	13,200	82,630	.....	82,630	246,085	.....	246,085	246,085

October.....	171,760	32,230	203,990	39,170	172,530	211,700	127,735	123,525	251,260	278,760	18,605	297,365
November.....	33,965	45,060	79,025	27,700	48,255	75,955	66,485	33,900	100,385	146,650	4,885	151,535
December.....	19,495	32,220	51,715	54,325	72,000	126,325	129,550	75,640	205,190	116,785	150	116,935
Total.....	905,880	109,510	1,015,390	484,607	292,785	777,392	549,410	233,065	782,475	2,116,695	23,640	2,140,335

Month	Yellowtail ¹			Halibut			Haddock					
							Large			Scrod		
	Offshore vessels	Inshore craft	Total	Offshore vessels	Inshore craft	Total	Offshore vessels	Inshore craft	Total	Offshore vessels	Inshore craft	Total
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
January.....				28,994	68	29,062	5,135,550	42,770	5,178,320	1,959,745	25,320	1,985,065
February.....				75,610	116	75,726	6,491,565	85,290	6,576,825	2,805,650	16,995	2,822,645
March.....				172,093	87	172,180	9,934,415	95,360	10,029,775	3,514,995	13,655	3,528,650
April.....				183,767	539	184,306	7,629,650	108,785	7,738,415	3,065,240	40,815	3,106,055
May.....	186,645		186,645	154,472	937	155,409	8,537,175	266,335	8,803,510	3,810,235	158,035	3,968,270
June.....	150,490		150,490	147,589	82	147,671	5,354,900	354,495	5,709,395	3,163,450	372,175	3,535,625
July.....	25,650		25,650	161,059	101	161,160	5,976,460	472,138	6,448,598	4,773,505	306,550	5,080,055
August.....	39,720		39,720	106,782	406	107,188	5,925,355	282,690	6,208,035	5,335,225	154,460	6,539,685
September.....	40,625		40,625	78,181	123	78,304	5,094,500	214,910	5,309,410	4,745,525	164,140	4,909,665
October.....	53,975	556,565	610,540	54,898	138	55,036	4,829,950	257,166	5,087,116	4,158,310	226,340	4,414,650
November.....	148,117	197,640	345,757	11,769	309	12,078	3,205,135	271,415	3,476,550	2,147,145	205,855	2,353,000
December.....	184,735	176,150	360,885	17,826	133	17,959	5,163,665	155,760	5,319,425	2,821,460	100,925	2,922,385
Total.....	829,957	930,355	1,760,312	1,193,040	3,039	1,196,079	73,278,320	2,607,054	75,885,374	43,380,485	1,787,265	45,167,750

¹ Includes whale cod.

² Includes scrod cod.

³ Shown separately as blackbacks, dabs, gray sole, lemon sole, and yellowtails if taken by offshore vessels after April 1939 or by inshore craft after September 1939.

⁴ Included under flounders if taken before May 1939 by offshore vessels or before October 1939 by inshore craft.

Sales of fishery products through the New England Fish Exchange, Boston, Mass., 1939—Continued

VOLUME: BY SPECIES AND MONTHS—Continued

Month	Hake			Mackerel	Pollock			Rosefish		
	Offshore vessels	Inshore craft	Total	All craft †	Offshore vessels	Inshore craft	Total	Offshore vessels	Inshore craft	Total
January	Pounds 484,245	Pounds 80,305	Pounds 564,550	Pounds 77,675	Pounds 1,693,473	Pounds 6,435	Pounds 1,699,908	Pounds 2,828,655	Pounds 311,925	Pounds 3,140,580
February	461,440	65,140	526,580	-----	1,218,300	2,490	1,220,790	3,500,998	230,105	3,731,103
March	355,126	25,675	380,800	-----	1,542,905	3,280	1,546,185	1,548,211	282,184	1,830,395
April	167,650	31,500	199,150	-----	1,304,735	6,325	1,311,060	600,836	488,571	1,089,407
May	198,425	86,993	285,418	1,499,190	1,651,880	38,945	1,690,825	668,455	1,122,322	1,790,777
June	112,530	214,105	326,635	1,091,650	259,415	63,675	323,090	982,993	1,097,068	2,080,061
July	142,365	261,915	404,280	400,533	383,690	78,195	461,885	1,078,680	411,312	1,489,992
August	381,110	294,195	675,305	1,986,960	283,085	50,305	333,390	1,120,249	209,793	1,330,442
September	377,940	513,075	891,015	2,507,543	940,375	47,980	988,355	1,908,575	170,880	2,079,455
October	718,860	621,360	1,240,220	585,505	740,450	70,310	810,760	2,266,992	300,865	2,567,857
November	713,770	376,025	1,089,795	593,875	2,092,825	1,421,435	3,514,260	1,299,966	53,620	1,353,586
December	440,000	101,645	541,645	484,440	3,706,590	728,440	4,435,030	1,708,960	50,810	1,759,770
Total	4,653,460	2,571,933	7,125,393	9,227,371	15,817,723	2,517,815	18,335,538	19,513,570	4,729,455	24,243,025

Month	Swordfish	Whiting †			Wolfish			Scallops, sea	Miscellaneous †			Total		
	Offshore vessels	Offshore vessels	Inshore craft	Total	Offshore vessels	Inshore craft	Total	Offshore vessels	Offshore vessels	Inshore craft	Total	Offshore vessels	Inshore craft	Total
January	Pounds 21,100	Pounds 180	Pounds 21,280	Pounds 109,720	Pounds 880	Pounds 110,600	Pounds 35,902	Pounds 13,639	Pounds 5,320	Pounds 18,959	Pounds 16,231,318	Pounds 1,281,268	Pounds 17,512,586	
February	-----	-----	-----	133,160	4,690	137,850	53,546	10,630	13,875	24,705	20,689,829	984,190	21,674,019	
March	6,125	75	6,200	158,665	16,393	175,058	103,559	10,425	8,470	18,895	24,850,378	1,153,114	26,003,492	
April	150	2,035	2,185	377,660	33,680	411,340	147,227	3,040	48,445	51,485	22,564,955	1,814,834	24,379,789	
May	-----	9,975	208,660	218,635	508,350	78,095	586,445	209,457	2,688	6,665	24,602,594	3,158,132	27,760,726	
June	50,215	7,000	602,320	609,320	122,170	38,620	160,790	336,559	1,725	4,230	5,955	17,331,451	21,019,904	
July	276,729	2,340	1,787,805	1,790,145	83,395	5,085	88,480	163,810	6,563	7,925	14,488	18,967,744	4,164,345	
August	763,862	700	1,775,214	1,775,914	44,920	940	45,860	134,617	49,571	6,890	56,461	22,238,336	3,444,998	
September	232,862	-----	1,248,817	1,248,817	33,530	150	33,680	226,818	10,860	56,070	66,930	19,945,194	3,262,423	
October	42,205	3,800	656,735	660,535	30,440	490	30,920	117,503	33,105	104,977	138,082	18,190,168	3,205,764	
November	-----	-----	165,795	165,795	20,330	145	20,475	39,741	12,604	35,725	48,329	18,041,877	3,112,448	
December	-----	100	18,155	18,255	44,855	3,655	48,510	180,560	2,740	25,250	27,990	20,108,206	2,059,299	
Total	1,365,993	51,290	6,465,791	6,517,081	1,667,195	182,813	1,850,008	1,749,299	167,790	323,842	481,632	243,762,050	31,221,062	274,983,112

PRICES: BY SPECIES AND MONTHS

Month	Total fares	Cod								Cusk			
		Large ¹				Market ²				Offshore vessels		Inshore craft	
		Offshore vessels		Inshore craft		Offshore vessels		Inshore craft					
		First sales prices	Average price	First sales prices	Average price	First sales prices	Average price	First sales prices	Average price	First sales prices	Average price	First sales prices	Average price
January	388	\$4.42-\$5.03	\$4.36	\$4.84-\$5.79	\$5.26	\$3.63-\$3.93	\$3.63	\$3.50-\$4.13	\$3.80	\$3.24	\$2.88	\$2.77-\$2.86	\$3.00
February	373	3.60-3.79	2.92	3.64-4.67	4.04	3.33-3.59	3.14	3.02-3.58	3.23	\$3.45-3.52	2.92	3.96-4.29	3.58
March	469	3.54-3.70	3.13	3.92-4.77	4.04	3.14-3.34	3.03	3.28-3.64	3.25	3.24	2.89	2.97-3.34	3.38
April	461	2.02-3.24	2.05	2.96-4.20	3.51	1.81-2.54	1.80	2.16-2.93	2.80	2.21-2.24	1.77	1.94-2.04	1.74
May	610	2.04-3.12	1.74	2.28-3.27	2.47	1.74-2.13	1.69	1.76-2.49	2.20	1.30	1.16	1.00-1.15	1.01
June	646	2.87-3.95	2.55	2.83-4.26	3.16	2.19-2.65	1.92	2.26-2.90	2.44	2.83-2.86	2.10	1.90-1.99	2.29
July	722	2.05-2.89	2.12	2.20-2.98	2.42	1.74-2.08	1.74	1.88-2.24	1.91	2.40-2.55	1.77	1.50-1.58	1.45
August	789	2.64-3.59	2.65	2.74-3.54	2.82	2.02-2.67	1.98	2.21-2.58	2.03	1.80-1.84	1.44	1.48-1.50	1.47
September	714	3.97-5.06	4.12	3.88-5.16	4.22	2.71-3.59	2.76	3.00-3.67	3.06	2.56-2.62	2.18	2.18-2.21	2.24
October	623	4.74-5.97	4.64	3.96-5.59	4.60	3.19-4.12	3.42	3.19-4.10	3.36	3.00-3.04	2.71	2.56-2.57	2.39
November	538	3.39-5.15	3.17	3.79-5.47	4.53	2.54-3.94	2.69	3.20-4.12	3.46	2.83-2.88	2.60	2.81	2.62
December	532	3.40-4.37	2.85	3.51-4.83	3.69	3.04-3.72	2.69	2.39-3.52	3.10	2.73-2.82	2.09	2.04-2.09	2.26
Average	571	3.23-4.15	2.87	3.35-4.49	3.57	2.69-3.18	2.38	2.65-3.33	3.07	2.68-2.72	2.25	2.02-2.13	1.99

¹ Includes whale cod.

² Includes scrod cod.

³ Includes offshore vessels and inshore craft.

⁴ Includes dressed, round, and steak whiting.

⁵ Includes butterfish, sharks, skates, spawn, etc.

NOTE.—Quantities shown are weigh-outs of fishery products as landed. Each classification by variety includes all sizes unless otherwise noted.

Sales of fishery products through the New England Fish Exchange, Boston, Mass., 1939—Continued

PRICES: BY SPECIES AND MONTHS—Continued

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U. S. BUREAU OF FISHERIES

Month	Flounders †				Blackback †				Dab †			
	Offshore vessels		Inshore craft		Offshore vessels		Inshore craft		Offshore vessels		Inshore craft	
	First sales prices	Average price	First sales prices	Average price	First sales prices	Average price	First sales prices	Average price	First sales prices	Average price	First sales prices	Average price
January.....	\$2.75-\$11.85	\$3.81	\$2.02-\$5.91	\$3.32								
February.....	4.00-12.03	4.38	2.87-7.37	4.33								
March.....	3.32-8.49	4.16	2.30-6.56	3.70								
April.....	2.06-8.10	3.63	1.72-4.15	2.70								
May.....			1.27-4.14	2.42	\$1.84-\$1.92	\$1.28			\$1.13-\$1.25	\$0.97		
June.....			1.60-5.27	3.18	2.71-2.74	2.22			1.90-1.93	1.63		
July.....			2.43-5.30	3.17	2.82-2.96	2.52			2.55-2.92	2.42		
August.....			2.57-6.36	3.08	3.23-3.28	3.04			2.50-2.44	1.80		
September.....			2.35-6.78	2.88	3.33	3.72			2.50-2.55	2.02		
October.....					3.99-4.05	3.52	\$3.68-\$5.03	\$3.95	3.09-3.27	2.51	\$2.93-\$3.14	\$2.58
November.....					6.41-6.53	5.75	3.86-5.17	4.05	3.49-3.51	3.00	3.64-4.00	3.60
December.....					5.91-6.00	5.39	4.40-6.40	4.47	3.46-3.57	2.63	2.87-3.00	2.81
Average.....	3.03-10.04	4.01	2.12-5.74	3.06	3.71-3.78	3.20	3.92-5.41	4.15	2.50-2.59	1.77	3.14-3.37	2.81

Month	Sole †								Yellowtail †			
	Gray				Lemon				Offshore vessels		Inshore craft	
	Offshore vessels		Inshore craft		Offshore vessels		Inshore craft		First sales prices	Average price	First sales prices	Average price
First sales prices	Average price	First sales prices	Average price	First sales prices	Average price	First sales prices	Average price	First sales prices	Average price	First sales prices	Average price	
January.....												
February.....												
March.....												
April.....												
May.....	\$2.85-\$2.93	\$2.52			\$3.56-\$3.58	\$2.70			\$1.33-\$1.40	\$0.96		
June.....	4.12-4.17	3.62			5.06-5.74	4.53			1.86-1.94	1.78		
July.....	4.11-4.25	3.41			7.38	6.78			2.07-2.58	1.88		
August.....	5.56	3.69			6.19-6.21	5.34			3.14-3.21	2.22		

September.....	5.06- 5.09	3.89			7.61- 7.64	7.32			3.13- 3.20	2.57		
October.....	5.21- 5.55	4.73	\$4.32- \$8.33	\$6.21	7.14- 7.20	6.19	\$7.80	\$6.17	2.78- 3.05	2.32	\$2.91- \$3.69	\$1.63
November.....	7.99- 8.27	7.30	5.47- 10.78	7.47	10.61	9.68	10.00	8.28	3.19- 3.63	2.40	3.60- 4.19	2.77
December.....	7.61- 7.70	6.43	4.31- 9.22	5.99	12.10	10.70		2.00	2.70- 2.95	2.07	3.12- 3.44	2.15
Average.....	5.45- 5.59	4.85	4.66- 9.13	6.32	7.43- 7.46	5.79	8.43	6.58	2.52- 2.72	1.87	3.28- 3.86	1.97

Month	Halibut			Haddock							
	Offshore vessels		Inshore craft	Large				Scrod			
	First sales prices	Average price		Offshore vessels		Inshore craft		Offshore vessels		Inshore craft	
			First sales prices	Average price	First sales prices	Average price	First sales prices	Average price	First sales prices	Average price	
January.....		\$20.78	\$22.65	\$4.22- \$4.86	\$3.93	\$4.50- \$5.09	\$5.66	\$2.99- \$3.06	\$2.80	\$2.20	\$2.60
February.....		16.58	28.78	3.97- 4.07	3.40	5.00- 5.42	5.60	2.65- 2.72	2.42	\$1.93- 1.98	1.94
March.....	\$13.00- \$20.00	15.65	23.90	3.57- 3.64	3.17	4.32- 5.05	5.05	2.89- 2.93	2.71	2.60	2.80
April.....	8.00- 13.25	12.54	16.78	2.90- 3.15	2.50	3.68- 4.45	3.88	2.14- 2.22	2.03	2.08- 2.21	2.10
May.....	8.50- 11.50	9.90	12.13	2.49- 2.66	2.14	3.22- 4.51	3.60	1.95- 2.01	1.74	1.75- 1.96	1.83
June.....	9.25- 13.75	10.77	13.44	3.27- 3.54	2.93	3.97- 5.05	4.16	2.16	2.02	2.11- 2.48	2.16
July.....	10.25- 14.25	11.46	15.00	2.41- 2.79	2.27	2.89- 3.72	3.16	1.94- 1.95	1.74	1.87- 2.10	1.93
August.....	10.50- 13.00	12.38	20.75	2.73- 3.18	2.50	3.44- 4.39	4.00	1.88- 1.89	1.74	1.91- 1.99	1.89
September.....	10.00- 15.50	12.38	18.37	3.26- 3.94	3.13	4.32- 5.31	4.83	2.26- 2.29	2.16	2.23- 2.43	2.28
October.....	10.00- 16.50	14.07	16.64	4.39- 5.11	3.98	4.53- 5.30	4.64	2.91- 3.01	2.79	2.15- 3.03	2.66
November.....		20.12	15.07	5.67- 6.12	5.11	5.43- 6.23	5.99	3.58- 3.86	3.18	2.42- 4.07	3.59
December.....		20.30	35.59	4.35- 4.65	3.76	4.83- 5.35	5.19	3.11- 3.23	2.67	2.72- 3.47	3.02
Average.....	9.90- 14.58	12.98	17.23	3.60- 3.96	3.09	4.04- 4.91	4.35	2.54- 2.60	2.23	2.15- 2.56	2.36

* Shown separately as blackbacks, dabs, gray sole, lemon sole, and yellowtails if taken by offshore vessels after April 1939 or by inshore craft after September 1939.

† Included under flounders if taken before May 1939 by offshore vessels or before October 1939 by inshore craft.

Sales of fishery products through the New England Fish Exchange, Boston, Mass., 1939—Continued

PRICES: BY SPECIES AND MONTHS—Continued

Month	Hake				Mackerel		Pollock			
	Offshore vessels		Inshore craft		All craft *		Offshore vessels		Inshore craft	
	First sales prices	Average price	First sales prices	Average price	First sales prices	Average price	First sales prices	Average price	First sales prices	Average price
January.....	\$3.63-\$4.34	\$3.58	\$3.66-\$3.96	\$3.64	\$1.60-\$2.50	\$2.02	\$1.48-\$1.60	\$1.37	\$1.34-\$1.48	\$1.68
February.....	3.60-4.68	3.56	4.24-4.69	3.44			2.30-2.33	1.94	2.33-2.50	1.79
March.....	4.86-5.66	4.72	4.37-5.25	4.34				2.47		1.95
April.....	4.03-4.87	3.86	2.99-3.21	2.76			1.94-1.95	1.82	1.75-1.94	1.78
May.....	2.19-2.63	2.36	1.83-2.28	2.18	3.54-4.82	3.08	1.64-1.70	1.50	1.62-1.69	1.60
June.....	2.11-2.29	2.14	2.07-2.64	2.11	4.50-5.30	3.82	2.56-2.56	2.26	2.01-2.42	2.14
July.....	1.65-1.89	1.64	1.82-2.13	1.85	4.90-8.93	4.03	2.21-2.24	1.87	1.90-2.10	2.03
August.....	1.78-1.99	1.78	1.82-2.33	2.11	1.23-6.91	2.60	2.56-2.57	2.11	2.40-2.55	2.38
September.....	2.28-2.67	2.30	2.34-2.95	2.83	1.69-4.01	1.85	2.77-2.67	2.12	2.52-2.63	2.59
October.....	2.65-3.11	2.79	2.70-3.09	2.83	4.75-6.37	4.68	2.77-2.84	2.55	2.46-2.78	2.82
November.....	2.80-3.07	2.81	2.73-3.33	3.12	5.46-7.40	3.14	2.16-2.18	1.93	2.11-2.13	1.96
December.....	3.33-3.89	3.23	3.62-3.99	3.37	4.92-5.77	4.34	1.75-1.77	1.64	1.79-1.86	1.76
Average.....	2.90-3.41	2.99	2.73-3.22	2.68	3.55-6.23	2.93	2.23-2.26	1.82	2.08-2.25	1.95

Month	Rosefish				Swordfish		Whiting *			
	Offshore vessels		Inshore craft		Offshore vessels		Offshore vessels		Inshore craft	
	First sales prices	Average price	First sales prices	Average price	First sales prices	Average price	First sales prices	Average price	First sales prices	Average price
January.....	\$1.89-\$1.90	\$1.80	\$1.91-\$2.05	\$1.94			\$1.25	\$1.33	\$3.00	\$3.56
February.....	1.83-1.84	1.72	1.72-2.34	1.78						
March.....	2.09	1.88	2.04	1.98			5.50	4.46		5.00
April.....		1.80	1.92-1.93	1.90				5.00	6.00	5.50
May.....	1.67-1.77	1.36	1.52-1.62	1.10			1.25	1.23	\$1.83-2.29	1.55
June.....		1.17	1.20-1.23	1.17	\$28.78-\$37.22	\$30.44		.25	1.15-1.67	1.20
July.....	1.34	1.32	1.12-1.13	1.04	17.63-27.61	24.47		.42	1.25-1.29	1.25
August.....	1.22-1.23	1.23	1.33-1.36	1.12	12.73-18.81	17.04		.50	1.24-1.26	1.25
September.....	1.45	1.44	1.50-1.51	1.44	15.71-21.53	21.20			1.30-1.60	1.38

October.....	1.72- 1.73	1.70	1.54- 1.59	1.55	20.00- 27.33	25.17	2.00	.82	1.95- 2.42	2.12
November.....	1.91- 1.97	1.89	1.74- 1.84	1.56	-----	-----	-----	-----	2.12- 2.60	2.40
December.....	1.85- 1.91	1.69	1.73- 1.86	1.87	-----	-----	-----	1.50	2.66- 2.86	2.46
Average.....	1.73- 1.75	1.64	1.59- 1.63	1.39	17.49- 25.00	20.00	2.08	1.46	1.63- 1.93	1.40

Month	Wolfish				Scallops, sea		Miscellaneous †		All species		
	Offshore vessels		Inshore craft		Offshore vessels		Offshore vessels	Inshore craft	Offshore vessels	Inshore craft	All craft
	First sales prices	Average price	First sales prices	Average price	First sales prices	Average price	Average price	Average price	Average price	Average price	Average price
January.....	\$3.55-\$3.61	\$3.09	\$4.00-\$5.00	\$4.02	\$13.05	\$13.05	\$8.99	\$1.48	\$3.17	\$3.26	\$3.18
February.....	3.70- 3.72	3.40	3.81- 3.88	4.46	15.17	15.24	7.84	1.90	2.92	3.48	2.95
March.....	4.29- 4.32	3.83	4.22- 4.56	4.38	\$15.52-15.65	15.62	9.76	1.94	3.16	3.37	3.16
April.....	2.58- 2.59	2.26	2.38- 2.70	2.77	12.36-12.50	13.87	7.80	2.78	2.36	2.63	2.38
May.....	1.71- 1.75	1.70	1.56- 1.73	1.71	11.31	11.19	4.10	1.55	2.07	1.90	2.05
June.....	2.51	2.44	2.42- 2.60	2.48	11.01	10.95	4.70	1.62	2.76	2.13	2.65
July.....	2.82	2.64	2.56- 2.61	2.57	11.42	11.37	3.89	1.80	2.54	1.88	2.42
August.....	3.75	3.41	-----	2.69	12.49	12.46	2.65	1.43	2.81	1.91	2.69
September.....	4.43	4.22	-----	2.60	14.18	14.06	1.81	2.99	2.95	2.31	2.86
October.....	4.93	4.46	-----	2.06	14.81	14.69	3.10	2.44	3.46	2.65	3.34
November.....	5.09- 5.16	4.75	-----	5.17	16.88	16.72	2.30	1.81	3.22	2.89	3.17
December.....	4.28- 4.33	4.02	4.00	1.54	15.03-15.16	14.98	4.91	1.92	2.93	2.79	2.92
Average.....	3.54- 3.56	2.61	2.57- 2.78	2.42	13.18-13.22	13.03	4.27	2.36	2.84	2.40	2.79

† Includes offshore vessels and inshore craft.

‡ Includes dressed, round, and steak whiting.

§ Includes butterfish, sharks, skates, spawn, etc.

NOTE.—Prices are in dollars per hundredweight. First sales prices represent an unweighted average. The average price always is weighted. Each classification by variety includes all sizes unless otherwise noted.

VESSEL LANDINGS OF FISHERY PRODUCTS AT NEW BEDFORD, MASS.

Landings of fishery products by fishing vessels (craft of 5 net tons capacity or greater) during 1939 amounted to 23,006,463 pounds, valued at \$1,343,048. The heaviest landings occurred in October, when 3,303,743 pounds were received, and the smallest landings occurred in April, when receipts amounted to 806,761 pounds. Sea scallops are particularly important in the landings at this port, being valued at \$609,570, or 45 percent of the total value of the landings of all species during the year.

Vessel landings of fishery products at New Bedford, Mass., 1939, by species and months

Month	Blackback		Butterfish		Cod		Dab		Eels		Fluke		Haddock	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
January	71,229	\$6,305	9,150	\$377	101,794	\$4,169	1,000	\$15			1,000	\$155	189,850	\$7,305
February	66,229	8,279	17,204	1,432	79,520	2,832			1,125	\$17	6,985	788	76,795	2,670
March	252,481	17,540			145,165	5,125	2,810	70	3,620	112	1,500	180	171,125	5,066
April	191,959	7,602	625	38	15,915	410					16	1	31,630	1,253
May	628,640	11,229			78,180	1,832	1,660	16			35	1	68,310	1,574
June	623,975	20,941	300	9	19,285	837	360	3				1,261	120,630	3,021
July	520,955	25,112	9,580	325	101,566	2,177	1,040	24				3,182	160,810	3,524
August	277,291	19,325	1,525	49	60,545	1,311		6				12,721	123,335	2,596
September	242,263	13,217	3,355	52	123,915	3,557			100	1	14,477	1,425	84,800	1,579
October	492,998	29,748	21,170	654	300,282	11,065	375	7	165	5	85,916	3,666	142,105	5,226
November	205,250	12,752	63,767	2,069	311,500	11,452			3,955	70	1,591	162	247,749	8,782
December	146,065	9,609	65,040	2,621	176,208	5,992			140	2	108	6	167,035	5,316
Total	3,722,335	181,659	189,016	7,626	1,508,874	80,329	7,560	141	9,140	208	80,781	8,128	1,584,874	47,712

Month	Hake		Halibut		Mackerel		Pollock		Rosefish		Scup		Sole, gray	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
January	1,090	\$33			269,330	\$12,178	1,200	\$12	33,200	\$544			90	\$4
February	31,105	646					113	3			720	\$12	155	9
March	50	2	105	\$12							4,000	220	590	17
April	285	6	90	11							125	8	145	3
May	10,905	181	275	28	642,050	18,597	6,120	96	100	1			4,795	125
June	6,945	142	637	68	622,305	19,994	50	2					560	13
July	3,450	56	58	8	101,780	5,281	125	1					770	27
August	2,940	52			112,750	5,239								8
September	5,305	119			438,525	18,048	3,350	48			275	3	275	
October	13,019	224			331,150	15,480	2,235	36			3,390	56		
November	3,620	89	288	56	327,013	9,712	61,595	1,229			3,730	109		
December	745	18	142	28	410,780	13,191	74,265	1,447			1,795	68		
Total	79,459	1,568	1,595	211	3,255,683	117,720	149,055	2,874	33,300	545	16,180	604	7,380	206

FISHERY INDUSTRIES OF THE UNITED STATES, 1939

Vessel landings of fishery products at New Bedford, Mass., 1939, by species and months—Continued

Month	Sole, lemon		Swordfish		Tilefish		Tuna		Whiting		Wolfish		Yellowtail	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
January	114,000	\$14,320									100	\$3	1,071,520	\$23,887
February	30,664	3,437			10,225	\$465							1,074,125	32,118
March	39,800	2,895			38,725	2,095			4,000	\$100			1,074,980	27,493
April	54,220	3,199							200	3			488,110	13,855
May	119,810	4,236	1,600	\$444					1,200	24	3,130	24	431,020	4,805
June	18,125	890	11,512	3,899							250	3	241,661	3,388
July	31,640	2,717	55,328	12,503									421,178	5,460
August	56,135	4,874	55,088	10,313									581,780	9,190
September	47,715	3,931	1,508	262			10,700	\$1,242					1,329,800	18,553
October	257,740	24,850							5,480	73			1,615,753	20,871
November	127,225	12,957	330	12					3,605	41			1,054,222	17,997
December	35,200	3,280	3,000	105					2,375	24			1,335,520	22,941
Total	932,274	81,586	128,366	27,538	48,950	2,560	10,700	1,242	16,860	265	3,480	30	10,719,969	200,658

Month	Spawn		Miscellaneous ¹		Total fish		Scallops, sea		Squid		Total shellfish		Grand total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
January			100	\$8	1,861,653	\$69,315	41,308	\$49,144			41,308	\$49,144	1,902,961	\$118,459
February	585	\$29	483	17	1,399,035	52,774	26,814	27,572		\$5	27,034	27,577	1,426,069	80,351
March			685	12	1,739,636	60,939	41,723	53,872			41,723	53,872	1,781,359	114,811
April			45	1	1,783,365	26,390	23,276	25,403			23,296	25,407	806,761	51,797
May			925	26	1,995,729	43,403	49,208	46,527			49,208	46,527	2,044,937	89,930
June			85	3	1,068,141	52,895	36,863	34,458			36,863	34,458	1,705,004	87,353
July					1,411,461	57,532	37,106	35,515	40	1	37,146	35,516	1,448,607	93,048
August					1,285,275	54,208	49,111	50,768			49,111	50,768	1,334,386	104,976
September					2,279,203	61,890	60,081	74,785			60,081	74,785	2,339,284	136,675
October			43	3	3,222,161	111,917	80,837	103,498	745	22	81,582	103,520	3,303,743	215,437
November			105	8	2,413,610	77,446	42,004	59,619	880	19	42,884	59,638	2,456,494	137,084
December			130	8	2,419,198	64,716	37,940	48,409	120	2	37,660	48,411	2,456,868	113,127
Total	585	39	2,601	86	22,478,467	733,425	525,871	609,570	2,125	53	527,996	609,623	23,006,463	1,343,048

¹ Includes rays, sea bass, gray sea trout, or weakfish, shad, sharks, and skates.

NOTE.—Volume of catch is shown in weights as landed which may be in the round or dressed condition. Data for sea scallops are shown in pounds of meats.

MACKEREL FISHERY OF THE ATLANTIC COAST¹

The mackerel season of 1938 extended from March 26, 1938, to January 24, 1939. One hundred and two vessels landed 29,844,100 pounds, an increase of 113 percent as compared with corresponding landings of the preceding year.

In this analysis, vessels include United States craft of 5 net tons capacity or over. Most of them are registered in Massachusetts. Purse seiners are classed as "regular" or "irregular" on the basis of their effort throughout the whole mackerel season. Regular seiners fished in all three major areas, and were active for more than two-thirds the duration of the Gulf of Maine fishery. Irregular seiners did not fish in the southern area, or ceased seining activity for 3 months or more during the time of the Gulf of Maine fishery. Vessels using purse seines may change gear and crew and engage in netting for a portion of the season, and during this time they are classed as netters. Allowance for such duplication has been made in the summary "Operating Units and Catch."

Mackerel fishery of the Atlantic coast, 1938¹

CATCH: BY AREAS IN 5-DAY PERIODS

Date	South (area XXIII)		Block Island (area XXII west of Nantucket Shoals)		Gulf of Maine (area XXII north of Nantucket Shoals)		Nova Scotia (area XXI)	Total
	Seiners	Netters	Seiners	Netters	Seiners	Netters	Seiners	
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
SPRING								
Mar. 29-31.....	11,800							11,800
Apr. 1-5.....	36,900							36,900
Apr. 6-10.....	26,600							26,600
Apr. 11-15.....	15,400	31,800						47,200
Apr. 16-20.....	284,600	159,500						444,100
Apr. 21-25.....	914,000	46,400						960,400
Apr. 26-30.....	1,003,100	8,100						1,011,200
May 1-5.....	1,281,700	57,300	39,600					1,358,600
May 6-10.....	2,080,000	51,800	102,000	9,700				2,223,500
May 11-15.....	460,300	106,600	435,200	14,300				1,016,400
May 16-20.....	865,300	20,900	544,500	5,900		500		937,100
May 21-25.....	118,600	12,400	1,380,400	3,800				1,515,200
May 26-31.....		1,300	924,900				60,000	986,200
June 1-5.....			351,400	5,600	8,700	200	29,700	395,600
June 6-10.....		1,700	9,000	600	54,900	8,400	250,100	324,700
June 11-15.....					1,391,200	2,900	16,700	1,410,800
June 16-20.....					1,222,200	2,200		1,224,400
June 21-25.....					345,800	3,400		349,200
June 26-30.....					110,200	100		110,300
SUMMER								
July 1-5.....					1,384,300			1,384,300
July 6-10.....					401,900			401,900
July 11-15.....					277,600			277,600
July 16-20.....					1,033,500			1,033,500
July 21-25.....					2,209,000			2,209,000
July 26-31.....					374,700			374,700
Aug. 1-5.....					583,000			583,000
Aug. 6-10.....					164,500			164,500
Aug. 11-15.....					163,400			163,400
Aug. 16-20.....					555,900			555,900

¹ Includes the catch made during the mackerel season, which extended from Mar. 28, 1938, to Jan. 24, 1939.

² This section, prepared by J. R. Webster of the Division of Scientific Inquiry, includes landings at Cape May, Wildwood, and Atlantic City, N. J.; New York City, N. Y.; Newport and Block Island, R. I.; New Bedford, Woods Hole, Nantucket, Provincetown, Plymouth, Scituate, Boston, and Gloucester, Mass.; Portland, Rockland, New Harbor, Vinal Haven, Boothbay, and Monhegan, Maine, by purse seine vessels or "seiners" and drift-gill-net vessels or "netters." It does not include incidental catches by other vessels such as menhaden steamers, otter trawlers, line trawlers, etc., or by traps. The figures will differ somewhat from statistics published elsewhere in this document, due to different methods of collecting and tabulating the material.

Mackerel fishery of the Atlantic coast, 1938—Continued

CATCH: BY AREAS IN 5-DAY PERIODS—Continued

Date	South (area XXIII)		Block Island (area XXII west of Nantucket Shoals)		Gulf of Maine (area XXII north of Nantucket Shoals)		Nova Scotia (area XXI)	Total
	Seiners	Netters	Seiners	Netters	Seiners	Netters	Seiners	
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
SUMMER—continued								
Aug. 21-25					611,700			611,700
Aug. 26-31					850,600			850,600
Sept. 1-5					138,000			138,000
Sept. 6-10					81,800	3,600		85,400
Sept. 11-15					638,900	3,100		642,000
Sept. 16-20					129,700			129,700
Sept. 21-25					9,300			9,300
Sept. 26-30					6,700	1,300		8,000
FALL AND WINTER								
Oct. 1-5					2,100	100		2,200
Oct. 6-10						800		800
Oct. 11-15			91,200		3,400			94,600
Oct. 16-20			1,187,100		800	400		1,188,300
Oct. 21-25	520,200		374,800			500		893,500
Oct. 26-31			123,700		2,000			125,700
Nov. 1-5	90,600					24,900		115,500
Nov. 6-10						70,600		70,600
Nov. 11-15	20,200		75,400			28,600		124,200
Nov. 16-20	1,100		35,400		61,600	4,300		102,400
Nov. 21-25	299,100		68,300		22,700	12,000		397,100
Nov. 26-30			600			2,400		2,900
Dec. 1-5			111,400			62,500		173,900
Dec. 6-10						32,300		32,300
Dec. 11-15		2,400			1,116,500	71,500		1,190,400
Dec. 16-20					803,900	24,800		828,700
Jan. 16-20			149,100					149,100
Jan. 21-25	28,000		309,700					337,700
Total	7,517,500	497,200	6,311,600	39,900	14,760,500	860,900	356,500	29,844,100

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

OPERATING UNITS AND CATCH: BY GEAR CLASSIFICATION AND GROUNDS

[Vessels of 5 net tons and over]

Designation	Vessels	Tonnage	Crew	Trips	Catch	
	Number	Net tons	Number	Number	Pounds	Value
SPRING PERIOD						
South (area XXIII)						
Seiners:						
Regular	30	1,263	392	212	5,166,200	\$129,816
Irregular	15	590	195	70	1,892,100	81,422
Netters	22	340	134	138	494,800	20,917
Block Island (area XXII—West of Nantucket Shoals)						
Seiners:						
Regular	30	1,263	392	68	2,944,500	63,442
Irregular	14	545	183	37	842,500	18,642
Netters	8	125	49	16	39,900	700
Gulf of Maine (area XXII—East of Nantucket Shoals)						
Seiners:						
Regular	29	1,198	378	113	2,483,100	49,999
Irregular	22	572	218	59	699,900	18,625
Netters	4	40	18	22	17,700	737
Nova Scotia (area XXI)						
Seiners:						
Regular	5	269	66	7	272,500	13,831

Mackerel fishery of the Atlantic coast, 1938—Continued

OPERATING UNITS AND CATCH: BY GEAR CLASSIFICATION AND GROUNDS

Designation	Vessels	Tonnage	Crew	Trips	Catch	
	Number	Net tons	Number	Number	Pounds	Value
SPRING PERIOD—continued						
Nova Scotia—Continued						
Seiners—Continued	Number	Net tons	Number	Number	Pounds	Value
Irregular.....	2	59	29	2	84,000	\$3,511
Total by gear:						
Seiners:						
Regular.....	30	1,263	392	430	10,816,300	256,608
Irregular.....	31	763	297	168	3,018,500	67,400
Netters.....	26	388	161	176	552,400	22,414
Total spring.....	184	12,373	1823	774	14,387,200	346,422
SUMMER PERIOD						
Gulf of Maine (area XXII—East of Nantucket Shoals)						
Seiners:						
Regular.....	30	1,263	392	515	7,712,000	205,497
Irregular.....	31	763	297	229	1,902,500	51,620
Netters.....	5	47	25	16	8,000	575
Total summer.....	164	12,050	1704	760	9,622,500	257,692
FALL AND WINTER PERIOD						
South (area XXIII)						
Seiners:						
Regular.....	24	1,071	336	45	682,700	34,254
Irregular.....	9	393	119	16	276,500	11,715
Netters.....	1	15	7	1	2,400	170
Block Island (area XXII)						
Seiners:						
Regular.....	29	1,244	405	107	2,147,900	98,884
Irregular.....	8	840	112	21	376,700	15,971
Gulf of Maine (area XXII—East of Nantucket Shoals)						
Seiners:						
Regular.....	25	1,071	346	51	1,426,200	70,337
Irregular.....	13	388	131	24	586,800	26,146
Netters.....	28	477	190	204	335,200	23,594
Total by gear:						
Seiners:						
Regular.....	30	1,263	416	203	4,256,800	203,475
Irregular.....	16	528	172	61	1,240,000	53,832
Netters.....	28	477	190	205	337,800	23,764
Total fall and winter.....	172	12,232	1762	489	5,834,400	281,071
SEASON OF 1938						
Seiners:						
Regular.....	30	1,263	392	1,148	22,785,100	665,580
Irregular.....	37	1,008	375	458	6,161,000	172,852
Netters.....	48	716	291	397	898,000	46,753
Grand total.....	1102	12,846	11,006	2,003	29,844,100	885,185

¹ Exclusive of duplication. Eight vessels engaged in both seining and netting during 1938.

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

FISHERIES OF THE MIDDLE ATLANTIC STATES

(Area XXIII)⁸

The yield of the commercial fisheries of the Middle Atlantic States (New York, New Jersey, Pennsylvania, and Delaware) during 1938 amounted to 216,858,500 pounds valued at \$8,249,244 to the fishermen, representing a decrease of 18 percent in volume but an increase of 4 percent in value as compared with the catch in 1937. These fisheries gave employment to 7,549 fishermen, as compared with 7,720 in 1937.

There were 383 fishery wholesale and manufacturing establishments in these States in 1938, as compared with 419 in the previous year. In 1938 these establishments employed 6,196 persons, paid \$7,413,363 in salaries and wages, and produced manufactured products (canned, cured, packaged, and byproducts), valued at \$15,435,934. In 1937 the wholesale and manufacturing firms employed 6,839 persons, paid \$8,611,693 in salaries and wages, and produced manufactured products valued at \$18,658,605.

Fisheries of the Middle Atlantic States, 1938

SUMMARY OF CATCH

Product	New York		New Jersey		Pennsylvania	
	Pounds	Value	Pounds	Value	Pounds	Value
Fish.....	72,737,500	\$2,206,117	92,052,700	\$1,513,836	39,800	\$4,294
Shellfish, etc.....	18,479,800	2,986,716	16,042,200	1,394,425	-----	-----
Total.....	91,217,000	5,192,833	108,094,900	2,908,261	39,800	4,294

Product	Delaware		Total	
	Pounds	Value	Pounds	Value
Fish.....	16,984,100	\$103,239	181,814,100	\$3,827,486
Shellfish, etc.....	522,700	40,617	35,044,400	4,421,768
Total.....	17,506,800	143,856	216,858,500	8,249,244

OPERATING UNITS: BY STATES

Item	New York	New Jersey	Pennsylvania	Delaware	Total
	Number	Number	Number	Number	Number
Fishermen:					
On vessels.....	1,032	1,097	-----	228	2,357
On boats and shore:					
Regular.....	970	997	-----	31	1,998
Casual.....	1,367	1,617	31	279	3,194
Total.....	3,369	3,611	31	538	7,549
Vessels:					
Steam.....	1	-----	-----	6	7
Net tonnage.....	45	-----	-----	889	894
Motor.....	205	186	-----	7	398
Net tonnage.....	3,952	2,863	-----	136	6,951
Sail.....	1	3	-----	-----	4
Net tonnage.....	6	30	-----	-----	36
Total vessels.....	207	189	-----	13	409
Total net tonnage.....	4,003	2,893	-----	975	7,871

⁸ 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 whose principal fishing ports are in the area but at times fish 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, 1938—Continued

OPERATING UNITS: BY STATES—Continued

Item	New York	New Jersey	Pennsylvania	Delaware	Total
Boats:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Motor.....	717	889		25	1,631
Other.....	1,042	1,268	11	121	2,442
Accessory boats.....	50	55		6	111
Apparatus:					
Purse seines:					
Mackerel.....	4				4
Length, yards.....	1,390				1,390
Menhaden.....	8	4		6	18
Length, yards.....	3,130	1,150		3,666	7,946
Other.....		10			10
Length, yards.....		3,390			3,390
Haul seines.....	60	105	10	35	211
Length, yards.....	11,862	9,934	1,705	8,350	31,841
Gill nets:					
Anchor.....		40			40
Square yards.....		20,400			20,400
Drift.....	473	880		25	1,378
Square yards.....	808,651	558,407		44,540	1,411,598
Runaround.....	4	65			78
Square yards.....	13,640	244,510		3,760	261,910
Stake.....	709	1,371		18	2,098
Square yards.....	95,790	354,365		9,337	459,998
Lines:					
Hand.....	128	260		11	399
Hooks.....	132	425		22	579
Trawl.....	2,148	474		3	2,625
Hooks.....	153,750	274,300		8,400	436,450
Troll.....		340			340
Hooks.....		340			340
Trot with baits or snoods.....	59	24			83
Baits or snoods.....	31,400	21,150			52,550
Trot with hooks.....	19				19
Hooks.....	3,750				3,750
Pound nets.....	125	175		13	313
Weirs.....		99			99
Stop nets.....		61		7	68
Square yards.....		60,700		1,230	61,930
Fyke nets.....	396	814		206	1,416
Dip nets.....	91	106		64	261
Cast nets.....		3			3
Drag nets.....	20				20
Yards at mouth.....	40				40
Drop nets.....		1			1
Otter trawls:					
Fish.....	152	63			215
Yards at mouth.....	3,617	1,452			5,069
Wire baskets.....		3			3
Pots:					
Crab.....		10			10
Eel.....	2,014	1,244		271	3,529
Fish.....	1,210	9,505			10,715
Lobster.....	10,150	6,075		98	16,323
Harpoons.....	17				17
Spears.....	70	12			82
Dredges:					
Clam.....	32	65		8	105
Yards at mouth.....	52	68		10	130
Crab.....	2	64		8	74
Yards at mouth.....	4	98		9	111
Mussel.....	8				8
Yards at mouth.....	14				14
Oyster.....					
Common.....	76	198		10	284
Yards at mouth.....	111	245		11	367
Suction.....	1				1
Yards at mouth.....	2				2
Scallop.....	52	4			56
Yards at mouth.....	187	14			201
Tongs:					
Oyster.....	180	156			346
Other.....	1,298	504		2	1,804
Rakes:					
Oyster.....		33			33
Other.....	325	768			1,093
Forks.....	369	1			370
Hoes.....		232			232

Fisheries of the Middle Atlantic States, 1938—Continued

CATCH: BY STATES

Species	New York		New Jersey		Pennsylvania		Delaware		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
FISH										
Alewives	66,400	\$655	8,100	\$121					121,800	\$1,727
Amberjack			800	16					800	16
Anchovies	9,600	288							9,600	288
Bluefish	249,600	28,938	1,038,300	81,378					1,287,900	110,526
Bonito	111,300	5,551	693,900	25,357			3,000	210	805,200	30,908
Butterfish	4,495,200	170,512	4,103,500	135,512					8,598,700	306,024
Carp	205,300	10,387	383,700	29,271	2,800	\$189	35,800	2,860	627,600	42,707
Catfish and bullheads	36,100	5,348	120,600	5,595			25,100	757	181,800	11,700
Cod	8,538,600	893,401	2,252,400	74,358			57,300	1,732	10,848,300	469,491
Croaker	400	12	5,759,000	69,368			228,100	2,713	5,987,500	72,083
Cunner	2,300	46							2,300	46
Cusk	100	2							100	2
Drum:										
Black			1,500	21					1,500	21
Red or redfish			5,200	52					5,200	52
Eels:										
Common	219,400	13,316	129,300	13,941			27,200	3,899	375,900	31,156
Conger	11,400	216	26,500	309					37,900	525
Flounders:										
Gray sole	51,800	3,365	1,900	37					53,700	3,402
Lemon sole	613,300	47,980	26,600	1,548					639,900	49,528
Yellowtail and dab	3,010,600	66,695	301,800	5,139					3,312,400	71,834
Blackback	6,149,100	294,647	181,400	6,276					6,330,500	300,922
Fluke	2,452,100	208,809	2,083,100	167,632			3,100	208	4,538,300	376,649
Unclassified	33,500	1,665							33,500	1,665
Frigate mackerel	11,500	232	61,000	614					72,500	846
Gizzard shad							400	12	400	12
Goosefish			2,500	25					2,500	25
Grayfish	300	5	101,900	1,016					102,200	1,021
Groupers	4,500	225	12,600	370					17,100	595
Haddock	11,107,400	414,254	1,500	14					11,108,900	414,268
Hake	323,800	7,999	41,100	820					364,900	8,819
Hallibut	47,800	5,977							47,800	5,977
Herring, sea	14,400	287	1,160,800	6,548					1,175,200	6,835
Hickory shad	2,300	40	27,000	198					29,300	238
Kingfish or "king mackerel"	40,100	2,191	100,000	8,000					140,100	5,191
King whiting or "kingfish"	2,300	65	102,500	4,147					104,800	4,202
Launce			100	3					100	3
Mackerel	1,786,200	65,363	2,136,400	83,133					3,922,600	148,496
Menhaden	22,632,600	102,567	48,101,000	164,246			16,207,000	72,990	86,940,600	339,833
Mullet			200	2			84,700	3,368	84,900	3,390
Pollock	305,700	5,746	101,200	2,162					406,900	7,898
Sand perch			1,100	12					1,100	12
Scup	2,491,900	61,814	4,950,300	60,829					7,442,200	122,643

Sea bass	284,700	22,163	1,964,400	104,187					2,249,100	126,350
Sea robin	11,700	231	73,200	754					84,900	985
Shad	1,071,300	59,039	2,492,000	222,480	13,900	2,978	14,400	2,385	3,591,600	284,882
Sharks	11,000	72	130,200	1,912					141,200	1,984
Silversides			1,500	15					1,500	15
Skates	31,000	512	107,800	607					138,800	1,119
Smelt	400	24							400	24
Snapper, red	3,800	190	28,200	1,808					32,000	1,998
Spanish mackerel	200	6	9,400	795					9,600	801
Spot			183,600	3,427			2,100	63	185,700	3,490
Squeteagues or "sea trout," gray	1,056,900	77,080	6,288,700	156,805			197,600	6,406	7,543,200	240,291
Squirrel hake			161,700	1,627					161,700	1,627
Striped bass	138,900	17,185	147,000	17,425			24,900	2,490	310,800	37,100
Sturgeon	5,000	1,474	5,100	652					10,100	2,128
Suckers	17,900	517	50,200	1,905	23,100	1,127			91,200	3,549
Sunfish	1,000	30							1,000	30
Swellfish	57,200	2,000	1,500	15					58,700	2,015
Swordfish	51,500	9,591							51,500	9,591
Tantog	11,600	459	30,600	697			1,400	42	43,600	1,198
Tilefish	807,600	24,445	100	4					807,700	24,449
Tomcod	4,700	198							4,700	198
Tuna	148,100	6,676	107,500	3,276					255,600	9,952
White perch	33,800	1,173	19,500	1,955			17,400	1,780	70,700	4,908
Whiting	3,955,900	64,255	6,228,500	50,135					10,184,400	114,390
Wolfish	6,200	169							6,200	169
Yellow perch	200	10	3,200	306			7,300	353	10,700	669
Total	72,737,500	2,206,117	92,052,700	1,513,836	39,800	4,294	16,984,100	103,239	181,814,100	3,827,486
SHELLFISH, ETC.										
Crabs:										
Hard	387,300	23,751	1,113,300	32,426			183,800	4,585	1,684,400	60,762
King			2,460,000	5,707			81,200	163	2,541,200	6,870
Soft and peelers	34,400	13,632	319,600	103,767			85,000	17,000	439,000	134,699
Lobsters	244,400	63,297	326,900	47,578			3,100	927	674,400	101,802
Shrimp	125,000	21,250							125,000	21,250
Clams:										
Hard, public ¹	2,008,500	352,407	2,710,700	348,510			4,400	559	4,728,600	701,476
Hard, private ¹	234,900	40,938	214,200	27,536			20,000	2,775	469,100	71,249
Soft, public ¹	371,800	33,928	874,700	54,423					1,246,500	88,351
Surf or skimmer	806,800	51,637	804,900	20,301					1,613,700	71,838
Conchs	7,000	695							7,000	695
Mussels, sea	240,600	18,135					1,900	323	242,700	18,458
Oysters, market:²										
Public, spring	210,000	49,344	20,900	2,729					230,900	52,073
Public, fall	200,300	47,109	114,200	11,464					314,600	58,573
Private, spring	5,153,900	884,391	2,745,900	342,930					7,899,800	1,227,321
Private, fall	4,642,400	976,385	2,916,700	367,830			139,700	14,001	7,698,800	1,358,216

¹ Statistics on hard clams are based on yields of 8 pounds of meats per standard bushel in New York, 9.49 pounds in New Jersey, and 9.52 pounds in Delaware.

² Statistics on soft clams are based on yields of 16 pounds of meat per standard bushel in New York and 19.04 pounds in New Jersey.

³ Statistics on oysters are based on yields of 7.5 pounds of meats per standard bushel in New York, 5.76 pounds in New Jersey, and 6.67 pounds in Delaware.

Fisheries of the Middle Atlantic States, 1938—Continued

CATCH: BY STATES—Continued

Species	New York		New Jersey		Pennsylvania		Delaware		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
SHELLFISH, ETC.—continued										
Scallops:										
Bay.....	21,100	6,003							21,100	6,003
Sea.....	2,944,800	350,242	114,000	8,790					3,058,800	359,032
Squid.....	758,900	14,252	1,288,000	19,443					2,046,900	33,695
Turtles:										
Green.....			3,900	39					3,900	39
Loggerhead.....			5,500	55					5,500	55
Snapper.....	35,500	2,480	8,700	897			3,600	284	47,800	3,661
Bloodworms.....	22,900	21,620							22,900	21,620
Sandworms.....	26,800	25,020							26,800	25,020
Total.....	18,479,500	2,986,716	16,042,200	1,394,425			522,700	40,617	35,044,400	4,421,758
Grand total.....	91,217,000	5,192,833	108,094,900	2,908,261	39,800	4,294	17,506,800	143,856	216,858,500	8,249,244

NOTES.—Data on the yield of shellfish meats per bushel are based on United States standard bushels of 2,150.4 cubic inches capacity. Prior to 1938 yields were based on bushels of the size prescribed by individual State regulations.

Statistics on the yield of fishery products for the Middle Atlantic States include the catch made by craft from this area in the southern trawl fishery as well as in other fisheries in the South Atlantic. The seed oyster fishery in the Middle Atlantic States was prosecuted in New York, New Jersey, and Delaware. In New York, 81 fishermen using 6 motor vessels, 19 motorboats, 32 other boats, 11 dredges, and 51 tongs, took 48,268 bushels of seed oysters, valued at \$51,232, from public beds, and 23,941 bushels, valued at \$27,346, from private beds. 47 of these fishermen are duplicated among those fishing for market oysters or other species. Similarly, the following craft and gear are duplicated: 1 motor vessel, 15 motorboats, 22 other boats, 2 dredges and 37 tongs. In New Jersey, 1,475 fish-

ermen, using 2 motor vessels, 117 sail vessels, 83 motorboats, 18 other boats, 238 dredges, and 106 tongs, took 1,548,110 bushels of seed oysters, valued at \$469,903 from public beds, and 1,500 bushels, valued at \$600, from private beds. Of the total number of persons fishing for seed oysters in New Jersey, 1,462 are duplicated among those fishing for market oysters or other species. Similarly, the following craft and gear are duplicated: 2 motor vessels, 72 sail vessels, 81 motorboats, 17 other boats, 144 dredges, and 103 tongs. In Delaware, 41 fishermen using 5 motor vessels, 1 sail vessel, and 6 dredges, took 52,300 bushels of seed oysters, valued at \$9,430, from public beds. Of the total number of persons fishing for seed oysters in Delaware, 18 are duplicated among those fishing for market oysters or other species. Similarly, the following craft and gear are duplicated: 2 motor vessels and 4 dredges.

Fisheries of the Middle Atlantic States, 1938—Continued

SUPPLEMENTARY TABLE SHOWING THE 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..	1,161,900	\$23,751	3,339,900	\$32,426	551,400	\$4,585	5,053,200	\$60,762
King.....do.....	-----	-----	615,000	5,707	20,800	163	685,300	5,870
Soft and peelers...do....	137,600	13,932	1,278,400	103,767	340,000	17,000	1,756,000	134,699
Clams:								
Hard, public...bushels..	251,062	352,407	285,638	348,510	462	559	537,162	701,476
Hard, private...do.....	29,362	40,038	22,571	27,536	2,101	2,775	54,084	71,249
Soft, public...do.....	23,237	38,928	45,940	54,423	-----	-----	69,177	88,351
Surfor skimmer...do....	67,400	51,537	47,825	20,301	-----	-----	115,225	71,838
Conchs.....do.....	389	695	-----	-----	-----	-----	389	695
Musels, sea.....do.....	24,080	18,135	-----	-----	166	323	24,246	18,458
Oysters, market:								
Public, spring...do.....	28,000	49,344	3,628	2,729	-----	-----	31,628	52,073
Public, fall...do.....	20,707	47,109	19,844	11,464	-----	-----	46,551	58,573
Private, spring...do....	687,187	884,391	476,719	342,930	-----	-----	1,168,906	1,227,321
Private, fall...do.....	618,987	976,385	506,372	367,830	20,945	14,001	1,146,304	1,358,216
Scallops:								
Bay.....do.....	4,220	6,003	-----	-----	-----	-----	4,220	6,003
Sea.....do.....	490,800	350,242	26,573	8,790	-----	-----	517,373	359,032

NOTE.—Bushels represent U. S. Standard Bushels of 2,150.4 cubic inches capacity. Prior to 1938 data on bushels of shellfish were based on bushel measures of the size prescribed by individual State regulations. For more detailed information concerning shellfish measures the reader is referred to the section on conversion factors, p. 548 of this document.

Industries related to the fisheries of the Middle Atlantic States, 1938

OPERATING UNITS, SALARIES, AND WAGES

Item	New York	New Jersey	Pennsylvania	Delaware	Total
Transporting:					
Persons engaged:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	110	24	-----	-----	134
On boats.....	-----	104	-----	-----	104
Total.....	110	128	-----	-----	238
Vessels, motor.....	24	10	-----	-----	34
Net tonnage.....	431	137	-----	-----	568
Boats.....	-----	82	-----	-----	82
Wholesale and manufacturing:					
Establishments.....	218	112	41	12	383
Persons engaged:					
Proprietors.....	44	89	37	9	179
Salaried employees.....	719	142	77	14	952
Average for season.....	2,997	1,436	330	302	5,065
Average for year.....	2,295	912	252	139	3,598
Paid to salaried employees.....	\$2,060,806	\$319,206	\$141,064	\$18,760	\$2,539,836
Paid to wage earners.....	\$3,575,952	\$865,637	\$312,667	\$119,271	\$4,873,527
Total salaries and wages.....	\$5,636,758	\$1,184,843	\$453,731	\$138,031	\$7,413,363
Fishermen manufacturing.....	234	53	-----	-----	287

Industries related to the fisheries of the Middle Atlantic States, 1938—Continued

PRODUCTS MANUFACTURED

Item	New York		New Jersey		Pennsylvania		Delaware	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
By manufacturing establishments:								
Buffalofish, smoked pounds	441,300	\$107,481						
Butterfish, smoked do	476,200	119,280	73,000	\$22,500	(1)	(1)		
Carp, smoked do	174,200	53,719	(1)	(1)				
Cisco, chubs, and tullibees, smoked pounds	3,001,200	889,781	(1)	(1)	(1)	(1)		
Cod, fresh fillets do	3,408,900	444,158	607,600	71,070				
Eels, smoked do	7,000	1,576						
Flounders, fresh fillets pounds	1,522,300	256,602	219,000	37,380				
Haddock, fresh fillets pounds	2,194,100	275,782	1,790,400	221,260				
Hake, fresh fillets pounds	105,500	10,550						
Herring, sea, smoked, bloaters do	92,300	22,098	(1)	(1)	356,200	\$40,769		
Lake trout, smoked pounds	136,400	45,336	(1)	(1)	(1)	(1)		
Mackerel, smoked pounds	543,500	97,312	(1)	(1)	(1)	(1)		
Pollock, fresh fillets pounds	46,500	5,130						
Paddlefish or spoonbill cat, smoked pounds	255,200	163,233						
Salmon:								
Smoked do	5,522,600	1,628,184	391,225	138,594	(1)	(1)		
Kippered do	169,500	47,906	(1)	(1)	(1)	(1)		
Caviar, canned standard cases	1,563	28,077						
Shad, smoked pounds	83,700	16,952			(1)	(1)		
Sturgeon:								
Smoked do	374,300	319,749	(1)	(1)	(1)	(1)		
Caviar, canned standard cases	2,491	307,298						
Whitefish:								
Smoked pounds	946,000	230,259	140,250	47,755	(1)	(1)		
Caviar, canned standard cases	325	6,660						
Clams:								
Hard:								
Fresh-shucked gallons					5,635	11,781		
Chowder, canned standard cases	(1)	(1)	179,133	648,776				
Soft, fresh-shucked gallons			12,470	12,470				
Marine-shell products:								
Buttons gross	1,254,224	688,604	1,495,932	1,153,457	(1)	(1)		
Novelties		76,200		76,604				
Oysters, fresh-shucked gallons	332,277	674,337	402,686	722,915	67,700	127,730	(1)	(1)
Oyster-shell products:								
Poultry feed tons	(1)	(1)	4,514	35,228	(1)	(1)	(1)	(1)
Lime do	(1)	(1)	1,480	5,567	(1)	(1)	(1)	(1)
Whale oil gallons	7,264,300	3,025,831						
Unclassified products:								
Smoked pounds			\$ 692,900	\$ 308,576	\$ 1,596,600	\$ 488,324		
Canned standard cases	\$ 18,375	\$ 222,232	(1)	(1)			(1)	(1)
Byproducts	(1)	(1)		\$ 416,223	(1)	(1)	(1)	(1)
Miscellaneous		\$ 279,013		\$ 195,648	\$ 319,511	\$ 100,805		\$ 406,162
Total		10,143,340		4,117,023		789,409		406,162

¹ The production of this item is included under "Unclassified products."

² Includes smoked bluefish, carp, cisco, chub, cod, finnan haddock, haddock fillets, sea herring bloaters, lake trout, mackerel, scup, sturgeon, tullibees, and kippered salmon.

³ Includes smoked butterfish, chub, cisco, haddock fillets, lake trout, mackerel, salmon, shad, sturgeon, tullibees, and whitefish; and kippered herring and salmon.

⁴ Includes canned pickled eels, pickled sea mussels, fish paste, clam products, and turtle and terrapin products.

⁵ This item has been included under "Miscellaneous."

⁶ Includes tuna and mixed liver oils, miscellaneous fish oil, king crab scrap, and menhaden products.

⁷ Includes fresh fillets of mackerel and halibut; halibut liver oil; menhaden products; crushed oyster-shell products; fresh-water mussel-shell buttons; and miscellaneous fish roe.

⁸ Includes salted boneless cod; and canned oysters, hard and soft clam products, shore dinners, fish chowder, and shellfish newberg.

⁹ Includes pickled sea herring, king crab and miscellaneous dry scrap, marine-shell buttons, and crushed oyster-shell products.

¹⁰ Includes fresh-shucked oysters; canned alewives and alewife roe; crushed oyster-shell products; king crab scrap; and menhaden products.

Industries related to the fisheries of the Middle Atlantic States, 1938—Continued

PRODUCTS MANUFACTURED—Continued

Item	New York		New Jersey		Pennsylvania		Delaware	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
By fishermen:								
Butterfish, smoked pounds.....	400	\$80						
Eels, smoked.....do.....	33,900	7,940	8,000	\$2,500				
Herring roe, salted pounds.....			2,100	357				
Whiting, smoked pounds.....	1,200	240						
Scallops:								
Bay, fresh-shucked gallons.....	2,361	5,903						
Sea, fresh-shucked gallons.....	303,609	317,761	12,661	10,634				
King crab meal.....tons.....			85	2,565				
Total.....		331,914		16,058				
Grand total.....		10,475,254		4,133,079		\$769,409		\$406,162

NOTE.—The total value of the manufactured products for the Middle Atlantic States was as follows: By manufacturing establishments, \$15,435,934, and by fishermen, \$347,970. Some of the above products may have been manufactured from fishery products imported from another State or a foreign country, therefore they cannot be correlated directly with the catch within the State. Of the total number of persons engaged on transporting craft, 212 have been included as fishermen, and among the total number of persons engaged in the preparation of fishermen's prepared products, all have been included as fishermen. The whale products shown above were manufactured on floating factory ships operating in the Southern Hemisphere.

NEW YORK

Fisheries of New York, 1938

OPERATING UNITS: BY GEAR

Item	Purse seines		Haul seines, common	Gill nets			Lines	
	Mack-erel	Men-haden		Drift	Run-around	Stake	Hand	Trawl
	Number	Number	Number	Number	Number	Number	Number	Number
Fishermen:								
On vessels.....	74	205		21	17		74	110
On boats and shore:								
Regular.....			47	44		86	48	64
Casual.....			118	417		170	6	
Total.....	74	205	165	482	17	256	128	174
Vessels:								
Steam.....		1						
Net tonnage.....		45						
Motor.....	4	7		3	4		15	18
Net tonnage.....	195	549		40	49		227	318
Total vessels.....	4	8		3	4		15	18
Total net tonnage.....	195	594		40	49		227	318
Boats:								
Motor.....			11			45	22	49
Other.....			52	228		97	6	
Accessory boats.....	7	17		1	2			16
Apparatus:								
Number.....	4	8	60	473	4	709	128	2,148
Length, yards.....	1,390	3,130	11,852					
Square yards.....				808,651	13,640	95,796		
Hooks, baits, or snoods.....							132	163,760

Fisheries of New York, 1938—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Lines—Con.		Pound nets	Fyke nets	Dip nets	Drag nets	Otter trawls, fish	Pots, eel
	Trot with baits or snoods	Trot with hooks						
	Number	Number	Number	Number	Number	Number	Number	Number
Fishermen:								
On vessels.....				2			426	2
On boats and shore:								
Regular.....	68	1	94	23	20	30	106	37
Casual.....	50	34		124	80	10		89
Total.....	118	35	94	149	100	40	532	128
Vessels, motor.....				1			99	1
Net tonnage.....				12			1,954	12
Boats:								
Motor.....	50		1	2		20	53	9
Other.....	61	18	10	82	91			62
Apparatus:								
Number.....	59	19	125	396	91	20	152	2,014
Yards at mouth.....						40	3,617	
Hooks, baits, or snoods.....	31,400	3,750						

Item	Pots—Con.		Harpoons	Spears	Dredges					
	Fish	Lobster			Clam	Crab	Mus-sel	Oyster		Scal-lop
								Com-mon	Suc-tion	
	Number	Number	Number	Number	Number	Number	Number	Number	Number	
Fishermen:										
On vessels.....		6	49		14		2	135	4	149
On boats and shore:										
Regular.....	24	99	10	22	20	2	6	14		
Casual.....	19	21		48						
Total.....	43	126	59	70	34	2	8	149	4	149
Vessels, motor.....		3	12		6		1	34	1	26
Net tonnage.....		21	288		64		13	594	20	596
Boats:										
Motor.....	20	56	5	10	10	1	3	7		
Other.....		5		35						
Accessory boats.....			12							
Apparatus:										
Number.....	1,210	10,150	17	70	32	2	8	76	1	52
Yards at mouth.....					52	4	14	111	2	187

Fisheries of New York, 1938—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Tongs		Rakes, other than for oysters	Forks	By hand, other than for oysters	Total, exclusive of dupli- cation
	Oyster	Other				
	Number	Number	Number	Number	Number	Number
Fishermen:						
On vessels.....	7	54	1			1,032
On boats and shore:						
Regular.....	147	707	122	121		970
Casual.....	27	537	202	248	12	1,367
Total.....	181	1,298	325	369	12	3,369
Vessels:						
Steam.....						1
Net tonnage.....						45
Motor.....	6	34	1			205
Net tonnage.....	43	225	7			3,952
Sail.....		1				1
Net tonnage.....		6				6
Total vessels.....	5	35	1			207
Total net tonnage.....	43	231	7			4,003
Boats:						
Motor.....	147	707	54			717
Other.....	83	612	270		12	1,042
Accessory boats.....						50
Apparatus, number.....	180	1,298	325	369		

CATCH: BY GEAR

Species	Purse seines				Haul seines		Gill nets, drift	
	Mackerel		Manbaden		Pounds	Value	Pounds	Value
	Pounds	Value	Pounds	Value				
Alewives.....					9,200	\$82	8,200	\$83
Bluefish.....					1,900	287	5,000	600
Butterfish.....					200	6		
Carp.....					145,800	6,825	3,000	180
Catfish and bullheads.....					9,200	1,415		
Eels, common.....					100	6		
Flounders:								
Blackback.....					7,300	302		
Fluke.....					100	7		
Kingfish or "king mack- erel".....					18,100	906		
Mackerel.....	385,600	\$12,944					105,300	4,620
Manbaden.....			22,100,000	\$99,934				
Scup.....					39,400	1,184		
Shad.....					11,600	620	946,000	52,554
Squeteagues or "sea trout," gray.....					300,700	21,040		
Striped bass.....					71,100	8,583	15,300	1,838
Sturgeon.....					100	15	2,800	1,030
Suckers.....					2,600	87		
White perch.....					2,800	79	1,600	50
Shrimp.....					25,000	4,250		
Total.....	385,600	12,944	22,100,000	99,934	645,300	45,763	1,087,200	60,955

Fisheries of New York, 1938—Continued

CATCH: BY GEAR—Continued

Species	Gill nets—Continued				Lines			
	Runaround		Stake		Hand		Trawl	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....			3,700	\$37				
Bluefish.....	5,000	\$580	17,100	2,046	77,100	\$8,822		
Bonito.....					400	8		
Butterfish.....			3,900	150			100	\$3
Carp.....			45,000	2,696				
Catfish and bullheads.....			200	30				
Cod.....					182,000	5,963	1,759,500	79,189
Cusk.....							100	2
Eels:								
Common.....					1,200	72		
Conger.....							2,900	58
Groupers.....					4,500	225		
Haddock.....							29,800	1,235
Hake.....							78,500	1,734
Halibut.....							700	84
Kingfish or "king mackerel".....			1,000	25				
King whiting or "kingfish".....			2,000	40				
Mackerel.....	206,100	6,595	48,300	1,167	34,600	888		
Pollock.....					53,000	1,080	47,400	743
Scup.....			500	15	8,200	235	1,200	36
Sea bass.....			300	24	48,000	3,691		
Shad.....			14,900	815				
Sharks.....					100	2		
Skates.....							1,300	17
Snapper, red.....					3,800	190		
Squeteagues or "sea trout," gray.....	13,900	1,022	118,000	9,443	1,800	144	27,700	2,207
Striped bass.....			17,500	2,118	1,800	216		
Sturgeon.....			800	205				
Suckers.....			400	13				
Swordfish.....							200	19
Tilefish.....							805,100	24,339
Tuna.....					500	10		
White perch.....			20,600	702				
Whiting.....							400	6
Total.....	225,000	8,197	204,200	19,526	417,000	21,525	2,754,900	109,672

Species	Lines—Continued				Pound nets		Fyke nets	
	Trot with baits or snoods		Trot with hooks		Pounds	Value	Pounds	Value
	Pounds	Value	Pounds	Value				
Alewives.....						24,600	\$246	
Bluefish.....					143,400	\$16,598		
Bonito.....					110,800	5,539		
Butterfish.....					2,719,500	106,296		
Carp.....			400	\$24			11,100	662
Catfish and bullheads.....			1,500	267			26,200	8,636
Cod.....					100	6		
Eels, common.....			1,800	107	14,300	858	21,700	1,305
Flounders:								
Blackback.....					32,200	1,369	91,000	4,670
Fluke.....					62,300	8,204		
Frigate mackerel.....					11,500	232		
Herring, sea.....					5,600	106		
Hickory shad.....					2,300	40		
Kingfish or "king mackerel".....					21,000	1,260		
Mackerel.....					979,700	38,399		
Menhaden.....					532,600	2,663		
Pollock.....					21,400	435		
Scup.....					478,500	15,305		
Sea bass.....					44,000	2,382		
Sea robin.....					9,200	182		
Shad.....					98,800	5,050		
Sharks.....					7,900	39		
Skates.....					2,100	23		
Smelt.....							400	24
Spanish mackerel.....					200	6		
Squeteagues or "sea trout," gray.....					545,100	39,356		
Striped bass.....					32,300	4,325	100	14

Fisheries of New York, 1938—Continued

CATCH: BY GEAR—Continued

Species	Lines—Continued				Pound nets		Fyke nets	
	Trot with baits or snoods		Trot with hooks					
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Sturgeon.....								
Suckers.....							14,600	\$417
Sunfish.....							1,000	30
Swellfish.....					57,200	2,000		
Tautog.....					11,400	454		
Tomcod.....			400	\$20			4,300	178
Tuna.....					147,600	6,666		
White perch.....							9,000	342
Whiting.....					124,200	2,482		
Yellow perch.....							200	10
Crabs, hard.....	369,900	\$22,863						
Squid.....					80,500	1,610		
Turtles, snapper.....	35,600	2,480						
Total.....	408,400	25,343	4,100	418	6,296,300	261,893	203,200	11,534

Species	Dip nets		Drag nets		Otter trawls		Pots	
	Eel							
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....					20,700	\$207		
Anchovies.....					9,600	288		
Bluefish.....					100	5		
Bonito.....					100	4		
Butterfish.....					1,771,500	64,057		
Cod.....					6,597,000	308,243		
Croaker.....					400	12		
Cunner.....					2,300	46		
Eels:							158,500	\$9,660
Common.....					8,500	158		
Conger.....								
Flounders:								
Gray sole.....					51,800	3,365		
Lemon sole.....					613,300	47,980		
Yellowtail and dab.....					3,010,600	66,695		
Blackback.....					6,018,600	288,246		
Fluke.....					2,389,700	200,598		
Unclassified.....					33,500	1,668		
Grayfish.....					800	5		
Haddock.....					11,077,600	413,019		
Hake.....					245,300	6,265		
Hallbut.....					47,100	5,893		
Herring, sea.....					8,500	181		
King whiting or "kingfish".....					300	15		
Mackerel.....					26,600	750		
Pollock.....					183,900	3,508		
Scup.....					1,964,100	45,039		
Sea bass.....					112,700	8,496		
Sea robin.....					2,500	49		
Sharks.....					3,000	31		
Skates.....					27,600	472		
Squeteagues or "sea trout,"								
gray.....					49,700	3,859		
Striped bass.....					800	61		
Sturgeon.....					1,000	186		
Tautog.....					200	5		
Tilefish.....					2,500	106		
Whiting.....					3,881,300	61,797		
Wolfish.....					6,200	169		
Crabs:								
Hard.....	11,200	\$618						
Soft and peelers.....	34,400	13,932						
Lobsters.....					17,300	3,305		
Shrimp.....			100,000	\$17,000				
Conchs.....					7,000	695		
Scallops, sea.....					2,300	262		
Squid.....					678,400	12,642		
Total.....	45,600	14,550	100,000	17,000	38,823,900	1,548,409	158,500	9,660

Fisheries of New York, 1938—Continued

CATCH: BY GEAR—Continued

Species	Pots—Continued				Harpoons	
	Fish		Lobster			
	Pounds	Value	Pounds	Value	Pounds	Value
Sea bass.....	79,700	\$7,570			51,300	\$9,572
Swordfish.....						
Lobsters.....			227,100	\$49,992		
Total.....	79,700	7,570	227,100	49,992	51,300	9,572

Species	Spears		Dredges		Tongs	
	Pounds	Value	Pounds	Value	Pounds	Value
Eels, common.....	21,800	\$1,308				
Crabs, hard.....			6,200	\$270		
Clams:						
Hard, public.....					2,008,500	\$352,407
Hard, private.....					234,900	40,938
Soft, public.....					3,000	285
Surf or skimmer.....			808,800	51,537		
Mussels, sea.....			113,300	8,566	114,300	8,581
Oysters, market:						
Public, spring.....			3,800	875	206,200	48,469
Public, fall.....			3,800	875	196,500	46,234
Private, spring.....			5,153,900	884,391		
Private, fall.....			4,642,400	976,385		
Scallops:						
Bay.....					21,100	6,003
Sea.....			2,942,500	349,980		
Total.....	21,800	1,308	13,674,700	2,272,879	2,784,500	502,917

Species	Rakes		Forks		By hand	
	Pounds	Value	Pounds	Value	Pounds	Value
Clams, soft, public.....	368,300	\$83,604			500	\$39
Mussels, sea.....					13,200	988
Bloodworms.....			22,900	\$21,620		
Sandworms.....			26,800	25,020		
Total.....	368,300	83,604	49,700	46,640	13,700	1,027

OPERATING UNITS: BY COUNTIES

Item	Albany	Colum- bia	Dutch- ess	Greene	Kings	Nassau	New York
	Number	Number	Number	Number	Number	Number	Number
Fishermen:							
On vessels.....					63	41	492
On boats and shore:							
Regular.....	16	40	5	2	74	135	
Casual.....			117	27	30	233	
Total.....	16	40	122	29	167	409	492
Vessels, motor.....					80	12	72
Net tonnage.....					312	206	1,933
Boats:							
Motor.....					37	49	
Other.....	8	18	60	17	7	261	
Accessory boats.....							29
Apparatus:							
Purse seines, mackerel:							
Length, yards.....							1,39
Haul seines, common:							
Length, yards.....		280	360	1,225			
Gill nets:							
Drift.....	1	7	38	3			240
Square yards.....	1,800	11,200	117,928	10,000			80,400
Runaround.....						1	1
Square yards.....						3,800	8,000
Stake.....			38	9		17	
Square yards.....			2,872	530		8,850	

Fisheries of New York, 1938—Continued

OPERATING UNITS: BY COUNTIES—Continued

Item	Albany	Colum- bia	Dutch- ess	Greene	Kings	Nassau	New York
Apparatus—Continued.							
Lines:	Number	Number	Number	Number	Number	Number	Number
Hand.....					16		57
Hooks and baits.....					16		57
Trawl.....					20	90	1,800
Hooks.....					4,000	4,800	97,950
Trot with baits or snoods.....						7	
Baits or snoods.....						1,400	
Trot with hooks.....			11	1			
Hooks.....			1,975	125			
Pound nets.....						6	
Fyke nets.....	19	58	82	16			
Dip nets.....						61	
Other trawls, fish.....					41	10	53
Yards at mouth.....					942	169	1,613
Pots:							
Eel.....		4			195		
Fish.....						1,210	
Lobster.....					2,418	72	
Harpoons.....							10
Spears.....					4	16	
Dredges:							
Clam.....					22	10	
Yards at mouth.....					34	18	
Crab.....					2		
Yards at mouth.....					4		
Mussel.....						6	2
Yards at mouth.....						12	2
Oyster:							
Common.....						18	
Yards at mouth.....						26	
Suction.....						1	
Yards at mouth.....						2	
Scallop.....							52
Yards at mouth.....							187
Tongs:							
Oyster.....						38	
Other.....						256	
Rakes, other than for oysters.....						124	
Forks.....					19	22	

Item	Orange	Put- nam	Rens- selaer	Rock- land	Suffolk	Ulster	West- chester
Fishermen:	Number	Number	Number	Number	Number	Number	Number
On vessels.....					436		
On boats and shore:							
Regular.....		2		7	710	10	25
Casual.....	35	12	8	165	375	155	154
Total.....	85	14	8	172	1,521	165	179
Vessels:							
Steam:							
Net tonnage.....					45		
Motor:							
Net tonnage.....					91		
Sail:							
Net tonnage.....					1,501		
Total vessels.....					1		
Total net tonnage.....					6		
Total vessels.....					93		
Total net tonnage.....					1,552		
Boats:							
Motor.....					631		
Other.....	17	6	3	88	384	86	87
Accessory boats.....					21		
Apparatus:							
Purse seines, manhaden.....					8		
Length, yards.....					3,130		
Haul seines, common.....	2	2	2	4	28	2	8
Length, yards.....	200	220	300	570	7,200	466	1,031
Gill nets:							
Drift:							
Square yards.....	9	4		48	1	69	53
Runaround.....	27,500	13,300		153,235	500	210,040	182,760
Square yards.....					2		
Stake:							
Square yards.....	1	9		227	280	12	116
Square yards.....	166	100		4,830	72,000	5,081	1,867

Fisheries of New York, 1938—Continued

OPERATING UNITS: BY COUNTIES—Continued

Item	Orange	Putnam	Rensselaer	Rockland	Suffolk	Ulster	Westchester
Apparatus—Continued							
Lines:	Number	Number	Number	Number	Number	Number	Number
Hand					55		
Hooks and baits					59		
Trawl					238		
Hooks					47,000		
Trot with baits or snoods					52		
Baits or snoods					30,000		
Trot with hooks	5			2			
Hooks	1,160			600			
Pound nets					120		
Fyke nets	7	9	3	3	90	84	25
Dip nets					30		
Drag nets					20		
Yards at mouth					40		
Otter trawls, fish					43		
Yards at mouth					893		
Pots:							
Eel	15	60		676	520	33	511
Lobster					7,660		
Harpoons					7		
Spears					50		
Dredges, oyster, common					54		
Yards at mouth					85		
Tongs:							
Oyster					147		
Other					1,042		
Rakes, other than for oysters					201		
Forks					328		

CATCH: BY COUNTIES

Species	Albany		Columbia		Dutchess		Greene	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives	2,600	\$26	6,800	\$68	12,100	\$121	1,700	\$17
Carp	1,000	60	7,300	438	21,600	1,318	85,600	2,136
Catfish and bullheads	2,000	240	3,600	444	8,500	1,563	5,700	1,015
Eels, common			400	24	1,200	72	400	24
Shad	2,800	112	55,400	2,770	140,000	7,057	17,600	880
Striped bass					900	110	200	23
Sturgeon					1,900	760		
Suckers	2,100	42	4,000	120	3,000	97	900	23
Sunfish					700	23		
Tomcod					400	20		
White perch	500	23	900	36	2,100	77	600	23
Total	11,000	503	78,400	3,900	192,400	11,213	62,700	4,154

Species	Kings		Nassau		New York		Orange	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives							2,400	\$24
Bluefish	10,300	\$1,236	34,300	\$4,110	64,800	\$7,281		
Bonito			10,400	312	600	12		
Butterfish			180,300	4,957	1,614,100	58,635		
Carp							9,000	540
Catfish and bullheads							1,000	160
Cod	221,000	6,781	211,000	8,264	7,689,700	352,579		
Croaker					400	12		
Cunner					100	2		
Cusk					100	2		
Eels:								
Common	8,400	532	6,000	360			2,000	120
Conger					11,400	216		
Flounders:								
Gray sole					51,800	3,355		
Lemon sole					613,300	47,930		
Yellowtail and dab	4,300	98			2,412,000	54,773		
Blackback	319,900	15,995	5,700	285	5,069,600	240,797		
Fluke	629,800	53,298	173,900	15,612	1,351,700	111,774		
Unclassified					33,500	1,555		
Frigate mackerel			8,000	160				
Grayfish					300	5		

Fisheries of New York, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Kings		Nassau		New York		Orange	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Groupers					4,500	\$225		
Haddock					11,105,400	414,174		
Hake	9,900	\$217	1,900	\$39	312,000	7,743		
Hallibut					47,800	6,977		
Herring, sea					700	13		
King whiting or "kingfish"			2,000	40				
Mackerel	9,200	186	185,600	4,680	721,200	24,847		
Pollock					218,400	3,993		
Scup	30,700	743	87,400	2,318	684,500	17,879		
Sea bass			80,500	7,634	103,200	6,511		
Sea robin	2,000	40	500	0				
Shad			2,500	150			29,500	\$1,475
Sharks	400	5			700	8		
Skates	17,000	257			11,900	232		
Snapper, red					3,800	190		
Spanish mackerel			100	3				
Squeteagues or "sea trout," gray			160,800	10,558	10,000	755		
Striped bass			7,400	850	800	91	400	60
Sturgeon					1,000	186		
Suckers							1,100	33
Swordfish					16,500	3,041		
Tautog					200	5		
Tilefish					807,600	24,445		
Tomcod							300	18
Tuna					500	10		
White perch							600	24
Whiting	2,678,200	43,403	498,100	8,081	350,100	5,902		
Wolfish					6,200	169		
Crabs:								
Hard	6,200	270	30,100	1,565				
Soft and peelers			22,400	8,442				
Lobsters	84,200	16,998	2,800	654	17,300	3,305		
Clams:								
Hard, public			252,800	45,119				
Soft, public			180,600	17,198				
Surf or skimmer	605,600	37,844	203,200	13,693				
Conchs	7,000	695						
Mussels, sea			94,500	7,091	53,300	4,066		
Oysters, market:								
Public, spring			10,400	2,348				
Public, fall			2,500	545				
Private, spring			1,460,000	336,023				
Private, fall			1,542,300	359,578				
Scallops, sea					2,944,800	850,242		
Squid	55,600	1,001	102,800	2,063	102,300	2,020		
Bloodworms	3,500	3,150	3,900	4,170				
Sandworms	4,400	4,060	8,100	8,805				
Total	4,707,600	185,859	5,501,400	875,712	36,338,100	1,755,127	46,300	2,454

Species	Putnam		Rensselaer		Rockland	
	Pounds	Value	Pounds	Value	Pounds	Value
Alwives	2,400	\$24	3,700	\$37	6,100	\$62
Carp	6,400	384	67,400	2,064	3,900	391
Catfish and bullheads	700	115	1,800	252	500	71
Eels, common	800	52			58,100	3,488
Shad	13,000	685	200	40	157,700	8,676
Smelt	400	24				
Striped bass					16,200	2,241
Suckers	300	9	500	15	500	15
White perch	900	28			10,500	319
Yellow perch			200	10		
Total	24,900	1,321	78,800	2,418	253,500	15,163

Fisheries of New York, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Suffolk		Ulster		Westchester	
	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	22,700	\$217	3,300	\$33	2,600	\$26
Anchovies.....	9,600	288				
Bluefish.....	140,700	16,311				
Bonito.....	100,400	5,227				
Butterfish.....	2,750,800	106,920				
Carp.....			36,100	2,143	17,000	1,018
Catfish and bullheads.....			6,300	769	6,000	716
Cod.....	516,900	25,827				
Cunner.....	2,200	44				
Eels, common.....	93,600	5,616	1,700	104	46,800	2,824
Flounders:						
Yellowtail and dab.....	593,700	11,824				
Blackback.....	753,900	37,570				
Fluke.....	296,700	28,125				
Frigate mackerel.....	3,500	72				
Haddock.....	2,000	30				
Herring, sea.....	13,700	274				
Hickory shad.....	2,300	40				
Kingfish or "king mackerel".....	40,100	2,191				
King whiting or "kingfish".....	90,300	15				
Mackerel.....	890,200	35,644				
Menhaden.....	22,632,600	102,597				
Pollock.....	87,300	1,753				
Scup.....	1,089,300	40,874				
Sea bass.....	101,000	8,018				
Sea robin.....	9,200	182				
Shad.....	96,300	4,900	310,600	18,561	236,700	13,733
Sharks.....	9,900	59				
Skates.....	2,100	23				
Spanish mackerel.....	2,100	3				
Squeteagues or "sea trout," gray.....	886,600	65,767				
Striped bass.....	100,700	12,473	700	98	11,600	1,234
Sturgeon.....	300	38	1,100	315	700	175
Suckers.....			2,500	68	3,000	90
Sunfish.....			100	2	200	5
Swellfish.....	57,200	2,000				
Swordfish.....	35,000	6,550				
Tautog.....	11,400	454				
Tomcod.....					4,000	160
Tuna.....	147,600	6,666				
White perch.....			3,800	143	13,900	500
Whiting.....	429,500	6,869				
Crabs:						
Hard.....	351,000	21,916				
Soft and peelers.....	12,000	5,490				
Lobsters.....	140,600	33,840				
Shrimp.....	125,000	21,250				
Clams:						
Hard, public.....	1,756,200	307,288				
Hard, private.....	234,900	40,938				
Soft, public.....	191,200	16,730				
Soft, private.....	93,000	6,978				
Mussels, sea.....						
Oysters, market:						
Public, spring.....	199,600	46,996				
Public, fall.....	197,800	46,564				
Private, spring.....	3,693,900	548,368				
Private, fall.....	3,100,100	616,807				
Scallops, bay.....	21,100	6,003				
Squid.....	498,100	9,178				
Turtle, snapper.....	35,500	2,480				
Bloodworms.....	13,500	14,300				
Sandworms.....	14,300	12,155				
Total.....	43,209,200	2,292,292	375,200	22,236	342,500	20,481

NEW JERSEY

Fisheries of New Jersey, 1938

OPERATING UNITS: BY GEAR

Item	Purse seines		Haul seines	Gill nets			
	Menhaden	Other		Anchor	Drift	Run-around	Stake
Fishermen:	Number	Number	Number	Number	Number	Number	Number
On vessels.....	85	113			10		2
On boats and shore:							
Regular.....			52	14	98	137	157
Casual.....			211	4	68	18	325
Total.....	85	113	263	18	176	155	484
Vessels, motor.....	4	10			3		1
Net tonnage.....	110	242			32		7
Boats:							
Motor.....				8	63	66	34
Other.....			105		20		184
Accessory boats.....	12	24			1		
Apparatus:							
Number.....	4	10	105	40	380	66	1,371
Length, yards.....	1,160	3,390	9,934				
Square yards.....				20,400	558,407	244,510	354,865

Item	Lines				Pound nets	Weirs	Stop nets	Fyke nets
	Hand	Trawl	Troll	Trot with baits or snoods				
Fishermen:	Number	Number	Number	Number	Number	Number	Number	Number
On vessels.....	15	37	14		264			
On boats and shore:								
Regular.....	178	155	69	24	97		24	30
Casual.....	34	14	42	2	22	20	70	78
Total.....	227	206	125	26	383	20	94	108
Vessels, motor.....	4	15	3		38			
Net tonnage.....	50	141	42		234			
Boats:								
Motor.....	92	76	81	24	20	7	14	20
Other.....	6	4			11	1	37	42
Accessory boats.....	10	7	8					
Apparatus:								
Number.....	260	474	340	24	175	99	61	814
Square yards.....							60,700	
Hooks, baits, or snoods.....	425	274,300	340	21,150				

Item	Dip nets	Cast nets	Drop nets	Otter trawls, fish	Wire baskets	Pots		
						Crab	Eel	Fish
Fishermen:	Number	Number	Number	Number	Number	Number	Number	Number
On vessels.....				118				
On boats and shore:								
Regular.....	94			62		2	20	63
Casual.....	12	3	1	2	1		23	2
Total.....	106	3	1	182	1	2	43	65
Vessels, motor.....				31				
Net tonnage.....				619				
Boats:								
Motor.....	2			32		1	17	41
Other.....	101	3	1		1		13	
Apparatus:								
Number.....	106	3	1	63	3	10	1,244	9,505
Yards at mouth.....				1,452				

Fisheries of New Jersey, 1938—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Pots— Contd.	Spears	Dredges				Tongs	
	Lobster		Clam	Crab	Oyster	Scallop	Oyster	Other
	Number	Number	Number	Number	Number	Number	Number	Number
Fishermen:								
On vessels.....			42	21	480	14		
On boats and shore:								
Regular.....	56	3	14	13	22		168	806
Casual.....	13	9	3	2	9		17	198
Total.....	69	12	59	36	511	14	185	504
Vessels:								
Motor.....			15	9	83	2		
Net tonnage.....			167	96	1,559	58		
Sail.....			3		1			
Net tonnage.....			30		8			
Total vessels.....			18	9	84	2		
Total net tonnage.....			197	96	1,667	58		
Boats:								
Motor.....	34		10	8	15		93	265
Other.....		11					61	216
Apparatus:								
Number.....	6,075	12	65	64	198	4	166	504
Yards at mouth.....			68	98	246	14		

Item	Rakes		Forks	Hoes	By hand		Total, ex- clusive of dupli- cation
	Oyster	Other			Oyster	Other	
	Number	Number	Number	Number	Number	Number	Number
Fishermen:							
On vessels.....							1,097
On boats and shore:							
Regular.....	30	355		146	9	110	997
Casual.....	3	413	1	86	7	178	1,517
Total.....	33	768	1	232	16	288	3,611
Vessels:							
Motor.....							186
Net tonnage.....							2,863
Sail.....							3
Net tonnage.....							30
Total vessels.....							189
Total net tonnage.....							2,893
Boats:							
Motor.....	26	282	1	52	1	57	889
Other.....	5	468		176	13	211	1,268
Accessory boats.....							55
Apparatus, number.....	33	768	1	232			

Fisheries of New Jersey, 1938—Continued

CATCH: BY GEAR

Species	Purse seines				Haul seines	
	Menhaden		Other			
	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....					8,000	\$120
Bluefish.....			80,800	\$5,154		
Bonito.....			6,700	253		
Butterfish.....			87,000	1,128		
Carp.....					144,000	10,439
Catfish and bullheads.....					39,500	1,473
Cod.....			800	25		
Croaker.....			1,745,200	19,772	1,700	65
Eels:						
Common.....					9,900	1,582
Conger.....						
Flounders:						
Blackback.....					1,100	98
Fluke.....			33,500	3,084		
Frigate mackerel.....			400	5		
Hake.....			900	14		
Herring, sea.....			1,400	16		
Mackerel.....			82,500	1,945		
Menhaden.....	41,041,000	\$139,891	929,600	3,527		
Scup.....			1,171,500	15,564		
Sea bass.....			13,300	438		
Sea robin.....			1,300	15		
Shad.....					205,800	19,830
Squeteague or "sea trout," gray.....			729,700	13,842	4,700	228
Striped bass.....			1,000	79	25,100	3,048
Suckers.....					49,900	1,887
White perch.....					12,700	1,186
Whiting.....			14,600	290		
Yellow perch.....					700	56
Crabs:						
Hard.....					4,300	221
Soft and peelers.....					16,900	5,315
Squid.....			5,600	41		
Total.....	41,041,000	139,891	4,825,000	65,213	524,300	45,548

Species	Gill nets							
	Anchor		Drift		Runaround		Stake	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Bluefish.....			12,100	\$724	140,600	\$11,090	1,000	\$240
Bonito.....			800	56				
Butterfish.....			600	24	100	2		
Carp.....							6,800	504
Croaker.....			19,200	391	2,500	25		
Flounders, blackback.....							600	18
Mackerel.....	1,600	\$119	368,400	17,607	10,700	477		
Scup.....					20,000	400		
Shad.....	5,800	1,167	146,900	17,462			1,531,300	127,258
Spot.....			10,000	200			7,000	140
Squeteague or "sea trout," gray.....			13,600	811	499,400	20,121	2,500	60
Striped bass.....			500	75			87,200	9,925
White perch.....							3,600	404
Total.....	7,400	1,286	572,000	37,850	673,300	32,115	1,639,500	188,544

Fisheries of New Jersey, 1938—Continued

CATCH: BY GEAR—Continued

Species	Lines						Trot with bait or snoods	
	Hand		Trawl		Troll			
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Amberjack.....	800	\$16						
Bluefish.....	234,100	19,604			363,200	\$29,282		
Bonito.....	100	6			23,200	1,153		
Cod.....	15,100	612	1,910,400	\$63,982				
Croaker.....	18,400	691						
Eels:								
Common.....	1,800	180						
Conger.....	100	1						
Flounders, fluke.....	2,600	251	17,400	1,392				
Grayfish.....			300	4				
Groupers.....	12,500	368						
Kingfish or "king mackerel"					100,000	3,000		
Mackerel.....					41,800	2,939		
Scup.....	18,500	285						
Sea bass.....	224,300	15,674						
Skates.....			2,400	20				
Snapper, red.....	23,200	1,808						
Squeteagues or "sea trout," gray	23,600	1,468			11,400	841		
Squirrel hake.....			9,000	98				
Striped bass.....	100	15			600	65		
Tautog.....	3,000	184						
Tuna.....					2,800	100		
Crabs, hard.....							269,800	\$5,875
Turtles, snapper.....							1,000	50
Total.....	583,200	41,163	1,939,500	66,496	543,000	37,080	270,800	5,925

Species	Pound nets		Weirs		Stop nets		Fyke nets	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	100	\$1						
Bluefish.....	199,500	14,636						
Bonito.....	663,000	23,885						
Butterfish.....	3,449,100	116,190						
Carp.....					228,700	\$17,906		
Catfish and bullheads.....					34,200	1,963	46,900	\$2,159
Cod.....	206,500	5,873						
Croaker.....	3,282,000	36,034						
Drum:								
Black.....	1,500	21						
Red or redfish.....	4,600	47						
Eels:								
Common.....	16,500	2,159					33,300	3,802
Conger.....	6,600	66						
Flounders:								
Blackback.....	19,900	553					71,800	2,644
Fluke.....	317,000	26,380						
Frigate mackerel.....	60,600	606						
Goosefish.....	2,500	25						
Grayfish.....	101,200	1,008						
Hake.....	4,600	53						
Herring, sea.....	1,153,900	6,478						
Hickory shad.....	27,000	198						
King whiting or "kingfish".....	92,200	3,764						
Mackerel.....	1,644,200	58,782						
Menhaden.....	6,129,000	20,822						
Mullet.....	200	2						
Pollock.....	100,600	2,142						
Sand perch.....	1,000	10						
Scup.....	2,403,100	23,807						
Sea bass.....	100,500	4,329						
Sea robin.....	62,100	621						
Shad.....	602,200	56,768						
Sharks.....	129,900	1,904						
Silversides.....	1,500	15						
Skates.....	97,400	517						
Spanish mackerel.....	9,400	795						
Spot.....	164,000	3,024						
Squeteagues or "sea trout," gray	4,724,900	112,853						
Squirrel hake.....	151,200	1,512						
Striped bass.....	4,900	606			2,500	375	16,400	1,898
Sturgeon.....	3,600	470						
Suckers.....					300	18		

Fisheries of New Jersey, 1938—Continued

CATCH: BY GEAR—Continued

Species	Pound nets		Weirs		Stop nets		Fyke nets	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Swellfish	1,500	\$15						
Tautog	21,300	397						
Tuna	104,700	3,176						
White perch					300	\$45	2,900	\$320
Whiting	5,909,800	45,097					2,500	250
Yellow perch								
Crabs:								
Hard	52,300	853						
King	1,276,000	2,871	1,176,000	\$2,806			8,000	30
Soft and peelers	300	100						
Lobsters	100	20						
Squid	1,105,000	16,187						
Turtles:								
Green	3,900	39						
Loggerhead	5,500	55						
Snapper							7,700	847
Total	34,418,400	595,666	1,176,000	2,806	266,000	20,307	189,500	11,650

Species	Dip nets		Cast nets		Drop nets		Otter trawls	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Bluefish							7,000	\$648
Bonito							100	4
Butterfish							616,700	18,168
Carp			4,700	\$422				
Cod							119,500	3,863
Croaker							690,000	12,380
Drum, red or redfish							800	5
Eels, conger							17,800	216
Flounders:								
Gray sole							1,900	37
Lemon sole							26,600	1,548
Yellowtail and dab							301,800	5,139
Blackback							88,000	2,962
Fluke							1,712,600	136,525
Grayfish							400	4
Groupers							100	2
Haddock							1,500	14
Hake							35,200	748
Herring, sea							8,500	54
King whiting or "kingfish"							10,300	383
Launce							100	3
Mackerel							17,200	1,264
Menhaden							1,400	6
Pollock							600	10
Sand perch							100	2
Scup							1,336,800	20,796
Sea bass							463,600	23,953
Sea robin							9,800	118
Sharks							300	8
Skates							8,000	70
Spot							2,600	63
Squeteagues or "sea trout," gray							279,000	6,881
Squirrel hake							600	8
Striped bass							8,700	1,439
Sturgeon							1,500	182
Tautog							1,200	21
Tilefish							100	4
Whiting							304,100	4,748
Crabs:								
Hard	184,500	\$15,520			1,600	\$162	400	25
Soft and peelers	296,400	97,227						
Lobsters							10,800	1,183
Scallops, sea							100	21
Squid							179,400	8,216
Total	430,900	112,747	4,700	422	1,600	162	6,262,000	246,690

Fisheries of New Jersey, 1938—Continued

CATCH: BY GEAR—Continued

Species	Wire baskets		Pots					
			Crab		Eel		Fish	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Eels:					64,600	\$6,152		
Common.....							800	\$8
Conger.....							400	7
Hake.....							400	7
Scup.....							1,165,700	59,372
Sea bass.....							900	9
Squirrel hake.....							5,100	95
Tautog.....								
Crabs:								
Hard.....	300	\$25	12,000	\$750				
Soft and peelers.....			6,000	1,125				
Lobsters.....							68,600	13,304
Total.....	300	25	18,000	1,875	64,600	6,152	1,231,900	72,800

Species	Pots, lobster		Spears		Dredges		Tongs	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Cod.....	100	\$3						
Eels, common.....			3,200	\$366				
Sea bass.....	7,000	421						
Crabs, hard.....					574,300	\$8,381	800	\$40
Lobsters.....	247,400	33,071						
Clams:								
Hard, public.....					115,600	14,040	625,400	79,513
Hard, private.....					41,900	5,374	141,500	18,366
Surf or skimmer.....					804,900	20,301		
Oysters, market:								
Public, spring.....					8,000	1,000	2,000	484
Public, fall.....					14,200	1,421	90,100	8,770
Private, spring.....					2,651,500	323,280	73,700	15,474
Private, fall.....					2,818,000	347,368	73,600	15,272
Scallops, sea.....					113,900	8,769		
Total.....	254,500	33,495	3,200	366	7,142,300	729,934	1,007,100	137,869

Species	Rakes		Forks		Hoes		By hand	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Crabs, hard.....	63,000	\$574						
Clams:								
Hard, public.....	1,579,700	205,813					390,000	\$49,144
Hard, private.....	14,500	1,959					16,300	1,837
Soft, public.....			4,000	\$200	870,700	\$54,223		
Oysters, market:								
Public, spring.....	10,200	1,130					700	165
Public, fall.....	9,300	1,108					700	165
Private, spring.....	13,800	2,760					6,900	1,418
Private, fall.....	13,300	2,844					11,800	2,346
Total.....	1,703,800	216,188	4,000	200	870,700	54,223	426,400	55,073

OPERATING UNITS: BY COUNTIES

Item	Atlant- tic	Bergen	Bur- lington	Cam den	Cape May	Cum- berland	Glou- cester
	Number	Number	Number	Number	Number	Number	Number
Fisherman:							
On vessels.....	53	2	8		313	457	
On boats and shore:							
Regular.....	173	2	25		141	9	2
Casual.....	172	152	59	20	267	59	29
Total.....	398	156	92	20	681	525	31
Vessels, motor.....	16	1	2		53	76	
Net tonnage.....	209	15	22		814	1,487	

Fisheries of New Jersey, 1938—Continued

OPERATING UNITS: BY COUNTIES—Continued

Item	Atlantic	Bergen	Burlington	Camden	Cape May	Cumberland	Gloucester
Boats:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Motor.....	133	1	23		134	77	5
Other.....	197	44	32	10	198	83	13
Accessory boats.....	3				43		
Apparatus:							
Furse seines:							
Menhaden.....					1		
Length, yards.....					310		
Other.....	1				9		
Length, yards.....	360				3,030		
Haul seines.....	18		12	10	5	14	4
Length, yards.....	1,634		1,190	880	343	1,400	235
Gill nets:							
Anchor.....					25		
Square yards.....					10,700		
Drift.....	75	1	10		612	14	2
Square yards.....	30,620	1,360	12,660		271,867	27,800	7,200
Runaround.....					5		
Square yards.....					20,800		
Stake.....	104	38	17		12	151	
Square yards.....	27,650	60,280	3,520		2,400	15,100	
Lines:							
Hand.....	7				125	2	
Hooks.....	13				264	2	
Trawl.....	110				220		
Hooks.....	88,700				117,800		
Troll.....	6				199		
Hooks.....	6				199		
Trot with baits or snoods.....						23	
Baits or snoods.....						20,950	
Pound nets.....	2				63		
Weirs.....					74	25	
Stop nets.....			7	2		9	9
Yards at mouth.....			9,575	3,400		9,250	17,400
Fyke nets.....	57		77		19	67	174
Dip nets.....	15				1		
Cast nets.....							2
Drop nets.....					1		
Otter trawls, fish.....	14				44		
Yards at mouth.....	306				1,047		
Pots:							
Eel.....	37		25		105	55	
Fish.....	300				3,235		
Spears:					2		
Dredges:							
Clam.....	1				13	2	
Yards at mouth.....	1				13	8	
Crab.....		2					
Yards at mouth.....		4					
Oyster.....	16		12			152	
Yards at mouth.....	18		14			189	
Scallop.....	4						
Yards at mouth.....	14						
Tongs:							
Oyster.....	26		9		12	103	
Other.....	161		24		136		
Rakes:							
Oyster.....	12				2	1	
Other.....	167				134	4	
Hoes.....	10						

Fisheries of New Jersey, 1938—Continued

OPERATING UNITS: BY COUNTIES—Continued

Item	Hudson	Hunter- don	Mercer	Middle- sex	Mon- mouth	Ocean	Salem
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	2				110	150	
On boats and shore:							
Regular.....				9	393	233	10
Casual.....		27	21	5	325	380	61
Total	2	27	21	16	828	763	71
Vessels:							
Motor	1				14	23	
Net tonnage.....	9				165	142	
Sail				1	2		
Net tonnage.....				8	22		
Total vessels	1			1	16	23	
Total net tonnage	9			8	187	142	
Boats:							
Motor.....				8	204	284	20
Other.....		6	4	6	427	224	24
Accessory boats					9		
Apparatus:							
Purse seines, menhaden					3		
Length, yards.....					840		
Haul seines.....		6	4	1	7	10	14
Length, yards.....		1,111	600	30	259	672	1,530
Gill nets:							
Anchor.....				3	12		
Square yards.....				2,500	7,200		
Drift.....					120	29	17
Square yards.....					70,600	40,900	95,400
Runaround.....				6	34	21	
Square yards.....				16,470	128,640	80,600	
Stake.....				14	80	927	30
Square yards.....				2,800	91,993	148,822	2,400
Lines:							
Hand.....					75	41	
Hooks.....					97	49	
Trawl.....					6	138	
Hooks.....					3,000	64,800	
Troll.....					68	67	
Hooks.....					68	67	
Trot with baits or snoods							1
Baits or snoods.....							200
Pound nets.....					43	67	
Stop nets.....							34
Square yards.....							21,075
Fyke nets.....			30		50	196	144
Dip nets.....					87	3	
Cast nets.....							1
Other trawls, fish.....	1				2	2	
Yards at mouth.....	27				24	48	
Wire baskets.....						3	
Pots:							
Crab.....							10
Eel.....				170	637	215	
Fish.....						5,970	
Lobster.....					6,075		
Spears.....					7	8	
Dredges:							
Clam.....				4	42	3	
Yards at mouth.....				5	42	4	
Crab.....					54	8	
Yards at mouth.....					80	14	
Oyster.....				2	2	14	
Yards at mouth.....				3	4	17	
Tongs:							
Oyster.....						16	
Other.....					1	182	
Rakes:							
Oyster.....					15	3	
Other.....				5	303	165	
Forks.....						1	
Hoes.....					203	19	

Fisheries of New Jersey, 1938—Continued

CATCH: BY COUNTIES

Species	Atlantic		Bergen		Burlington		Camden	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alowives	100	\$1						
Bluefish	6,100	327						
Bonito	500	40						
Butterfish	281,100	8,417						
Carp					39,200	\$2,504	20,600	\$1,648
Catfish and bullheads	15,500	465			4,600	205	10,000	200
Cod	286,100	9,278						
Croaker	124,900	2,076						
Drum:								
Black	100	1						
Red, or redfish	100	1						
Eels:								
Common	11,600	1,581			500	41		
Conger	3,600	36						
Flounders:								
Yellowtail and dabs	40,700	712						
Blackback	4,000	267						
Fluke	419,600	32,794						
Grayfish	200	3						
Hake	12,200	262						
Herring, sea	2,000	20						
Hickory shad	100	1						
King whiting or "kingfish"	5,700	185						
Mackerel	21,300	772						
Menhaden	409,100	1,533						
Mullet	200	2						
Pollock	400	6						
Scup	185,400	4,861						
Sea bass	110,200	5,242						
Sea robin	2,500	35						
Shad	10,300	1,322	783,900	\$60,185	1,800	332	30,600	4,080
Skates	5,600	55						
Spot	1,700	18						
Squeteagues or "sea trout," gray	124,100	2,314						
Squirrel hake	9,100	99						
Striped bass	47,300	4,913			24,000	2,880		
Sturgeon	300	31						
Suckers	1,100	110			1,500	117	400	16
Tautog	1,600	32						
White perch	9,800	1,022			1,000	95		
Whiting	18,700	286						
Crabs:								
Hard	19,200	670	6,700	168				
Soft and peelers	8,000	1,082						
Lobsters	15,100	2,888						
Clams:								
Hard, public	251,000	30,773			6,700	891		
Hard, private	61,800	7,985			15,300	2,854		
Soft, public	222,700	18,643						
Surf or skimmer	6,500	250						
Oysters, market:								
Public, fall	1,800	375						
Private, spring	64,000	14,329			14,800	1,850		
Private, fall	66,500	15,087			55,400	8,832		
Scallops, sea	113,900	8,769						
Squid	35,000	563						
Turtles:								
Green	100	1						
Snapper	1,400	112						
Total	3,039,900	180,587	790,000	60,353	164,800	20,601	61,600	5,944

Fisheries of New Jersey, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Cape May		Cumberland		Gloucester		Hudson	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....								
Amberjack.....	800	\$16						
Bluefish.....	458,100	24,402						
Bonito.....	39,700	1,574						
Butterfish.....	1,141,800	44,075						
Carp.....			45,500	2,051	65,800	\$6,580		
Catfish and bullheads.....	400	12	5,600	305	37,200	1,590		
Cod.....	1,221,600	44,509						
Croaker.....	3,814,400	46,203	1,000	30				
Drum:								
Black.....	600	6						
Red or redfish.....	5,100	51						
Eels:								
Common.....	22,300	3,447	5,400	568	100	15		
Conger.....	17,200	216						
Flounders:								
Gray sole.....	1,900	37						
Lemon sole.....	26,600	1,548						
Yellowtail and dabs.....	246,600	3,831						
Blackback.....	17,900	868					72,000	\$2,160
Fluke.....	1,335,000	106,997						
Frigate mackerel.....	1,400	18						
Grayfish.....	700	7						
Groupers.....	12,600	370						
Haddock.....	1,500	14						
Hake.....	24,900	611						
Herring, sea.....	29,900	300						
Hickory shad.....	500	5						
Kingfish or "king mackerel".....	100,000	3,000						
King whiting or "kingfish".....	46,600	1,995						
Mackerel.....	414,700	19,700						
Menhaden.....	5,629,300	21,747						
Pollock.....	200	4						
Sand perch.....	100	2						
Scup.....	2,684,500	35,185						
Sea bass.....	1,093,300	67,788						
Sea robin.....	16,500	177						
Shad.....	13,500	934	165,000	18,613	7,700	4,220		
Sharks.....	15,000	134						
Skates.....	25,000	156						
Snapper, red.....	28,200	1,808						
Spanish mackerel.....	1,900	121						
Spot.....	40,700	826	17,000	340				
Squeteagues or "sea trout,"								
gray.....	2,687,300	59,577	11,300	382				
Squirrel hake.....	3,600	36						
Striped bass.....	10,700	1,660	4,200	630				
Sturgeon.....	1,700	201						
Tautog.....	7,800	137						
Tilefish.....	100	4						
White perch.....	2,100	212	3,000	309				
Whiting.....	251,000	4,411					800	8
Crabs:								
Hard.....	6,700	442	267,800	5,750				
King.....	2,164,000	4,994	288,000	683				
Soft and peelers.....	900	405						
Lobsters.....	7,000	772						
Clams:								
Hard, public.....	282,300	42,154	12,100	1,828				
Hard, private.....	2,700	324	13,100	1,378				
Surf or skimmer.....	765,900	17,551						
Oysters, market:								
Public, spring.....	1,400	330						
Public, fall.....	1,800	360	86,100	7,988				
Private, spring.....	32,200	6,336	2,602,600	312,937				
Private, fall.....	35,600	6,954	2,730,800	330,642				
Scallops, sea.....	100	21						
Squid.....	445,900	7,574						
Turtles:								
Loggerhead.....	100	1						
Snapper.....			7,200	780	100	5		
Total.....	25,239,400	597,050	6,273,700	685,334	110,900	9,410	72,800	2,168

Fisheries of New Jersey, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Hunterdon		Mercer		Middlesex	
	Pounds	Value	Pounds	Value	Pounds 45,200	Value \$2,696
Bluefish						
Carp	2,700	\$216	13,000	\$520		
Catfish and bullheads			2,000	100		
Eels, common			3,000	240	4,600	268
Mackerel					200	8
Shad	45,600	4,398	11,000	1,262	4,900	887
Squeteagues or "sea trout," gray					73,500	3,138
Suckers	7,100	428	39,000	1,170		
Crabs, hard					2,000	60
Clams, hard, public					17,200	1,960
Oysters, market, public, fall					14,200	1,421
Total	55,400	5,040	68,000	3,292	161,800	10,439

Species	Monmouth		Ocean		Salem	
	Pounds	Value	Pounds	Value	Pounds	Value
Bluefish	320,000	\$28,117	210,900	\$15,836		
Bonito	107,100	3,706	546,600	20,037		
Butterfish	338,300	14,219	2,342,800	68,801		
Carp					196,900	\$15,762
Catfish and bullheads					45,300	2,718
Cod	47,500	1,552	697,200	19,019		
Croaker	150,600	2,630	1,668,100	18,419		
Drum, black	200	2	600	12		
Eels:						
Common	62,100	6,115	8,300	706	11,400	960
Conger	1,600	16	4,100	41		
Flounders:						
Yellowtail and dabs	13,000	551	1,500	45		
Blackback	47,100	1,260	40,400	1,730		
Fluke	49,000	2,632	279,500	25,209		
Frigate mackerel	14,400	144	45,200	452		
Goosefish			2,500	25		
Grayfish	21,400	210	79,600	796		
Hake	300	3	3,700	44		
Herring, sea	620,600	3,684	508,300	2,644		
Hickory shad	12,000	120	14,400	72		
King whiting or "kingfish"	16,400	740	38,800	1,227		
Launce	100	3				
Mackerel	292,300	15,821	1,407,900	46,832		
Menhaden	41,697,800	140,051	364,800	915		
Pollock	70,800	1,593	29,800	549		
Sand perch	1,000	10				
Scup	763,000	7,609	1,317,400	13,174		
Sea bass	26,800	1,139	734,600	30,018		
Sea robin	4,400	44	49,800	498		
Shad	993,900	85,166	312,300	30,635	111,500	13,444
Sharks	9,500	92	105,700	1,686		
Silversides	1,500	15				
Skates	28,200	151	49,000	245		
Spanish mackerel	2,800	280	4,700	394		
Spot	64,300	1,522	59,900	721		
Squeteagues or "sea trout," gray	1,168,200	37,578	2,224,300	53,516		
Squirrel hake	23,700	239	125,800	1,253		
Striped bass	2,800	872	57,300	6,865	700	105
Sturgeon	1,300	260	1,800	1,800		
Suckers					1,100	66
Swellfish	1,500	15				
Tautog	6,900	262	14,300	266		
Tuna	76,000	2,272	31,500	1,004		
White perch			1,000	135	2,600	182
Whiting	2,888,000	21,469	3,070,000	23,971		
Yellow perch			2,500	250	700	56
Crabs:						
Hard	690,800	23,804	105,300	1,107	14,800	926
King	8,000	30				
Soft and peelers	293,300	97,565	11,400	3,590	6,000	1,125
Lobsters	247,600	33,118	57,200	10,850		

Fisheries of New Jersey, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Monmouth		Ocean		Salem	
	Pounds	Value	Pounds	Value	Pounds	Value
Clams:						
Hard, public.....	1,270,500	\$164,930	870,900	\$105,974		
Hard, private.....			121,300	14,995		
Soft, public.....	550,000	29,205	102,000	6,575		
Surf or skimmer.....			32,500	2,500		
Oysters, market:						
Public, spring.....	18,200	2,130	1,300	269		
Public, fall.....	9,000	1,051	1,400	269		
Private, spring.....			32,300	7,478		
Private, fall.....			28,400	6,315		
Squid.....	145,100	964	662,000	10,342		
Turtles:						
Green.....	3,800	38				
Loggerhead.....	4,300	43	1,100	11		
Total.....	53,186,500	734,034	18,478,500	558,677	391,000	\$35,333

PENNSYLVANIA

Fisheries of Pennsylvania, 1938¹

OPERATING UNITS: BY GEAR

Item	Haul seines
	Number
Fishermen on boats and shore, casual.....	31
Boats, other than motor.....	11
Apparatus:	
Number.....	10
Length, yards.....	1,705

CATCH: BY GEAR

Species	Haul seines	
	Pounds	Value
Carp.....	2,800	\$189
Shad.....	13,900	2,978
Suckers.....	23,100	1,127
Total.....	39,800	4,294

¹ The commercial fisheries of Pennsylvania are confined to Bucks County.

DELAWARE

Fisheries of Delaware, 1938

OPERATING UNITS: BY GEAR

Item	Purse seines, mon-haden	Haul seines	Gill nets			Lines	
			Drift	Run-around	Stake	Hand	Trawl
	Number	Number	Number	Number	Number	Number	Number
Fishermen:							
On vessels.....	186						
On boats and shore:							
Regular.....		4		4	1		
Casual.....		120	38	12	18	11	6
Total.....	186	124	38	16	19	11	6
Vessels, steam.....	6						
Net tonnage.....	839						
Boats:							
Motor.....			10	4	1	3	3
Other.....		36	10	5	9	4	
Accessory boats.....		6					
Apparatus:							
Number.....	6	36	25	8	18	11	3
Length, yards.....	3,666	8,350					
Square yards.....			44,540	3,700	9,337		
Hooks, baits, or snoods.....						22	8,400

Fisheries of Delaware, 1938—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Pound nets	Stop nets	Fyke nets	Dip nets	Pots	
					Eel	Lobster
Fishermen:						
On boats and shore:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Regular.....				25	1	
Casual.....	4	3	25	39	9	4
Total.....	4	3	25	64	10	4
Boats:						
Motor.....			3	6	1	2
Other.....	3	2	13	65	7	
Apparatus:						
Number.....	13	7	200	64	271	98
Square yards.....		1,230				

Item	Dredges			Tongs, other than for oysters	By hand, other than for oysters	Total, exclusive of duplication
	Clam	Crab	Oyster			
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	14	9	35			228
On boats and shore:						
Regular.....						31
Casual.....		2		2	19	279
Total.....	14	11	35	2	19	538
Vessels:						
Steam.....						6
Net tonnage.....						839
Motor.....	4	3	5			7
Net tonnage.....	84	49	103			136
Total vessels.....	4	3	5			13
Total Net tonnage.....	84	49	103			976
Boats:						
Motor.....		1				25
Other.....				2		121
Accessory boats.....						6
Apparatus:						
Number.....	8	8	10	2		
Yards at mouth.....	10	9	11			

CATCH: BY GEAR

Species	Purse seines		Haul seines		Gill nets			
					Drift		Runaround	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....			44,300	\$887	1,700	\$38		
Bluefish.....			700	49	2,300	161		
Carp.....			16,200	1,296				
Catfish and bullheads.....			13,300	403				
Croaker.....			162,400	1,727	63,200	798		
Gizzard shad.....			100	3				
Menhaden.....	16,207,000	\$72,990						
Mullet.....			600	24	10,100	404	74,000	\$2,960
Shad.....			1,800	280	8,800	1,611		
Spot.....					1,900	67		
Squeteagues or "sea trout," gray.....			172,700	5,375	18,100	718		
Striped bass.....			11,100	1,110	300	30	1,000	100
White perch.....			9,100	950	100	10	800	30
Yellow perch.....			400	16				
Total.....	16,207,000	72,990	432,700	12,120	96,500	3,727	75,300	3,090

Fisheries of Delaware, 1938—Continued

CATCH: BY GEAR—Continued

Species	Gill nets—Con.		Lines				Pound nets	
	Stake		Hand		Trawl			
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....							1,800	\$26
Carp.....	14,400	\$1,152					200	16
Catfish and bullheads.....							1,600	48
Ood.....					57,300	\$1,732		
Croaker.....			11,300	\$170				
Eels, common.....							600	97
Flounders, fluke.....	400	40						
Gizzard shad.....							800	9
Shad.....	3,800	594						
Spot.....			200	6				
Squeteagues or "sea trout," gray.....			5,700	225				
Striped bass.....	8,200	820						
Tautog.....			1,400	42				
White perch.....	300	30					2,100	210
Yellow perch.....							2,600	117
Total.....	27,100	2,636	18,600	443	57,300	1,732	8,600	523

Species	Stop nets		Fyke nets		Dip nets	
	Pounds	Value	Pounds	Value	Pounds	Value
Carp.....	5,000	\$396				
Catfish and bullheads.....			10,200	\$306		
Croaker.....			1,200	18		
Eels, common.....			13,100	1,649		
Flounders, fluke.....			2,700	168		
Squeteagues or "sea trout," gray.....			1,100	88		
Striped bass.....			4,300	430		
White perch.....			5,600	550		
Yellow perch.....			4,400	220		
Crabs:						
Hard.....			400	12	181,000	\$2,620
Soft and peelers.....					86,000	17,000
Turtles, snapper.....			3,600	284		
Total.....	5,000	396	46,600	3,725	216,000	19,620

Species	Pots				Dredges		Tongs		By hand	
	Eel		Lobster							
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Eels, common.....	13,500	\$2,153								
Crabs:										
Hard.....					52,400	\$1,953				
King.....									81,200	\$168
Lobsters.....			3,100	\$927						
Clams:										
Hard, public.....					4,400	559				
Hard, private.....					20,000	2,775				
Mussels, sea.....							1,900	\$323		
Oysters, market, private, fall.....					139,700	14,001				
Total.....	13,500	2,153	3,100	927	216,500	19,288	1,900	323	81,200	168

OPERATING UNITS: BY COUNTIES

Item	Kent	New Castle	Sussex
	Number	Number	Number
Fishermen:			
On vessels.....	42		186
On boats and shore:			
Regular.....		2	29
Casual.....	82	35	162
Total.....	124	37	377
Vessels:			
Steam.....			6
Net tonnage.....			839

Fisheries of Delaware, 1938—Continued

OPERATING UNITS: BY COUNTIES—Continued

Item	Kent		New Castle		Sussex	
	Number		Number		Number	
Vessels—Continued.						
Motor.....	7					
Net tonnage.....	188					
Total vessels.....	7					6
Total net tonnage.....	188					839
Boats:						
Motor.....	8		3			19
Other.....	19		15			87
Accessory boats.....						
Apparatus:						
Furse seines, menhaden.....						6
Length, yards.....						8,686
Haul seines, common.....	11		9			16
Length, yards.....	2,570		1,395			4,385
Gill nets:						
Drift.....	2		6			17
Square yards.....	1,220		25,100			18,220
Runaround.....						8
Square yards.....						3,760
Stake.....	6		3			9
Square yards.....	7,340		1,000			997
Lines:						
Hand.....						11
Hooks.....						22
Trawl.....						3
Hooks.....						8,400
Pound nets.....						9
Stop nets.....	5		2			
Square yards.....	780		450			
Fyke nets.....	4		84			118
Dip nets.....						64
Pots:						
Eel.....	70		21			180
Lobster.....						98
Dredges:						
Clam.....	8					
Yards at mouth.....	10					
Crab.....	8					
Yards at mouth.....	9					
Oyster.....	10					
Yards at mouth.....	11					
Tongs, other than for oysters.....	2					

CATCH: BY COUNTIES

Species	Kent		New Castle		Sussex	
	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....			1,700	\$38	45,600	\$913
Bluefish.....					3,000	210
Carp.....	8,800	\$676	27,800	2,184		
Catfish and bullheads.....	2,300	69	22,400	672		
Cod.....					400	16
Croaker.....	65,800	762			67,300	1,732
Eels, common.....	3,300	521	5,300	468	162,300	1,951
Flounders, fluke.....					18,600	2,920
Gizzard shad.....			400	12	3,100	208
Menhaden.....					16,207,000	72,990
Mullet.....					84,700	8,388
Shad.....	5,100	789	7,100	1,205	2,200	891
Spot.....					2,100	63
Squeteagues or "sea trout," gray.....	71,800	2,887			126,300	4,019
Striped bass.....	3,900	390			21,000	2,100
Tautog.....					1,400	42
White perch.....	3,800	380			13,600	1,400
Yellow perch.....			1,200	48	6,100	805
Crabs:						
Hard.....	52,400	1,953	400	12	181,000	2,620
King.....	81,200	163				
Soft and peelers.....					85,000	17,000
Lobsters.....						
Clams:						
Hard, public.....	4,400	559				
Hard, private.....	20,000	2,775				
Mussels, sea.....	1,900	323				
Oysters, market, private, fall.....	139,700	14,001				
Turtles, snapper.....			8,600	284		
Total.....	463,600	25,748	69,400	4,913	16,973,800	113,195

RECEIPTS OF FISHERY PRODUCTS AT NEW YORK CITY

Receipts of fresh and frozen fishery products (excluding imports arriving by steamship and entered at New York City) at the salt-water market in New York City during 1939 totaled 228,293,329 pounds, with the largest receipts amounting to 23,517,566 pounds in May, and the smallest amounting to 15,650,541 pounds in February. The State of New York (including direct landings at the market) was the largest contributor to these receipts, furnishing 90,721,867 pounds. Next in order were Massachusetts, New Jersey, Florida, and Connecticut. Imports of fishery commodities entered at New York City during 1939 aggregated 7,710,619 pounds. Important among the countries of origin of these commodities were Japan, Union of South Africa, Portugal, and Morocco. Tabular statements which include detailed data collected and compiled by the Division's Fishery Market News Service on the receipts of fishery commodities at New York City during 1939 are included in the following tables. There also is included a statement of the landings of fishery commodities by fishing craft.

Receipts of fresh and frozen fishery products at the Salt-Water Market in New York City, 1939

BY SPECIES AND MONTHS

Species	January	February	March	April	May	June
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
SALT-WATER FISH						
Albacore.....		200				
Alewives.....	31,205	7,279	23,711	62,632	3,985	2,275
Alewives, frozen.....	128	434	2,203			
Amberjack.....	4,380	1,900	1,000			
Anchovies, frozen.....	150					
Bluefish.....	495,054	122,367	157,195	350,821	98,157	162,363
Bluefish, frozen.....	3,861	14,850				
Blue runner.....	400	200	560			
Bonito.....					615	21,497
Bonito, frozen.....			300			
Butterfish.....	593,813	86,555	884,905	1,030,159	829,694	1,371,608
Butterfish, frozen.....	33,018	23,194	7,731			
Cod:						
Large.....	83,610	269,896	571,295	210,905	36,525	52,845
Market.....	581,491	598,967	622,410	555,930	509,037	543,036
Steak.....	872,366	1,184,156	1,176,567	1,116,866	1,157,729	1,056,000
Crevalle (jacks).....		2,200	660	90		
Croaker.....	85,600	44,900	217,510	211,020	322,253	438,510
Croaker, frozen.....	25,506		100			
Cunner (bergall).....	525	85	1,137	239	805	1,292
Cusk.....	2,665	165	475	285	335	185
Dabs, sea.....	2,175			23,750	8,525	2,788
Dogfish.....	14,865	739	540	2,467	3,926	3,461
Drum:						
Black.....				100		
Red (channel bass).....	5,484		139		700	
Eels:						
Common.....	32,097	21,343	50,941	51,864	57,327	97,926
Common, frozen.....	150	560	125			
Conger (sea).....	18,168	7,395	20,866	3,705	2,267	
Eel pout (conger eel).....	3,032	1,379	3,250	1,010	67	425
Flounders.....	626,046	428,700	966,208	1,562,171	3,148,254	2,104,710
Flounders, frozen.....	700	630				
Fluke.....	177,415	315,257	360,251	141,011	336,950	658,833
Garfish.....			166	231	25	130
Goatfish (salmonete).....	25	305	268			
Goosefish (bellyfish).....	1,989	2,986	4,105	4,001	1,903	970
Groupers.....	1,842	460	1,398			
Haddock.....	975,482	661,842	1,118,636	1,524,422	1,991,790	1,634,520
Hake.....	163,542	75,658	63,879	108,392	124,512	234,043
Halibut.....	13,034	50,065	73,841	494,488	791,717	616,105
Halibut, frozen.....	276,376	348,811	327,416	68,100	23,000	10,060
Herring, sea (sardine).....	45,425	26,970	141,557	86,035	85,170	101,050
Herring, sea (sardine) frozen.....	6,650		4,980			
Hickory shad.....	10,357	4,620	13,468	8,725	200	
Hickory shad (warsaw).....	9,689	6,279	6,866	6,097	5,617	1,350

NOTE.—Weights shown are for fishery products as received.

Receipts of fresh and frozen fishery products at the Salt-Water Market in New York City, 1939—Continued

BY SPECIES AND MONTHS—Continued

Species	January	February	March	April	May	June
SALT-WATER FISH—continued						
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
John Dory.....			1,205	10		
Kingfish (king mackerel).....	230,343	205,283	263,182	7,766	10	
King whiting (kingfish).....	46,664	14,655	11,183	20,534	38,608	12,046
Launce (sand eel).....	900	1,525	60	440	3,560	5,400
Mackerel.....	252,752	26,407	30,400	491,314	2,106,544	1,472,620
Mackerel, frozen.....	231,186	327,742	349,481	116,723		
Menhaden (bunker).....			60	150		100
Mojarra (muttonfish).....	1,184	6,616	2,854	1,665	410	
Mullet.....	40,208	13,571	11,750	9,620	1,900	1,875
Mullet, frozen.....		3,500				
Permit.....	2,040	255	2,296			
Pollock.....	289,030	97,939	132,323	127,743	117,556	92,202
Pollock, frozen.....		2,981				
Pompano.....	13,359	606	5,518	6,788	1,439	1,208
Pompano, frozen.....		3,109	1,514			
Rosefish.....	12,290	2,470	5,970	450		
Sablefish, frozen.....	8,000		25,000	15,000	22,000	8,000
Salmon:						
Atlantic.....	80				400	16,814
Atlantic, frozen.....	1,000			1,000	105	
Chinook (king).....		1,560	3,425	41,292	233,254	277,593
Chinook (king), frozen.....	3,800	28,000	11,000	10,900		13,200
Chum (fall), frozen.....	7,000	13,277	13,050	10,000		
Silver.....					3,375	14,000
Silver, frozen.....	63,000	167,675	202,400	116,400	19,300	35,000
Scup (porgy).....	484,832	554,475	949,279	1,327,779	987,538	1,046,782
Scup (porgy) frozen.....	31,852	28,216	10,020	100		
Sea bass.....	183,892	160,200	362,046	127,625	272,710	400,030
Sea robin.....	4,337	14,120	10,860	9,565	13,545	6,434
Sea trout (weakfish):						
Gray.....	27,406	5,156	11,442	88,580	384,845	273,367
Gray, frozen.....	34,085	32,077	22,188			
Spotted.....	55,775	29,782	41,589	27,276	13,424	33
Spotted, frozen.....			5,500			
Shad.....	16,895	87,548	264,700	1,968,128	1,364,300	73,520
Shad, frozen.....	74,614	6,800				
Sharks.....	3,355			920	2,309	6,345
Sheepshead.....	2,243	1,610	2,811	25	340	200
Silversides (spearing).....	23,615	180	3,280	15,920	5,190	1,570
Skate wings.....	17,084	12,055	26,382	19,162	6,879	5,658
Skate wings, frozen.....		600	1,300			
Smelt.....	157,805	71,318	144,149	187,482	3,405	790
Smelt, frozen.....	834,866	671,256	223,160	14,400	8,200	
Snapper:						
Mangrove.....					104	
Red.....	11,373	8,135	18,625	19,561	54,183	2,975
Sole, gray.....	287,143	161,539	302,064	310,800	293,257	232,987
Spanish mackerel.....	452,309	133,513	56,376	42,189	1,126	1,015
Spanish mackerel, frozen.....		691	448	2,050	1,080	
Spot.....	400	2,100	400	1,170	7,735	6,048
Spot, frozen.....		10,500				
Steelhead trout.....	16,997	11,040	11,497	1,600		
Steelhead trout, frozen.....		3,000				
Striped bass.....	121,236	189,762	305,219	318,951	105,119	24,874
Striped bass, frozen.....			377			
Sturgeon.....	2,005	446	6,030	2,699	4,339	1,772
Swallowfish (blowfish).....				24	1,490	112
Swordfish.....						11,306
Tautog (blackfish).....	1,854			294	15,797	3,405
Tilfish.....	104,832	97,099	141,186	150,580	161,898	142,145
Tomcod.....	2,390					3,825
Tuna.....		700	620			
Tuna, frozen.....		1,994	1,326	1,510	8,215	1,620
Whitebait.....	12,366	21,477	69,648	59,942	3,532	1,377
White perch.....	779,323	191,180	276,128	342,967	768,740	784,402
Whiting.....	15,081	130,037	72,310	12,233	10,000	
Whiting, frozen.....	2,435	605	1,455	420	255	1,405
Wolfish (catfish).....	2,237,442	2,473,766	2,119,704	1,114,249	455,780	381,203
Yellowtail (dabs).....	16,200	165,070	257,630	199,300	179,185	185,675
Fillets, unclassified.....	145,920	61,635	118,632	32,200	60,116	16,700
Fillets, unclassified, frozen.....	8,839	16,662	9,252	8,117	4,554	932
Roe.....		850	50		150	
Tongues and cheeks.....	92					
Unclassified.....	31,307	35,784	39,035	47,499	101,544	148,916
Total.....	12,606,664	10,688,734	13,767,919	15,053,627	17,443,608	14,784,653

Receipts of fresh and frozen fishery products at the Salt-Water Market in New York City, 1939—Continued

BY SPECIES AND MONTHS—Continued

Species	January	February	March	April	May	June
FRESH-WATER FISH						
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Brook trout.....	2,330	2,885	2,898	3,942	5,781	7,955
Carp.....	17,175	16,914	35,072	80,437	6,387	1,437
Catfish and bullheads.....	13,692	14,054	10,342	14,052	12,402	900
Crappie.....	2,469	3,205	153	100	-----	-----
Pickeral (jacks).....	639	640	531	833	-----	-----
Rock bass.....	-----	-----	-----	-----	210	240
Sucker "mullet".....	300	216	60	400	-----	-----
Sunfish.....	200	-----	200	50	200	140
Yellow perch.....	2,821	4,381	7,580	945	770	-----
Unclassified.....	305	151	-----	-----	50	48
Total.....	39,831	42,446	56,826	50,169	25,800	10,720
SHELLFISH, ETC.						
Clams:						
Hard.....	1,999,200	2,093,760	2,100,400	1,846,640	2,104,320	2,178,960
Razor.....	105	840	1,155	105	-----	-----
Soft.....	136,845	159,435	180,180	182,235	138,375	191,655
Soft, shucked.....	-----	42	42	-----	-----	-----
Conchs.....	17,040	17,480	45,800	49,920	56,720	73,280
Crabs:						
Hard.....	106,575	111,090	99,925	102,431	56,815	170,565
King.....	-----	-----	-----	-----	1,600	30
Oyster.....	344	868	165	76	-----	-----
Soft.....	-----	-----	16,521	70,047	407,955	377,664
Crab meat.....	47,027	41,779	49,205	59,230	64,681	112,633
Frogs.....	4,950	6,741	6,168	2,365	7,828	9,398
Frog legs, frozen.....	-----	-----	190	-----	-----	18
Lobsters:						
Common.....	255,548	235,430	201,980	205,792	369,041	488,946
Spiny.....	149	119	227	200	150	-----
Lobster meat:						
Common.....	628	10	162	908	4,868	2,499
Common, frozen.....	984	1,174	-----	-----	-----	-----
Spiny.....	631	429	1,184	-----	785	775
Mussels.....	85,195	131,010	211,255	222,915	219,945	204,930
Octopus.....	3,294	498	531	77	210	-----
Oysters, shell.....	1,072,650	1,001,625	1,106,550	864,000	46,425	-----
Oysters, shucked.....	126,905	141,347	153,306	96,373	2,108	-----
Periwinkles.....	5,940	5,220	6,180	7,500	5,520	9,318
Scallops:						
Bay.....	22,673	17,771	12,138	3,320	624	512
Bay, frozen.....	180	1,953	6,162	3,150	-----	-----
Sea.....	262,017	164,676	813,641	241,434	393,228	428,652
Sea, frozen.....	5,076	1,188	2,250	1,800	270	-----
Sea urchins (sea eggs).....	10,950	6,400	6,725	2,725	-----	-----
Shrimp.....	1,194,370	643,945	723,909	810,531	1,368,127	1,411,131
Shrimp, frozen.....	-----	32,716	61,569	65,010	40,000	200
Squid.....	51,092	52,520	185,220	263,669	761,342	662,809
Squid, frozen.....	37,268	58,934	48,120	1,100	-----	-----
Terrapin.....	637	565	736	655	162	55
Turtles:						
Loggerhead.....	-----	-----	-----	-----	-----	465
Snapping.....	640	400	290	420	1,850	510
Total.....	5,448,908	4,919,261	5,491,856	5,074,920	6,048,158	6,324,995
Grand total.....	18,095,403	15,850,541	19,316,601	20,178,706	23,517,666	21,120,368

Species	July	August	September	October	November	December	Total
SALT-WATER FISH							
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Albacore.....	-----	9,428	40,658	10,604	-----	-----	60,890
Alewives.....	1,916	3,870	9,409	14,403	8,730	22,956	192,371
Alewives, frozen.....	-----	-----	-----	-----	-----	-----	2,765
Amberjack.....	-----	-----	-----	100	-----	200	7,680
Anchovies.....	2,320	7,945	7,275	4,155	-----	-----	21,695
Anchovies, frozen.....	-----	-----	-----	-----	-----	-----	150
Bluefish.....	145,164	268,547	338,564	298,117	92,193	646,410	3,202,952
Bluefish, frozen.....	1,800	-----	-----	-----	-----	-----	20,511
Blue runner.....	-----	75	-----	-----	-----	-----	1,235
Bonito.....	9,775	47,323	21,531	15,042	188	-----	115,871

Receipts of fresh and frozen fishery products at the Salt-Water Market in New York City, 1939—Continued

BY SPECIES AND MONTHS—Continued

Species	July	August	September	October	November	December	Total
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
SALT-WATER FISH—continued							
Bonito, frozen.....					932		1,232
Butterfish.....	909,796	1,151,595	949,017	559,998	284,190	595,094	9,246,423
Butterfish, frozen.....			167	6,949	28,923	19,318	119,300
Cod:							
Large.....	83,305	32,075	62,865	50,015	58,874	71,904	1,583,614
Market.....	583,496	570,327	621,881	738,202	892,794	690,990	7,508,541
Steak.....	744,445	819,876	587,901	670,166	943,743	763,842	11,093,656
Crevalle (jacks):							2,950
Croaker.....	436,054	302,261	188,910	244,896	210,385	162,775	2,865,074
Croaker, frozen.....		8,251	15,763	10,111	20,137	20,895	100,753
Cunner (bergall).....	2,055	360	1,218	2,108	1,894	1,143	12,821
Cusk.....	120	825	270	1,070			6,050
Dabs, sea.....	2,785	1,160	4,900	2,605	1,895	1,310	52,023
Dogfish.....	2,464	1,610	1,833	4,679	24,260	12,647	73,451
Dolphin.....		100					100
Drum:							
Black.....	200		2,510		400		3,210
Red (channel bass).....				1,980	550	4,341	13,194
Eels:							
Common.....	66,302	53,852	85,934	90,942	57,240	228,317	894,085
Common, frozen.....				28,850	25,000	5,225	58,910
Conger (sea).....			305	805	3,298	1,235	58,042
Eel pout (conger eel).....	150			40			10,949
Flounders.....	1,372,611	1,098,850	1,089,719	1,968,993	1,503,400	751,561	16,621,223
Flounders, frozen.....					2,000	3,102	6,432
Fluke.....	514,170	529,870	302,006	80,443	27,853	138,351	3,582,410
Garfish.....	116	408	47	1,042	568		2,727
Goatfish (salmonete).....	420			635	2,088	3,018	22,115
Goosefish (bellyfish).....	1,000	200				1,000	6,208
Groupers:							
Haddock.....	1,562,195	1,378,859	1,381,844	871,641	917,968	955,428	14,972,627
Hake.....	194,801	237,328	335,747	372,155	297,098	76,347	2,284,102
Halibut.....	709,899	549,179	550,221	654,649	100,477	3,639	4,607,814
Halibut, frozen.....	23,000	15,100	85,794	146,390	263,759	176,009	1,768,805
Harvestfish (angelfish).....			4,100				4,100
Herring, sea (sardine).....	56,375	77,025	96,900	50,625	106,890	140,045	1,014,070
Herring, sea (sardine), frozen.....					50,025	10,737	72,392
Hickory shad.....		186		13,105	5,677	8,636	64,974
Jack, yellow.....			10,372	458			10,830
Jewish (warsaw).....	845	605	2,092	1,055	1,041	7,110	47,647
John Dory.....		100		940	2,986	212,316	983,926
Kingfish (king mackerel).....	7,209	4,917	10,923	11,904	87,655	56,099	278,397
King whiting (kingfish).....	1,780	625	3,930	11,680	28,760	10,085	68,745
Lanuce (sand eel).....	1,126,835	1,274,963	1,319,859	907,680	733,725	416,221	10,159,350
Mackerel.....	2,480	55,000	12,068	57,552	99,502	104,146	1,354,860
Mackeral, frozen.....		1,435	1,530	1,247			4,522
Mojarra (muttonfish).....					500	120	13,349
Mullet.....	15,760	51,913	95,456	110,547	118,380	55,178	516,158
Mullet, frozen.....							3,500
Permit.....					460	2,643	7,694
Pilotfish.....			2,836	225			3,061
Pollock.....	91,853	112,201	198,283	247,739	350,313	245,574	2,102,756
Pollock, frozen.....							2,981
Pompano.....	2,744	4,154	6,892	10,780	4,186	6,930	64,604
Pompano, frozen.....	100						4,523
Rosefish.....			40	95	250	550	22,115
Sablefish, frozen.....			38,124	25,000	27,000	3,049	171,178
Salmon:							
Atlantic.....	5,268	1,056	880				24,498
Atlantic, frozen.....			10,000				12,105
Chinook (king).....	245,880	185,904	79,295	57,400	1,400	4,860	1,131,863
Chinook (king), frozen.....	2,000	15,700	38,000	17,601	7,000	24,907	171,808
Chum (fall).....			240	15,500	3,400		19,140
Chum (fall), frozen.....		15,000			3,050		61,377
Pink (humpback).....			5,340				5,340
Red (sockeyes), frozen.....						2,054	2,054
Silver.....	145,725	133,750	209,941	228,565	67,800		802,956
Silver, frozen.....		7,000	31,186	40,792	76,700	69,500	328,958
Scup (porgy).....	1,049,393	799,329	476,180	730,055	301,520	362,295	9,069,457
Scup (porgy), frozen.....		1,488	6,786	11,748	35,463	13,793	139,469
Sea bass.....	249,794	119,962	151,184	193,741	142,794	105,377	2,415,355
Sea bass, frozen.....			4,343	7,405	9,638	7,960	29,346
Sea robin.....	8,115	7,167	5,823	23,018	9,495	7,083	119,562
Sea trout (weakfish):							
Gray.....	286,274	283,931	429,481	475,077	197,061	26,905	2,489,615
Gray, frozen.....		1,610	4,781	1,110	13,093	7,776	116,720
Spotted.....	60	2,546	4,146	56,305	98,040	127,282	456,257
Spotted, frozen.....							500

Receipts of fresh and frozen fishery products at the Salt-Water Market in New York City, 1939—Continued

BY SPECIES AND MONTHS—Continued

Species	July	August	Septem-ber	October	Novem-ber	Decem-ber	Total
SALT-WATER FISH—continued							
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Shad.....	718	20	360	3,210	5,050	6,754	3,791,263
Shad, frozen.....			90,000			67,539	238,953
Sharks.....	5,209	10,579	2,791	7,119	8,564	4,072	51,283
Sheepshead.....	100		470	1,726	2,693	2,266	14,484
Silverides (spearing).....	540	7,830	21,280	33,050	40,190	57,555	210,200
Skate wings.....	4,463	3,531	6,834	8,911	32,192	22,524	165,675
Skate wings, frozen.....							1,900
Smelt.....			15,611	67,972	123,653	182,004	954,189
Smelt, frozen.....		175	3,225	119,775	224,577	325,535	2,425,168
Smelt, sea.....			1,000	450			1,450
Snapper:							
Mangrove.....							104
Red.....	4,065	1,844	2,736	1,185	4,515	70,930	200,127
Sole, gray.....	201,393	185,983	171,632	136,367	101,414	98,525	2,484,004
Spanish mackerel.....	200	100	1,828	15,241	32,063	289,956	1,005,916
Spanish mackerel, frozen.....	1,316		1,069				6,652
Spot.....	38,312	82,676	114,665	173,487	34,005	1,100	462,698
Spot, frozen.....						3,995	14,495
Steelhead trout.....	300		4,400			12,259	58,093
Steelhead trout, frozen.....							3,000
Striped bass.....	25,742	63,019	28,779	178,789	143,795	102,999	1,608,274
Striped bass, frozen.....							377
Sturgeon.....	1,345	1,290	566	1,681	2,485	935	25,893
Swellfish (blowfish).....				250	25		1,871
Swordfish.....	47,254	143,376	85,424	5,098			292,458
Swordfish, frozen.....					181		181
Tautog (blackfish).....	1,057	259	3,881	20,544	17,295	15,484	79,870
Thimble-eyed mackerel.....	25,925	21,365	11,194	41,780	2,650		102,914
Tilefish.....	4,550	20,070	630	19,760	52,445	61,170	958,965
Tomcod.....					100	2,900	5,450
Tuna.....	129,505	127,766	75,169	8,962			345,227
Tuna, frozen.....							1,320
Whitebait.....	80	200	5,535	4,145	13,511	8,708	50,369
White perch.....	100		908	3,674	14,576	13,552	201,060
Whiting.....	628,333	662,009	596,437	691,758	1,084,213	709,987	7,463,457
Whiting, frozen.....				3,403		4,286	247,356
Wolfish (catfish).....		120	40	55		105	6,895
Yellowtail (dabs).....	607,710	963,642	1,158,274	1,490,193	1,551,791	1,927,080	16,460,834
Fillets, unclassified.....	96,730	122,650	107,980	93,340	212,033	87,833	1,724,226
Fillets, unclassified, frozen.....	2,700	10,150	17,100	39,300	5,130	2,540	512,123
Roe.....	90		25	4,060	25,169	2,283	79,983
Tongues and cheeks.....					100	190	1,432
Unclassified.....	90,178	102,683	117,496	122,507	81,579	53,371	1,031,899
Total.....	12,584,733	12,808,672	12,590,479	13,369,821	12,119,790	11,516,364	159,335,084
FRESH-WATER FISH							
Brook trout.....	5,864	9,068	7,240	6,783	3,915	4,043	62,704
Carp.....	1,568	500	9,299	6,834	17,108	10,201	152,920
Catfish and bullheads.....			4,105	14,293	12,554	10,857	107,151
Crapple.....				3,700	6,090	4,042	19,759
Lake herring.....					1,050		1,050
Pickeral (jacks).....					126	12	2,281
Rock bass.....							450
Sucker "mullet".....							966
Sunfish.....	95			1,100	3,330	540	5,855
Yellow perch.....				431	2,544	2,790	22,162
Unclassified.....				400	125		1,079
Total.....	7,517	9,568	20,644	33,541	46,840	32,485	376,377
SHELLFISH, ETC.							
Clams:							
Hard.....	1,984,720	2,061,040	1,964,160	1,923,600	1,713,920	1,618,320	23,589,040
Razor.....				140		1,190	3,535
Soft.....	104,715	101,340	83,610	103,185	114,930	143,010	1,609,515
Soft, shucked.....	42		128	357	6,579	8,288	15,478
Surf.....						180	180
Conchs.....	82,800	77,520	92,400	88,400	54,640	52,400	708,400
Crabs:							
Hard.....	150,705	183,755	377,415	301,785	130,705	105,875	1,897,641
King.....							1,530
Oyster.....			112	292	630	184	2,171
Rock.....						210	210
Soft.....	309,381	312,376	183,667	26,772	207		1,704,489
Soft, frozen.....	60						60

Receipts of fresh and frozen fishery products at the Salt-Water Market in New York City, 1939—Continued

BY SPECIES AND MONTHS—Continued

Species	July	August	September	October	November	December	Total
SHELLFISH, ETC.—continued							
Crab meat.....	Pounds 89,691	Pounds 104,055	Pounds 70,186	Pounds 71,644	Pounds 52,968	Pounds 50,799	Pounds 813,798
Frogs.....	.....	.....	.....	.....	.....	.....	598
Frog legs.....	12,673	11,274	11,971	13,800	13,002	5,894	106,114
Frog legs, frozen.....	.....	.....	.....	.....	.....	.....	190
Lobsters:							
Common.....	445,976	454,679	396,327	359,649	295,752	306,495	4,015,615
Spiny.....	125	.....	.....	60	.....	2,529	3,549
Spiny, frozen.....	.....	.....	.....	.....	.....	200	200
Lobster meat:							
Common.....	5,244	15,560	6,731	7,148	67	199	44,024
Common, frozen.....	708	.....	.....	.....	.....	600	3,466
Spiny.....	2,385	1,974	490	3,681	3,197	6,575	22,076
Mussels.....	134,200	112,860	143,385	166,365	122,375	125,895	1,870,330
Octopus.....	.....	.....	205	.....	446	.....	5,747
Oysters, shell.....	.....	11,625	990,450	1,205,925	1,236,675	1,247,400	6,783,325
Oysters, shucked.....	.....	85	112,048	149,294	144,644	154,198	1,081,208
Periwinkles.....	3,436	2,150	2,175	5,979	5,989	3,113	62,519
Scallops:							
Bay.....	4,832	3,493	11,264	26,942	21,102	18,268	142,939
Bay, frozen.....	.....	.....	.....	.....	.....	.....	11,445
Sea.....	547,542	572,454	414,495	430,965	299,421	326,052	4,384,476
Sea, frozen.....	.....	.....	.....	.....	.....	.....	10,584
Sea urchins (sea eggs).....	.....	.....	175	3,650	2,800	11,250	44,675
Shrimp.....	1,272,557	1,263,727	1,606,390	1,852,476	1,424,670	1,088,239	14,556,061
Shrimp, frozen.....	.....	.....	.....	.....	.....	1,600	201,094
Snails.....	.....	.....	.....	.....	1,350	1,550	2,900
Squid.....	213,804	124,289	48,796	128,509	62,052	12,067	2,516,169
Squid, frozen.....	.....	4,303	44,835	20,026	39,770	92,988	347,337
Terrapin.....	30	15	220	252	2,862	756	6,975
Turtles:							
Green.....	.....	1,910	1,200	1,500	.....	.....	4,610
Hawksbill.....	.....	.....	450	400	.....	.....	880
Loggerhead.....	280	150	340	60	.....	.....	1,295
Snapping.....	350	40	230	330	540	840	6,440
Total.....	5,366,255	5,420,682	6,464,470	6,883,440	5,751,193	5,387,650	68,581,888
Grand total.....	17,968,505	18,238,922	19,075,593	20,286,802	17,917,823	16,936,499	228,293,329

BY ORIGIN AND MONTHS

Origin	January	February	March	April	May	June
DOMESTIC						
Alabama.....	Pounds 2,175	Pounds 1,400	Pounds.....	Pounds 180	Pounds 1,650	Pounds.....
California.....	.....	47,044	89,674	34,000	11,625	.....
Connecticut.....	421,957	399,283	530,096	481,971	600,682	859,847
Delaware.....	6,778	6,657	5,345	10,710	1,208	4,007
District of Columbia.....	.....	.....	1,100	3,400	350	.....
Florida.....	2,316,981	996,746	774,649	575,694	332,205	125,704
Georgia.....	31,684	49,235	32,404	136,684	330,247	422,359
Illinois.....	.....	.....	.....	5,600	.....	.....
Louisiana.....	196,262	251,065	411,519	405,384	445,202	410,014
Maine.....	317,921	139,652	424,735	427,965	394,957	571,048
Maryland.....	172,462	282,173	379,783	604,854	863,958	807,253
Massachusetts.....	3,987,388	3,661,846	4,660,044	3,956,359	4,947,425	4,000,624
Michigan.....	.....	35	23,710	890	400	.....
Mississippi.....	.....	6,408	41,775	1,510	550	400
New Jersey.....	1,092,232	1,154,232	579,655	1,816,725	2,818,161	1,260,737
New York.....	6,646,922	5,941,658	8,859,414	6,190,299	9,901,823	9,451,081
North Carolina.....	441,075	433,239	549,779	471,941	90,850	73,565
Oregon.....	7,475	66,135	4,300	.....	.....	.....
Pennsylvania.....	8,731	905	10,399	13,842	6,228	4,920
Rhode Island.....	284,880	142,395	149,311	168,715	719,101	482,295
South Carolina.....	27,992	11,405	14,413	37,788	359,606	492,810
Texas.....	.....	6,000	40,000	55,000	51,750	9,375
Vermont.....	2,205	3,060	2,571	1,048	1,234	1,022
Virginia.....	663,894	723,002	712,760	887,245	494,820	244,045
Washington.....	189,898	127,513	182,022	277,897	431,836	423,567
Wisconsin.....	7,271	33,259	111,934	183,480	130	790
Alaska.....	.....	80,000	61,000	.....	28,100	6,400
Total.....	16,826,183	14,554,347	18,652,392	19,739,081	22,834,168	20,551,863

Receipts of fresh and frozen fishery products at the Salt-Water Market in New York City, 1939—Continued

BY ORIGIN AND MONTHS—Continued

Origin	January	February	March	April	May	June
IMPORTED ¹						
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
British Columbia ²	177,500	309,715	343,466	401,642	598,180	540,437
New Brunswick.....	824,299	588,137	188,275	37,123	3,320	5,290
Nova Scotia.....	120,891	91,457	87,547	.....	76,005	12,326
Ontario.....	.....	.....	.....	.....	275	.....
Prince Edward Island.....	83,255	38,165	41,275	60	.....	818
Quebec.....	36,900	68,120	3,535	800	1,808	8,758
Canada (unclassified).....	25,040	450	.....	.....	176	.....
Newfoundland.....	1,335	150	111	.....	3,644	876
Total.....	1,289,220	1,096,194	664,209	439,625	683,408	568,505
Grand total.....	18,095,403	15,650,541	19,316,601	20,178,706	23,517,566	21,120,368

Origin	July	August	September	October	November	December	Total
DOMESTIC							
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Alabama.....	3,915	.....	2,586	4,300	7,958	24,005	48,259
California.....	32,775	.....	.....	.....	.....	3,700	218,518
Connecticut.....	588,333	440,900	435,925	529,956	683,139	744,518	6,696,905
Delaware.....	3,055	756	1,960	6,362	11,157	8,464	66,459
District of Columbia.....	.....	.....	600	780	1,415	3,200	10,845
Florida.....	189,172	830,201	240,242	393,470	531,845	1,985,668	8,792,475
Georgia.....	332,793	174,033	215,015	268,573	116,801	67,448	2,175,276
Illinois.....	.....	.....	.....	5,030	11,576	.....	22,226
Louisiana.....	611,264	570,171	500,257	263,061	181,339	195,192	4,440,790
Maine.....	462,925	480,722	386,279	380,023	275,083	232,114	4,473,424
Maryland.....	617,960	621,629	489,780	372,570	163,400	69,702	5,435,524
Massachusetts.....	4,600,142	5,393,684	5,456,477	6,051,862	5,500,606	4,265,033	57,381,490
Michigan.....	.....	.....	.....	.....	.....	.....	25,035
Mississippi.....	200	11,500	950	.....	.....	340	63,633
New Hampshire.....	.....	.....	.....	.....	59	.....	59
New Jersey.....	1,213,265	1,506,413	1,672,531	1,499,154	1,259,208	948,818	16,821,131
New York.....	7,499,949	6,979,042	7,204,892	6,849,869	6,245,049	5,951,869	90,721,867
North Carolina.....	59,081	209,408	610,652	1,049,107	1,141,694	740,516	5,870,907
Oregon.....	11,300	.....	66,900	121,110	15,000	9,900	292,120
Pennsylvania.....	2,195	2,220	10,660	4,720	2,965	3,715	71,500
Rhode Island.....	154,025	174,557	241,547	516,762	320,344	165,831	3,509,793
South Carolina.....	197,394	201,305	247,332	472,169	59,449	22,204	2,143,867
Texas.....	11,250	.....	.....	.....	21,250	.....	194,625
Vermont.....	29	20	9	135	.....	60	11,554
Virginia.....	237,088	115,749	162,785	221,187	434,990	568,994	5,466,559
Washington.....	399,406	453,494	295,823	603,554	226,173	208,954	3,820,137
Wisconsin.....	.....	.....	.....	26,818	44,782	36,189	446,653
Alaska.....	92,200	7,700	.....	25,000	47,705	37,158	385,263
Total.....	17,319,716	17,673,504	18,243,202	19,643,572	17,283,148	16,285,978	219,607,144
IMPORTED ¹							
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
British Columbia ²	585,600	462,795	678,945	429,992	259,234	32,928	4,815,432
New Brunswick.....	8,366	12,632	79,352	41,454	144,067	807,780	2,235,095
Nova Scotia.....	46,095	89,151	37,612	38,656	37,594	52,282	689,596
Ontario.....	.....	.....	.....	.....	.....	270	545
Prince Edward Island.....	.....	.....	.....	61,055	135,617	235,842	596,087
Quebec.....	2,492	440	41,346	70,338	40,228	20,041	295,706
Canada (unclassified).....	1,236	.....	.....	.....	.....	.....	26,902
Newfoundland.....	.....	400	136	1,735	17,935	500	26,822
Total.....	638,789	565,418	832,391	643,230	634,675	650,521	8,686,185
Grand total.....	17,958,505	18,238,922	19,075,593	20,286,802	17,917,823	16,936,499	228,293,329

¹ Does not include imports arriving by steamship entered at New York City.² Includes catch taken by United States vessels and shipped in bond through British Columbia ports to New York.

Imports of fishery products entered at New York City, 1939, by species and origin

Species	Belgium	British West Indies	Canada	Costa Rica	Cuba	Denmark	France	Germany	Iceland
FISH									
Brook trout, frozen						22,704			
Eels:									
Frozen			47,883						
Live			140,000						
Hallbut, frozen			2,060						
Mackerel			22,000						
Salmonete					1,400				
Smelt, frozen			8,050						
Sole, frozen	112								
Sturgeon, frozen						7,086			
Tuna			2,076						
Fillets, frozen:									
Cod			20,000						4,420
Haddock			60,000						700
Hallbut			10,250						
Unclassified	1,000								7,500
Steaks, frozen:									
Hallbut			7,500						
Swordfish			25,244						
Unclassified, frozen			100					66	
Total	1,112		345,162		1,400	22,704	7,086	66	12,620
SHELLFISH, ETC.									
Frog legs					7,788				
Lobster, spiny					21,632				
Lobster meat:									
Common			8,584						
Spiny					2,150				
Snails						1,440			
Turtles		700		291,037	573				
Total		700	8,584	291,037	32,143		1,440		
Grand total	1,112	700	353,746	291,037	33,543	22,704	8,526	66	12,620

Species	Italy	Jamaica	Japan	Mexico	Morocco	Netherlands	Newfoundland	Norway	Panama
FISH									
Herring, sea, frozen							56,425	11,000	
Plaice, frozen						300			
Smelt, frozen			93,100			1,470	190,750		
Sole, frozen						44,052			
Swordfish, frozen:									
Round			587,588						
Split			1,806,298						
Turbot, frozen						4,200			
Fillets, frozen:									
Hallbut			12,500				100		
Unclassified								9,000	
Steaks, frozen:									
Hallbut			10,000						
Swordfish			103,655						
Unclassified, frozen	259								
Total	259		2,613,141			50,022	247,275	20,000	
SHELLFISH, ETC.									
Frog legs, frozen			162,491						
Lobster tails, spiny, frozen	1,822								
Scallops, frozen			4,482						
Snails	47,520								
Turtles		154,500		72,849	706,545				7,500
Pulp, frozen	10,000		4,301	20,551					
Sepia, frozen			16,927						
Unclassified				15,000					
Total	59,842	154,500	188,201	108,400	706,545				7,500
Grand total	59,601	154,500	2,801,342	108,400	706,545	50,022	247,275	20,000	7,500

NOTE.—Includes only imports arriving by steamship entered at New York City.

Imports of fishery products entered at New York City, 1939, by Species and Origin—Continued

Species	Peru	Portugal	Rumania	U.S.S.R. (Russia)	Spain	Tunisia	Union of South Africa	United Kingdom	Total
FISH	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Brook, trout, frozen									22,704
Eels:									
Frozen									47,883
Live									140,000
Halibut, frozen									2,060
Herring, sea, frozen		8,000							70,425
Mackerel									22,000
Plaice, frozen									2,800
Salmon, frozen				162,697					162,697
Salmonete									1,400
Sardine, frozen		14,200							14,200
Smelt, frozen									293,370
Sole, frozen								3,400	47,564
Sprat, frozen		2,000							2,000
Sturgeon, frozen			30,110	278,800					315,996
Swordfish, frozen:									
Round									687,588
Split									1,806,208
Tuna									2,075
Turbot, frozen									4,200
Fillets, frozen:									
Cod									24,420
Haddock									60,700
Halibut									22,850
Unclassified									17,500
Steaks, frozen:									
Halibut									17,500
Swordfish									128,899
Unclassified		5,580		89,272				3,789	99,063
Total		24,780	30,110	530,769				7,189	3,913,695
SHELLFISH, ETC.									
Frog legs									7,788
Frog legs, frozen									162,491
Lobster, spiny									21,632
Lobster tails, spiny, frozen							1,413,300		1,415,122
Lobster meat:									
Common									8,584
Spiny									2,150
Scallops, frozen									4,482
Snails						4,425			759,930
Turtles	8,818								535,977
Pulpi, frozen		447,000			74,500				556,352
Pulpi and sepla, frozen		173,030							173,030
Sepla, frozen		70,930							87,857
Unclassified		46,529							61,529
Total	8,818	737,489			74,500	4,425	1,413,300		3,796,924
Grand total	8,818	762,269	30,110	530,769	74,500	4,425	1,413,300	7,189	7,710,619

Landings by fishing craft at New York City, 1939

BY SPECIES AND MONTHS

Species	January	February	March	April	May	June
FISH	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Bluefish	10		1,431	243	50	
Butterfish	556,936	60,105	884,505	931,045	110,227	12,620
Cod:						
Large	83,610	269,896	571,295	210,905	36,525	52,845
Market	110,365	153,350	213,240	185,000	216,030	342,715
Steak	10,740	13,245	8,515		48,555	112,755
Croaker			19,700			945
Cunnor (bergall)		85				170
Ousk	2,320			270		
Dabs, sea	2,175					
Dogfish	215	100				

Landings by fishing craft at New York City, 1939—Continued

BY SPECIES AND MONTHS—Continued

Species	January	February	March	April	May	June
FISH—continued						
Eels:	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Common	100					
Conger (sea)	16,716	6,955	18,526	3,705	2,140	
Eel pout (conger eel)			1,735			
Flounders	123,695	106,940	173,421	160,255	557,799	329,526
Fluke	157,656	260,115	363,326	134,117	49,051	180
Goosefish (bellyfish)		670	1,690	1,010		
Haddock	727,287	437,400	808,910	1,381,782	1,901,300	1,514,965
Hake	64,011	14,273	20,492	33,755	29,180	12,440
Hallbut	1,613	1,546	3,348	8,682	11,610	6,268
Herring, sea (sardine)	40		100	240		
John Dory			1,205	10		
Mackerel	17,262	26,467	30,245	273,885	562,944	18,000
Menhaden			60			
Pollock	134,130	11,455	18,280	47,165	14,680	14,850
Rosefish	12,290			410		
Scup (porgy)	435,498	454,675	919,688	1,221,130	214,780	112,870
Sea bass	81,717	82,749	303,216	94,180	15,987	4,025
Sea robin	2,190	1,710	5,800	2,410		
Sea trout, gray (weakfish)	3,719	3,576	6,872	7,165	4,005	2,125
Shad			1,130	71,446	45,022	
Sharks				350	40	
Skate wings	3,515	4,455	6,625	2,500		
Sole, gray	85,670	1,728	1,515	5,046	860	70
Striped bass				6		
Sturgeon				625	320	
Tilefish	73,512	84,494	76,456	125,130	159,720	131,195
Whiting	42,670	35,145	204,188	158,045	35,078	
Wolfish (catfish)	2,075	395	315	150		620
Yellowtail (dabs)	401,668	766,550	355,675	146,105	64,695	108,880
Roach	623	3,800	470			
Unclassified	406	500	1,675	160		20
Total	3,244,433	2,802,689	5,013,709	5,206,928	4,080,619	2,777,574
SHELLFISH						
Crabs:						
Hard	25,760	16,100	10,850			
King					1,500	
Lobsters, common	3,463	2,790	3,250	8,916	5,735	35
Mussels, sea	11,550	18,150	17,050	21,450	29,150	29,150
Scallops, sea	79,155	28,278	93,276	89,199	236,673	291,357
Squid	33,209	27,645	116,245	78,056	7,730	557
Total	153,137	92,063	240,671	197,621	280,788	321,099
Grand total	3,397,570	2,895,652	5,254,380	5,404,547	4,361,407	3,098,673

Species	July	August	September	October	November	December	Total
FISH							
Albacore			1,253				1,253
Alewives			320	940			1,260
Bluefish	10,152	83,618	34,672	13,302	1,012		144,390
Bonito	20	39	1,013	1,701			2,773
Butterfish	64,653	54,120	81,316	76,980	43,495	273,677	3,149,679
Cod:							
Large	83,305	32,075	62,865	50,015	58,374	71,904	1,583,614
Market	431,420	373,735	348,315	209,330	240,353	179,870	3,063,723
Steak	85,790	186,470	75,120	10,000			551,190
Croaker	6,060		9,670	42,760			79,135
Cunner (bergall)	1,140			243			1,638
Ousk	85						2,675
Dabs, sea							2,175
Dogfish							315
Eels:							
Common							100
Conger (sea)				310	1,710	50	50,112
Eel pout (conger eel)							1,735
Flounders	150,165	238,730	336,180	579,283	220,583	160,925	3,146,592
Fluke	1,278	535	7,551	8,375	5,823	9,141	987,445
Goosefish (bellyfish)					280		3,650
Haddock	1,419,117	1,254,563	1,235,093	555,293	648,665	711,365	12,695,740
Hake	51,425	22,960	30,902	7,514	5,385	6,260	297,597
Hallbut	1,896	961	555	50	523	739	37,781

See footnotes at end of table.

Landings by fishing craft at New York City, 1939—Continued

BY SPECIES AND MONTHS—Continued

Species	July	August	Septem-ber	October	Novem-ber	Decem-ber	Total
FISH—continued	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Herring, sea (sardine).....							380
John Dory.....							1,215
King whiting (kingfish).....			80	110			190
Mackerel.....	903	2,912	3,185	9,783	5,405	13,595	904,586
Menhaden.....							60
Pollock.....	22,335	9,160	43,607	3,715	6,100	3,827	329,304
Rosefish.....							12,700
Scup (porgy).....	225,955	104,695	145,349	414,825	261,475	280,940	4,791,880
Sea bass.....	3,485	12	323	6,320	2,047	1,803	595,364
Sea robin.....				330	3,015	3,300	19,475
Sea trout, gray (weakfish).....	5,525		2,740	9,946	1,250		46,924
Shad.....	10	20					117,628
Sharks.....				1,055	450	240	2,145
Skate wings.....	280		280	1,130	5,175	3,205	27,145
Sole, gray.....	235					100	95,223
Spot.....			680	130			810
Striped bass.....						7	33
Sturgeon.....	255	500		215			1,915
Tautog (blackfish).....	10			20			30
Tilefish.....		9,570	630		44,395	50,715	755,817
Tuna.....	32		728	97			857
Whiting.....	5,550		14,800	50,490	21,750	17,520	591,236
Wolfish (catfish).....							3,555
Yellowtail (dabs).....	152,525	294,240	292,050	229,045	347,990	475,890	3,725,823
Roe.....							4,893
Unclassified.....	40		110	2,676	190	440	6,517
Total.....	2,732,644	2,668,915	2,729,567	2,351,993	1,926,045	2,264,073	37,799,187
SHELLFISH							
Crabs:							
Hard.....					875	1,200	54,845
King.....							1,500
Lobsters, common.....			48	60	790	754	25,841
Mussels, sea ¹	14,300	23,650	20,800	21,725	13,750	15,400	236,225
Scallops, sea ²	421,020	389,601	293,877	274,958	137,421	136,989	2,471,805
Squid.....	1,150	410	2,070	12,310	5,548	3,725	288,655
Total.....	436,470	413,661	316,895	309,054	158,384	158,128	3,078,871
Grand total.....	3,169,114	3,082,576	3,046,462	2,661,047	2,084,429	2,422,201	40,878,058

¹ Data for landings of sea mussels include the weights of the shells.² Data for landings of sea scallops do not include the weight of the shells.

NOTE.—Includes landings by both vessels and boats. Landings are based on weighed-out weights.

SHAD FISHERY OF THE HUDSON RIVER

The shad fishery of the Hudson River in 1938 was prosecuted by 875 fishermen who used 375 boats, 18 haul seines, 233 drift gill nets, and 366 stake gill nets. The total commercial catch amounted to 711,799 shad, having a weight of 2,467,000 pounds, and a value to the fishermen of \$172,475. This is a decrease of 19 percent in the number of shad and also 19 percent in their value as compared with 1937. The average price per pound received by the fisherman was about 7 cents, compared with a price of approximately 8 cents in 1937.

Stake gill nets accounted for 61 percent of the weight of shad taken; drift gill nets, 38 percent; and haul seines, 1 percent.

Statistics of the catch of shad in the Hudson River also are included in the catch data for New York and New Jersey which are published elsewhere in this report.

Shad fishery of the Hudson River, 1938

Item	New York			New Jersey			Total		
OPERATING UNITS									
Fishermen:									
On boats and shore:	<i>Number</i>			<i>Number</i>			<i>Number</i>		
Regular.....	50			103			153		
Casual.....	569			163			722		
Total.....	619			266			875		
Boats:									
Motor.....	-----			1			1		
Other.....	299			75			374		
Apparatus:									
Haul seines.....	18			-----			18		
Length, yards.....	2,574			-----			2,574		
Gill nets:									
Drift.....	232			1			233		
Square yards.....	727,751			1,360			729,111		
Stake.....	801			65			866		
Square yards.....	6,993			144,479			151,472		
CATCH									
	<i>Number</i>	<i>Pounds</i>	<i>Value</i>	<i>Number</i>	<i>Pounds</i>	<i>Value</i>	<i>Number</i>	<i>Pounds</i>	<i>Value</i>
Haul seine.....	3,480	11,600	\$620	-----	-----	-----	3,480	11,600	\$620
Drift gill nets.....	283,700	946,000	52,554	70	200	\$12	283,770	946,200	52,566
Stake gill nets.....	4,470	14,900	815	420,079	1,494,300	118,474	424,549	1,509,200	119,289
Total.....	291,650	972,500	53,989	420,149	1,494,500	118,486	711,799	2,467,000	172,475

FISHERIES OF THE CHESAPEAKE BAY STATES

(Area XXIII) °

The yield of the commercial fisheries of the Chesapeake Bay States (Maryland and Virginia) during 1938 amounted to 294,593,900 pounds, valued at \$6,662,951 to the fishermen, representing an increase of 1 percent in volume and 5 percent in value as compared with the catch in the previous year. These fisheries gave employment to 15,297 fishermen, as compared with 16,529 in 1937.

There were 582 fishery wholesale and manufacturing establishments in the two States in 1938, as compared with 561 in 1937. In 1938 these establishments employed 12,844 persons, paid \$3,135,628 in salaries and wages, and produced manufactured products (canned, cured, packaged and byproducts), valued at \$9,224,417. In 1937 the wholesale and manufacturing firms employed 12,005 persons, paid \$3,068,069 in salaries and wages, and produced manufactured products valued at \$10,009,939.

° This is the number given to this area by the North American Council on Fishery Investigations. It should be explained that there may be included under this area, craft whose principal fishing ports are in the area but at times fish elsewhere. 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 the 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, 1938

SUMMARY OF CATCH

Product	Maryland		Virginia		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
Fish.....	14, 114, 100	\$437, 684	188, 708, 600	\$2, 152, 300	202, 822, 700	\$2, 589, 984
Shellfish, etc.....	43, 149, 100	1, 822, 104	48, 622, 100	2, 250, 863	91, 771, 200	4, 072, 967
Total.....	57, 263, 200	2, 250, 788	237, 330, 700	4, 403, 163	294, 593, 900	6, 662, 951

OPERATING UNITS: BY STATES

Item	Maryland	Virginia	Total
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	748	1, 789	2, 537
On boats and shore:			
Regular.....	3, 591	4, 217	7, 808
Casual.....	2, 118	2, 834	4, 952
Total.....	6, 457	8, 840	15, 297
Vessels:			
Steam.....		25	25
Net tonnage.....		2, 880	2, 880
Motor.....	30	149	179
Net tonnage.....	207	2, 598	2, 805
Sail.....	137		137
Net tonnage.....	1, 703		1, 703
Total vessels.....	167	174	341
Total net tonnage.....	1, 910	5, 478	7, 388
Boats:			
Motor.....	2, 669	3, 324	5, 993
Other.....	1, 598	3, 687	5, 285
Accessory boats.....		99	99
Apparatus:			
Purse seines, monhaden.....		33	33
Length, yards.....		10, 890	10, 890
Haul seines.....	178	148	326
Length, yards.....	32, 018	63, 888	95, 906
Gill nets:			
Anchor.....	433		433
Square yards.....	77, 558		77, 558
Drift.....	251	234	485
Square yards.....	217, 592	206, 751	424, 343
Runaround.....		10	10
Square yards.....		5, 369	5, 369
Stake.....	3, 200	4, 883	8, 083
Square yards.....	271, 900	222, 870	494, 770
Lines:			
Hand.....	100	300	400
Hooks.....	120	400	520
Trot with baits or snoods.....	1, 768	1, 603	3, 369
Baits or snoods.....	1, 214, 800	928, 900	2, 143, 700
Trot with hooks.....		6	6
Hooks.....		1, 600	1, 600
Pound nets.....	548	1, 871	2, 419
Fyke nets:			
Crab ¹		408	408
Fish.....	1, 871	621	2, 492
Dip nets.....	670	954	1, 624
Otter trawls.....		28	28
Yards at mouth.....		776	776
Slat traps.....		5	5
Pots:			
Crab.....	55	740	795
Fel.....	14, 236	734	14, 970
Fish.....	200	245	445
Turtle.....		35	35
Scrapes.....	614	170	784
Yards at mouth.....	614	194	808
Dredges:			
Crab.....		296	296
Yards at mouth.....		485	485
Oyster.....	380	67	447
Yards at mouth.....	442	108	550
Tongs:			
Oyster.....	3, 975	2, 098	6, 073
Other.....	04	241	305
Rakes:			
Oyster.....	56	192	248
Other.....		241	241
Picks.....		100	100

¹ Formerly listed as crab pound nets.

Fisheries of the Chesapeake Bay States, 1938—Continued

CATCH: BY STATES

Species	Maryland		Virginia		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
FISH						
Alewives.....	5,396,600	\$51,228	17,690,900	\$164,057	23,087,500	\$215,285
Black bass.....	93,400	9,577			93,400	9,577
Bluefish.....	51,200	4,711	303,100	17,414	354,300	22,125
Bonito.....	6,900	295	34,800	1,044	41,700	1,339
Butterfish.....	64,900	2,906	3,140,000	41,960	3,204,900	44,866
Cabio or crab eater.....	100	5	22,700	1,061	22,800	1,066
Carp.....	235,000	16,505	539,200	33,151	824,200	49,656
Catfish and bullheads.....	517,200	17,151	664,200	26,447	1,181,400	43,598
Cod.....			400	13	400	13
Crappie.....	2,500	136			2,500	136
Croaker.....	3,024,900	40,084	43,284,500	558,819	46,309,400	598,903
Drum:						
Black.....	9,000	99	116,800	1,024	125,800	1,123
Red or redfish.....	2,500	42	133,600	1,789	136,100	1,831
Eels:						
Common.....	133,700	10,448	161,700	16,998	295,400	27,446
Conger.....	200	2	3,700	45	3,900	47
Flounders.....	65,900	3,452	772,100	42,329	838,000	45,781
Gizzard shad.....	135,100	1,793	426,500	5,230	561,600	7,023
Hake.....			12,100	179	12,100	179
Harvestfish or "starfish".....	1,500	54	498,500	8,293	490,000	8,347
Hickory shad.....	26,100	541	140,400	2,651	166,500	3,192
Hogchoker.....	2,000	70			2,000	70
Hogfish.....			400	8	400	8
King whiting or "kingfish".....	3,700	195	261,000	10,922	264,700	11,117
Mackerel.....	2,500	250	17,400	889	19,900	1,139
Menhaden.....	62,800	328	95,020,500	360,948	95,083,300	361,276
Mullet.....	3,600	170	23,400	945	27,000	1,115
Pike or pickerel.....	43,900	6,540	2,200	370	46,100	6,910
Pollock.....			100	1	100	1
Sand perch.....			7,300	97	7,300	97
Scup or porgy.....	22,000	270	2,343,800	38,250	2,365,800	38,520
Sea bass.....	42,000	1,680	301,600	13,007	343,600	14,687
Sea robin.....			3,000	30	3,000	30
Shad.....	599,700	61,135	3,607,600	332,799	4,207,300	393,934
Shark.....			237,300	2,756	237,300	2,756
Skates.....			8,600	115	8,600	115
Spanish mackerel.....	20,400	1,278	437,000	29,536	457,400	30,814
Spot.....	59,900	1,643	3,895,800	71,874	3,925,700	73,517
Squeteagues or "sea trout":						
Gray.....	1,069,100	35,147	12,547,400	225,865	13,616,500	261,012
Spotted.....	8,200	327	393,700	32,322	401,900	33,089
Striped bass.....	1,714,400	140,270	1,155,000	91,293	2,869,400	231,563
Sturgeon.....	100	14	15,700	2,236	15,800	2,250
Suckers.....	4,500	209			4,500	209
Sunfish.....	9,000	181			9,000	181
Swallowfish.....			33,800	780	33,800	780
Tautog.....	500	17	1,100	18	1,600	35
Tomcod.....			7,400	79	7,400	79
White perch.....	436,600	17,097	290,200	8,817	726,800	25,914
Whiting.....			139,500	2,570	139,500	2,570
Yellow perch.....	192,500	11,394	52,600	3,269	245,100	14,663
Total.....	14,114,100	437,684	188,708,600	2,152,300	202,822,700	2,589,984
SHELLFISH, ETC.						
Crabs:						
Hard.....	20,699,100	385,230	28,690,400	486,068	49,389,500	871,328
Soft and peelers.....	2,899,400	224,760	2,782,600	211,179	5,681,000	435,939
Lobsters.....	100	20	1,400	157	1,500	177
Shrimp.....			8,000	980	8,000	980
Clams: ¹						
Hard, public.....	53,400	10,020	2,757,800	370,048	2,811,200	380,068
Hard, private.....			52,200	5,000	52,200	5,000
Soft, public.....			2,500	1,000	2,500	1,000
Mussels, sea.....			30,000	900	30,000	900
Oysters, market: ²						
Public, spring.....	5,300,300	314,159	1,611,200	141,855	6,911,500	456,014
Public, fall.....	12,764,300	740,921	2,751,800	244,596	15,516,100	985,517
Private, spring.....	501,000	65,779	3,506,700	297,323	4,007,700	363,102
Private, fall.....	797,400	77,300	6,179,600	487,736	6,977,000	565,036

¹ Statistics on hard clams used in this table are based on yields of 6.14 pounds of meats per standard bushel in Maryland, and 5.73 pounds of meats in Virginia.

² Statistics on market oysters used in this table are based on yields of 4.67 pounds of meats per standard bushel in Maryland, and 4.24 pounds of meats in Virginia.

Fisheries of the Chesapeake Bay States, 1938—Continued

CATCH: BY STATES—Continued

Species	Maryland		Virginia		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
SHELLFISH, ETC.—continued						
Squid.....	180,000	\$1,300	233,000	\$2,851	363,000	\$4,151
Terrapin, diamond-back.....	4,500	2,579	4,300	150	8,800	2,729
Turtles, snapper.....	600	36	10,900	990	11,200	1,028
Total.....	43,149,100	1,822,104	48,622,100	2,250,863	91,771,200	4,072,967
Grand total.....	57,263,200	2,259,788	237,330,700	4,403,163	294,593,900	6,662,951

NOTE.—Data on the yield of shellfish meats per bushel are based on U. S. Standard Bushels of 2,150.4 cubic inches capacity. Prior to 1938, yields were based on bushels of the size prescribed by individual State regulations. The seed-oyster fishery in the Chesapeake Bay States was prosecuted only in Virginia, where 1,440 fishermen, using 14 motor vessels, 542 motorboats, 162 other boats, 957 tongs, and 112 rakes, took 1,234,140 bushels of seed oysters valued at \$231,958 from public beds. Of the total number of persons fishing for seed oysters, 665 are duplicated among those fishing for market oysters or other species. Similarly, the following craft and gear are duplicated: 229 motorboats, 150 other boats, 341 tongs, and 112 rakes.

SUPPLEMENTARY TABLE SHOWING THE PRODUCTION OF CERTAIN SHELLFISH, IN NUMBER AND BUSHELS

Product	Maryland		Virginia		Total	
	Quantity	Value	Quantity	Value	Quantity	Value
Crabs:						
Hard.....number.....	62,097,300	\$385,230	86,071,200	\$496,098	148,168,500	\$871,328
Soft and peelers.....do.....	11,693,600	224,760	11,130,400	211,179	22,724,000	435,939
Clams:						
Hard, public.....bushels.....	8,697	10,020	481,291	370,048	489,988	380,068
Hard, private.....do.....			9,110	5,000	9,110	5,000
Soft, public.....do.....			349	1,000	349	1,000
Mussels, sea.....do.....			4,190	900	4,190	900
Oysters, market:						
Public, spring.....do.....	1,134,968	314,159	380,000	141,855	1,514,968	456,014
Public, fall.....do.....	2,733,255	740,821	649,009	244,596	3,382,264	995,617
Private, spring.....do.....	107,291	65,779	827,052	297,323	934,333	363,102
Private, fall.....do.....	170,749	77,300	1,457,453	487,736	1,628,202	565,036

NOTE.—Bushels represent U. S. Standard Bushels of 2,150.4 cubic inches capacity. Prior to 1938, data on bushels of shellfish were based on bushel measures of the size prescribed by individual State regulations. For more detailed information concerning shellfish measures the reader is referred to the section on conversion factors published on p. 548 of this document.

Industries related to the fisheries of the Chesapeake Bay States, 1938

OPERATING UNITS, SALARIES, AND WAGES

Item	Maryland	Virginia	Total
	Number	Number	Number
Transporting:			
Persons engaged.....	276	911	1,187
Vessels, motor.....	141	452	593
Net tonnage.....	1,967	4,578	6,545
Wholesale and manufacturing:			
Establishments.....	321	261	582
Persons engaged:			
Proprietors.....	449	288	737
Salaried employees.....	190	189	379
Wage earners:			
Average for season.....	6,178	5,550	11,728
Average for year.....	2,732	2,338	5,070
Paid to salaried employees.....	\$182,185	\$281,876	\$464,061
Paid to wage earners.....	\$1,616,286	\$1,056,281	\$2,672,567
Total salaries and wages.....	\$1,797,471	\$1,338,157	\$3,135,628
Fishermen manufacturing.....	128		128

Industries related to the fisheries of the Chesapeake Bay States, 1938—Continued

PRODUCTS MANUFACTURED

Item	Maryland		Virginia	
	Quantity	Value	Quantity	Value
By manufacturing establishments:				
Alewives:				
Salted:				
Corned.....pounds..	(1)	(1)	1,566,155	\$37,073
Pickled.....do.....	2,511,800	\$78,877	2,263,300	47,346
Tight-pack cut.....do.....			1,166,350	38,164
Canned.....standard cases..	31,782	93,066	15,494	33,560
Roe, canned.....do.....	12,132	57,661	16,560	68,662
Oil.....gallons..			12,681	2,277
Butterfish, smoked.....pounds..	51,000	12,200		
Carp, smoked.....do.....	12,850	3,462		
Chub, cisco, and tullibee, smoked.....do.....	135,000	38,250		
Croaker:				
Fresh fillets.....do.....			140,000	13,950
Fresh pan-dressed.....do.....			280,000	21,000
Eels, smoked.....do.....	23,000	6,900		
Flounders, fresh fillets.....do.....			54,000	8,400
Herring, sea, smoked.....do.....	90,500	8,860		
Menhaden:				
Dry scrap.....tons.....			9,374	341,346
Oil.....gallons..			1,087,503	319,065
Salmon, smoked.....pounds..	221,000	67,300		
Sea bass:				
Fresh fillets.....do.....			94,000	13,880
Fresh pan-dressed.....do.....			95,000	9,900
Squeteague, gray:				
Fresh fillets.....do.....			262,000	34,120
Fresh pan-dressed.....do.....			865,000	25,800
Whitefish, smoked.....do.....	28,800	8,680		
Crab meat, packaged, fresh-cooked.....do.....	3,047,985	948,377	2,157,354	672,718
Oysters:				
Fresh-shucked.....gallons..	2,415,064	2,589,081	1,579,493	1,825,255
Shell products:				
Poultry feed.....tons.....	32,200	145,800	21,559	123,071
Lime.....do.....	19,970	35,800	17,223	91,327
Lime, burned.....do.....			14,789	93,338
Unclassified products:				
Packaged, fresh and frozen fillets, and pan-dressed.....pounds..			\$ 104,200	\$ 9,114
Smoked.....do.....	\$ 46,500	\$ 18,650		
Canned.....standard cases..	\$ 189,544	\$ 344,259	(1)	(1)
Dry scrap and meal.....tons.....	(1)	(1)	\$ 3,618	\$ 114,994
Miscellaneous.....do.....	(1)	\$ 812,217		7 10,717
Total		5,269,340		3,955,077
By fishermen:				
Alewives:				
Pickled.....pounds..	283,800	4,290		
Smoked.....do.....	500	40		
Eels, salted.....do.....	132,854	12,179		
Hogchoker, salted.....do.....	11,000	500		
Total	428,154	17,009		
Grand total		5,286,349		3,955,077

¹ The production of this item is included under "Miscellaneous."

² Includes fresh fillets of scup, sea robin, Spanish mackerel, and swellfish; frozen fillets of croaker; fresh sticks of swellfish; and fresh pan-dressed King whiting, scup, and Spanish mackerel.

³ Includes smoked alewives, sablefish, shad, sturgeon, and lake trout.

⁴ Includes canned hard-clam chowder, oysters, oyster soup, shrimp soup, fish paste, terrapin products, and fish for animal food.

⁵ Includes menhaden, starfish, and miscellaneous fish meals; menhaden acid scrap; and alewife, blue-crab, and miscellaneous dry scrap.

⁶ Includes corned alewives, blue-crab dry scrap, and marine-shell buttons and novelties.

⁷ Includes fresh-shucked clams, salted tight-pack roe alewives, canned crab, and miscellaneous oil.

NOTE.—The total value of manufactured products in the Chesapeake Bay States was as follows: By manufacturing establishments, \$9,224,417, and by fishermen, \$17,009. Some of the above products may have been imported from another State or a foreign country; therefore, they cannot be correlated directly with the catch within the State. Of the total number of persons engaged on transporting vessels, 1,073 have been included as fishermen, and among the total number of persons engaged in the preparation of fishermen's prepared products, all have been included as fishermen.

MARYLAND

Fisheries of Maryland, 1938

OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets			Lines	
		Anchor	Drift	Stake	Hand	Trot with baits or snoods
Fishermen, on boats and shore:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Regular.....	364	30	57	112	.....	1,249
Casual.....	182	33	223	117	40	222
Total.....	546	63	280	229	40	1,471
Boats:						
Motor.....	97	31	76	102	20	1,328
Other.....	159	13	91	59	.....	130
Apparatus:						
Number.....	178	433	251	3,200	100	1,766
Length, yards.....	32,018	.....	.....	.....	.....	.....
Square yards.....	.....	77,558	217,592	271,900	.....	.....
Hooks, baits, or snoods.....	.....	.....	.....	.....	120	1,214,800

Item	Pound nets	Fyke nets	Dip nets	Pots			Scrapes
				Crab	Eel	Fish	
Fishermen, on boats and shore:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Regular.....	380	63	354	9	172	2	307
Casual.....	111	86	316	.....	35	.....	.....
Total.....	491	149	670	9	207	2	307
Boats:							
Motor.....	169	60	.....	9	113	1	.....
Other.....	115	68	670	.....	23	.....	307
Apparatus:							
Number.....	548	1,871	670	55	14,230	200	614
Yards at mouth.....	.....	.....	.....	.....	.....	.....	614

Item	Dredges, oyster	Tongs		Rakes, oyster	By hand, other than for oysters	Total, exclusive of duplication
		Oyster	Other			
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	694	54	.....	.....	.....	748
On boats and shore:						
Regular.....	86	3,036	51	20	47	3,591
Casual.....	.....	885	13	36	13	2,118
Total.....	780	3,975	64	56	60	6,457
Vessels:						
Motor.....	3	27	.....	.....	.....	30
Net tonnage.....	28	179	.....	.....	.....	207
Sail.....	137	.....	.....	.....	.....	137
Net tonnage.....	1,703	.....	.....	.....	.....	1,703
Total vessels.....	140	27	.....	.....	.....	167
Total net tonnage.....	1,731	179	.....	.....	.....	1,910
Boats:						
Motor.....	33	1,852	21	10	.....	2,609
Other.....	33	121	62	19	11	1,598
Apparatus:						
Number.....	380	3,975	64	56	.....	.....
Yards at mouth.....	442	.....	.....	.....	.....	.....

Fisheries of Maryland, 1938—Continued

CATCH: BY GEAR

Species	Haul seines		Gill nets						
			Anchor		Drift		Stake		
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	
Alewives	77,700	\$839	2,700	\$44	35,900	\$1,053		28,900	\$727
Black bass	57,300	5,804					200	16	
Bluefish	8,200	758					3,700	296	
Butterfish	500	20							
Carp	252,600	15,086			1,000	20	1,400	66	
Catfish and bullheads	184,000	6,092			200	6	3,500	135	
Crappie	1,500	73							
Croaker	510,500	10,523			2,300	57	5,500	78	
Eels, common	1,300	115					1,500	60	
Flounders	2,500	120					7,200	79	
Gizzard shad	54,000	761	500	10	600	30			
Hickory shad					100	3			
Mullet							3,000	150	
Pike or pickerel	18,600	2,927					500	80	
Shad	4,800	311	3,200	280	72,700	7,896	38,600	3,886	
Spot	26,800	700					1,000	50	
Squeteagues or "sea trout":									
Gray	48,700	2,262	100	7	500	25	300	25	
Spotted	1,900	200							
Striped bass	463,000	38,139	67,200	5,083	269,500	20,555	247,600	20,200	
Sturgeon					160	14			
Suckers	700	33							
Sunfish	2,600	39							
White perch	76,700	2,872	200	16	4,800	300	27,000	1,488	
Yellow perch	40,700	3,061					1,900	125	
Crabs, soft and peelers	71,500	7,034							
Total	1,906,100	97,752	73,900	6,040	387,400	30,019	371,900	27,521	

Species	Lines				Pound nets		Fyke nets	
	Hand		Trot with baits or snoods					
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives					5,243,800	\$48,437	7,900	\$128
Black bass					2,200	185	33,700	3,572
Bluefish	20,000	\$2,000			19,300	1,657		
Bonito	5,000	200			1,900	95		
Butterfish					64,300	2,876	100	10
Cable or crab eater					100	5		
Carp					17,300	575	12,700	778
Catfish and bullheads					101,000	2,800	225,500	8,028
Crappie					300	28	700	35
Croaker					2,505,200	29,393	1,400	33
Drum:								
Black					9,000	99		
Red or redfish					2,500	42		
Eels:								
Common					9,000	553	4,900	409
Conger	200	2						
Flounders					58,900	3,122	3,000	150
Gizzard shad					71,100	690	1,700	23
Harvestfish					1,600	54		
Hickory shad					26,000	538		
Hogchoker					2,000	70		
King whiting or "kingfish"					3,700	195		
Mackerel					2,500	250		
Menhaden					62,800	328		
Mullet					400	12		
Pike or pickerel					1,700	242	23,100	3,291
Scup	10,000	100			12,000	170		
Sea bass	12,900	480						
Shad					478,100	48,429	100	10
Spanish mackerel					20,400	1,278		
Spot					32,100	893		
Squeteagues or "sea trout":								
Gray	3,000	240			1,016,500	32,588		
Spotted					6,300	587		
Striped bass					662,900	55,277	4,200	356
Suckers					300	9	3,500	167
Sunfish					400	19	6,000	123
Tautog	400	16						
White perch					217,700	7,827	110,200	4,534
Yellow perch					22,300	1,116	127,600	7,089
Crabs:								
Hard			20,529,100	\$381,830				
Soft and peelers			249,600	20,879	6,300	437	1,700	114
Squid					190,000	1,300		
Total	50,600	3,038	20,778,700	402,709	10,811,800	242,356	568,200	28,858

Fisheries of Maryland, 1938—Continued

CATCH: BY OEAR—Continued

Species	Dip nets		Pots							
			Crab		Eel		Fish			
			Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Catfish.....					3,000	\$90				
Eels, common.....					118,500	9,371				
Sea bass.....								30,000	\$1,200	
Shad.....	2,200	\$323								
Tautog.....								100	1	
Crabs:										
Hard.....	50,000	1,000	20,000	\$400						
Soft and peelers.....	715,800	65,872	27,500	1,925						
Lobsters.....								100	20	
Total.....	768,000	67,195	47,500	2,325	121,500	9,461		30,200	1,221	

Species	Scrapes		Dredges		Tongs		Rakes		By hand	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Crabs:										
Hard.....	100,000	\$2,000								
Soft and peelers.....	1,826,000	128,499								
Clams, hard, public.....					42,700	\$8,010	8,000	\$1,500	2,700	\$510
Oysters, market:										
Public, spring.....			815,500	\$48,995	4,484,800	265,164				
Public, fall.....			2,718,400	164,820	10,045,900	576,101				
Private, spring.....			79,600	6,032	421,400	59,747				
Private, fall.....			199,200	14,696	598,200	62,604				
Terrapin, diamond-back.....									4,500	2,579
Turtle, snapper.....									600	86
Total.....	1,926,000	180,499	3,812,700	224,543	15,593,000	971,626	8,000	1,500	7,800	3,125

OPERATING UNITS: BY COUNTIES

Item	Anne Arundel	Baltimore	Calvert	Caroline	Cecil	Charles	Dorchester	Harford
	Number	Number	Number	Number	Number	Number	Number	Number
Fishermen:								
On vessels.....	24	35	27			4	227	
On boats and shore:								
Regular.....	387	8	197	6	30	102	476	14
Casual.....	131	53	127	50	77	136	266	37
Total.....	542	96	351	56	107	242	969	51
Vessels:								
Motor.....	10		8			1	9	
Net tonnage.....	70		57			12	56	
Sail.....	1	7	2				42	
Net tonnage.....	19	161	37				407	
Total vessels.....	11	7	10			1	51	
Total net tonnage.....	89	161	94			12	468	
Boats:								
Motor.....	253	25	156	16	36	123	467	17
Other.....	117	28	82	18	40	27	83	20
Apparatus:								
Haul seines.....	37	5	9	6	15	23	4	9
Length, yards.....	5,023	645	1,555	1,490	3,485	3,655	1,800	2,655
Gill nets:								
Anchor.....		12			156			11
Square yards.....		1,641			39,941			3,264
Drift.....	3		1	60	8		83	9
Square yards.....	4,800		200	31,682	17,655	14,132	36,164	11,110
Stake.....	33	40	2	50	25	1,271	138	135
Square yards.....	5,000	5,939	80	167	2,075	91,790	5,062	17,829
Lines, trot with baits or snoods.....	85	30	61			95	680	
Baits or snoods.....	46,500	15,000	27,900			68,000	434,900	
Pound nets.....	30	5	15	12	39	27	117	6
Fyke nets.....	12	44		51	932	30	18	370
Dip nets.....	69	20	61				35	
Pots, eel.....	530	450			1,085	89	3,150	425
Dredges, oyster.....	2	14	8			2	84	
Yards at mouth.....	3	18	10			2	105	
Tongs, oyster.....	394		346			153	711	

Fisheries of Maryland, 1938—Continued

OPERATING UNITS: BY COUNTIES—Continued

Item	Kent	Prince Georges	Queen Annes	St. Marys	Somer-set	Talbot	Wicom-ico	Worcester
	Number	Number	Number	Number	Number	Number	Number	Number
Fishermen:				5	376	44	6	
On vessels.....								
On boats and shore:								
Regular.....	312	1	831	429	475	468	201	154
Casual.....	178	26	181	254	178	78	173	178
Total.....	490	27	512	683	1,029	590	380	327
Vessels:								
Motor.....					2			
Net tonnage.....					12			
Sail.....				1	74	9	1	
Net tonnage.....				32	954	68	25	
Total vessels.....				1	76	9	1	
Total net tonnage.....				32	966	68	25	
Boats:								
Motor.....	267	5	209	269	161	391	131	143
Other.....	57	13	42	226	596	57	49	143
Apparatus:								
Haul seines.....	27	9	17	8	5	2	1	1
Length, yards.....	4,635	1,105	2,610	2,220	50	450	500	130
Gill nets:								
Anchor.....	254							
Square yards.....	32,712							
Drift.....	22	1	3		9	12	63	21
Square yards.....	39,231	2,500	2,000		3,972	9,133	89,083	5,880
Stake.....	1,026	2	3		88	11	225	101
Square yards.....	123,340	40	750		2,088	522	7,588	10,130
Lines:								
Hand.....								100
Hooks.....								120
Trot with baits or snoods.....	137		81	128	139	223	4	103
Baits or snoods.....	102,800		64,800	101,900	105,200	162,600	3,200	82,000
Pound nets.....	29		4	78	33	87	26	40
Fyke nets.....	238	60	45	3	11	27	6	27
Dip nets.....			32	135	256	19		43
Pots:								
Crab.....					55			
Eel.....	1,212	35	2,245	12	35	4,943	25	
Fish.....								200
Scrapes.....					614			
Yards at mouth.....					614			
Dredges, oyster.....				2	190	18	2	58
Yards at mouth.....				3	235	21	3	42
Tongs:								
Oyster.....	334		492	581	162	468	303	81
Other.....								64
Rakes, oyster.....								56

CATCH: BY COUNTIES

Species	Anne Arundel		Baltimore		Calvert		Caroline	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	817,900	\$3,978	30,400	\$408	334,500	\$3,835	12,100	\$810
Black bass.....	100	15	200	21	100	10	1,000	105
Bluefish.....	5,300	370			700	56		
Butterfish.....	4,200	358						
Carp.....	5,300	306	2,300	99	5,100	236	7,700	500
Catfish and bullheads.....	15,200	481	20,600	574	13,000	391	14,300	429
Crapple.....	300	6					100	4
Croaker.....	264,300	6,224	100	4	87,500	523	2,500	75
Drum:								
Black.....					300	3		
Red or redfish.....	100	2			100	1		
Eels, common.....	12,100	917	7,200	591			200	12
Flounders.....	3,700	250	700	15	1,700	85		
Gizzard shad.....	11,200	153	9,200	142	600	14	3,700	110
Hickory shad.....	3,600	64			2,200	35		
Menhaden.....	2,800	28						

Fisheries of Maryland, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Anne Arundel		Baltimore		Calvert		Caroline	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Pike or pickerel.....	1,500	\$225	500	\$90	200	\$30	200	\$24
Shad.....	38,100	3,532	300	26	62,900	7,738	4,100	595
Spanish mackerel.....	4,200	374	.....	.....	.....	.....	.....	.....
Spot.....	21,000	699	400	8	1,000	15	.....	.....
Squeteagues or "sea trout":	.....	.....	.....	.....	.....	.....	.....	.....
Gray.....	428,100	13,925	1,600	124	7,000	210	1,100	55
Spotted.....	300	30	.....	.....	400	38	.....	.....
Striped bass.....	202,700	16,936	20,000	1,899	40,100	3,871	112,700	7,361
Suckers.....	100	3	.....	.....	.....	.....	800	33
Sunfish.....	100	3	.....	.....	.....	.....	.....	.....
White perch.....	30,500	1,330	26,100	1,074	4,200	251	78,300	2,601
Yellow perch.....	5,300	504	12,000	605	2,900	175	13,700	732
Crabs:	.....	.....	.....	.....	.....	.....	.....	.....
Hard.....	575,200	13,806	136,900	4,107	535,700	14,392	.....	.....
Soft and peelers.....	29,300	3,674	10,500	1,306	62,500	8,649	.....	.....
Oysters, market:	.....	.....	.....	.....	.....	.....	.....	.....
Public, spring.....	564,200	37,616	74,400	4,340	237,500	15,701	.....	.....
Public, fall.....	1,010,000	67,333	177,000	10,325	673,500	44,547	.....	.....
Private, spring.....	.....	.....	.....	.....	67,700	4,583	.....	.....
Private, fall.....	.....	.....	.....	.....	192,000	13,150	.....	.....
Total.....	4,057,300	178,145	530,400	25,758	2,283,400	118,539	262,500	13,146

Species	Cecil		Charles		Dorchester		Harford	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	681,900	\$3,514	86,200	\$722	327,000	\$3,673	163,200	\$1,470
Black bass.....	64,200	6,016	8,300	806	500	44	16,700	2,334
Bluefish.....	.....	.....	.....	.....	12,900	1,187	.....	.....
Butterfish.....	.....	.....	.....	.....	1,900	101	.....	.....
Carp.....	29,900	1,696	93,300	5,411	7,500	217	53,200	3,787
Catfish and bullheads.....	89,500	3,152	110,900	3,632	32,800	969	49,300	1,553
Crappie.....	800	42	200	20	300	28	600	20
Croaker.....	.....	.....	3,700	119	207,300	3,797	600	18
Drum:	.....	.....	.....	.....	.....	.....	.....	.....
Black.....	.....	.....	.....	.....	1,000	10	.....	.....
Red or redfish.....	.....	.....	.....	.....	1,900	29	.....	.....
Eels, common.....	18,500	1,379	1,000	86	33,300	2,164	6,600	595
Flounders.....	.....	.....	.....	.....	16,600	690	.....	.....
Gizzard shad.....	5,300	37	74,400	774	7,900	92	2,000	20
Hickory shad.....	1,700	35	100	2	3,500	69	400	18
Menhaden.....	.....	.....	.....	.....	60,000	300	.....	.....
Pike or pickerel.....	17,300	2,210	2,200	367	1,000	162	15,600	2,707
Shad.....	37,000	2,832	16,200	1,642	45,100	4,788	16,600	1,445
Spot.....	.....	.....	.....	.....	2,300	90	.....	.....
Squeteagues or "sea trout":	.....	.....	.....	.....	.....	.....	.....	.....
Gray.....	.....	.....	.....	.....	21,900	861	.....	.....
Spotted.....	.....	.....	.....	.....	900	65	.....	.....
Striped bass.....	45,400	3,607	95,300	7,114	328,400	24,652	47,300	4,015
Suckers.....	2,500	111	.....	.....	.....	.....	.....	.....
Sunfish.....	3,500	92	.....	.....	300	16	5,100	70
White perch.....	32,800	1,156	17,100	614	76,900	2,601	13,000	579
Yellow perch.....	60,500	2,517	16,000	1,387	1,100	54	24,300	1,308
Crabs:	.....	.....	.....	.....	.....	.....	.....	.....
Hard.....	.....	.....	833,200	21,629	7,655,800	130,151	.....	.....
Soft and peelers.....	.....	.....	13,000	1,160	183,000	14,527	.....	.....
Oysters, market:	.....	.....	.....	.....	.....	.....	.....	.....
Public, spring.....	.....	.....	98,100	5,125	1,221,000	78,706	.....	.....
Public, fall.....	.....	.....	227,000	11,754	2,407,400	156,438	.....	.....
Private, spring.....	.....	.....	8,000	600	.....	.....	.....	.....
Private, fall.....	.....	.....	64,400	4,836	.....	.....	.....	.....
Terrapin, diamond-back.....	.....	.....	.....	.....	2,100	1,779	.....	.....
Turtle snapper.....	600	36	.....	.....	.....	.....	.....	.....
Total.....	1,081,400	28,432	1,768,600	67,800	12,661,600	428,250	414,500	19,919

Fisheries of Maryland, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Kent		Prince Georges		Queen Annes		St. Marys	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alwives.....	206,400	\$2,299	200	\$10	11,000	\$178	641,600	\$7,086
Black bass.....	1,500	146	800	80				
Bluefish.....	3,100	310					1,800	144
Butterfish.....	2,600	250					600	59
Carp.....	4,100	155	55,100	3,193	10,800	569	4,400	137
Catfish and bullheads.....	37,900	1,325	40,400	1,718	26,600	1,088	9,700	286
Crappie.....			200	16				
Croaker.....	109,800	2,604	200	20	15,400	421	65,900	1,471
Drum:								
Black.....							700	11
Red or redfish.....							300	6
Eels, common.....	9,800	935	2,100	210	25,000	2,591	400	35
Flounders.....	1,100	65					4,800	308
Gizzard shad.....	7,100	191	800	10	1,800	34	5,000	105
Hickory shad.....	100	3					5,900	146
Mullet.....					200	8	100	3
Pike or pickerel.....	3,200	470	300	45			1,500	180
Shad.....	29,500	2,828	7,100	699			152,900	15,922
Spanish mackerel.....	4,300	194					100	10
Spot.....	19,300	404					3,300	107
Squeteagues or "sea trout":								
Gray.....	132,300	5,949					54,000	1,778
Spotted.....	3,300	340	300	30			900	70
Striped bass.....	359,100	32,512	3,100	310	35,100	3,182	107,300	8,828
Suckers.....			400	18	400	35		
White perch.....	61,200	2,352	6,300	225	24,100	1,113	16,500	655
Yellow perch.....	24,600	1,492	600	33	19,700	1,236	10,600	425
Crabs:								
Hard.....	472,300	14,168			866,200	21,654	1,117,500	27,937
Soft and peelers.....	13,400	2,155			34,200	4,384	95,100	13,597
Oysters, market:								
Public, spring.....	282,300	14,316			589,300	29,460	450,900	24,793
Public, fall.....	791,800	43,187			2,310,900	115,544	661,100	36,054
Private, spring.....							40,000	2,500
Private, fall.....							112,000	7,000
Total.....	2,580,000	128,650	126,900	6,617	3,970,700	181,477	3,564,900	140,632

Species	Somerset		Talbot		Wicomico		Worcester	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alwives.....	80,400	\$889	1,943,800	\$17,032	59,300	\$631	700	\$13
Bluefish.....	2,700	197	2,100	192			22,600	2,255
Bonito.....							6,900	295
Butterfish.....	600	30	600	45	1,500	75	53,000	1,990
Cabio or crab eater.....							100	5
Carp.....	300	11	3,400	122	2,000	86		
Catfish and bullheads.....	5,900	285	18,300	524	23,800	744		
Croaker.....	128,200	1,484	185,100	2,561	114,100	1,853	1,890,200	18,910
Drum:								
Black.....			2,000	25			5,000	50
Red or redfish.....	100	5						
Eels:								
Common.....	1,800	93	10,800	502	1,900	138	3,000	200
Conger.....							200	2
Flounders.....	3,900	208	1,700	84	2,200	212	29,500	1,535
Gizzard shad.....	2,100	23	100	1	3,900	82		
Harvestfish.....					500	24	1,000	30
Hickory shad.....	200	4	7,300	141	100	4	1,000	20
Hogchoker.....	2,000	70						
King whiting or "kingfish".....					200	20	3,500	175
Mackerel.....							2,500	250
Mullet.....							3,300	159
Pike or pickerel.....			200	20	200	20		
Scup.....							22,000	270
Sea bass.....							42,000	1,080
Shad.....	16,300	1,986	133,500	12,452	29,400	3,411	10,700	1,239
Spanish mackerel.....			800	95			11,000	605
Spot.....			3,600	110	3,000	60	5,400	150
Squeteagues or "sea trout":								
Gray.....	16,600	366	217,200	7,280	15,800	738	173,500	3,861
Spotted.....	100	10	1,000	84	1,000	100		
Striped bass.....	15,300	1,216	198,400	15,379	96,600	8,636	7,600	772
Sturgeon.....					100	14		
Suckers.....					300	9		
Tautog.....							500	17

Fisheries of Maryland, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Somerset		Talbot		Wicomico		Worcester	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
White perch.....	5,200	\$237	27,200	\$1,242	9,600	\$487	7,600	\$600
Yellow perch.....			10,000	861	1,200	65		
Crabs:								
Hard.....	2,717,800	\$52,106	3,957,400	\$53,318	32,800	\$492	1,798,300	\$31,470
Soft and peelers.....	2,346,400	164,923	23,800	2,338	1,200	96	86,000	7,961
Lobsters.....							100	20
Clams, hard, public.....							53,400	10,020
Oysters, market:								
Public, spring.....	997,800	58,205	675,900	39,547	108,900	6,350		
Public, fall.....	1,972,100	113,786	1,932,800	112,746	800,700	29,207		
Private, spring.....	40,000	3,002			15,400	1,168	329,900	53,936
Private, fall.....	86,400	6,470			84,600	6,339	258,000	39,505
Squid.....							130,000	1,300
Terrapin, diamond-back.....	2,400	800						
Total.....	8,444,600	406,406	9,387,000	266,701	1,210,900	61,031	4,958,500	179,285

VIRGINIA

Fisheries of Virginia, 1938

OPERATING UNITS: BY GEAR

Item	Purse seines men- haden	Haul selses	Gill nets			Lines, hand
			Drift	Run- around	Stake	
Fishermen:	Number	Number	Number	Number	Number	Number
On vessels.....	1,271					
On boats and shore:						
Regular.....		285	14	12	76	15
Casual.....		204	320	9	152	22
Total.....	1,271	489	334	21	228	37
Vessels:						
Steam.....	25					
Net tonnage.....	2,880					
Motor.....	8					
Net tonnage.....	765					
Total vessels.....	33					
Total net tonnage.....	3,645					
Boats:						
Motor.....		90	25	6	87	14
Other.....		198	199	6	139	2
Accessory boats.....	99					
Apparatus:						
Number.....	33	148	234	10	4,863	800
Length, yards.....	10,890	63,888				
Square yards.....			206,761	5,389	222,870	
Hooks, baits, or snoods.....						400

Item	Lines—Continued		Pound nets	Fyke nets		Dip nets	Otter trawls
	Trot with baits or snoods	Trot with hooks		Crab	Fish		
Fishermen:	Number	Number	Number	Number	Number	Number	Number
On vessels.....							132
On boats and shore:							
Regular.....	1,233	1	1,697	106	77	416	
Casual.....	873	5	306	31	102	538	
Total.....	1,606	6	2,003	137	179	954	182
Vessels, motor.....							28
Net tonnage.....							573
Boats:							
Motor.....	1,153		337	97	46	50	
Other.....	450	6	588	52	90	894	
Apparatus:							
Number.....	1,603	6	1,871	408	621	954	28
Yards at mouth.....							776
Hooks, baits, or snoods.....	928,900	1,600					

Fisheries of Virginia, 1938—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Slat traps	Pots				Scrapes	Dredges	
		Crab	Eel	Fish	Turtle		Crab	Oyster
Fishermen:	Number	Number	Number	Number	Number	Number	Number	Number
On vessels.....							311	126
On boats and shore:								
Regular.....		35	9	6		127	100	10
Casual.....	5	6	11	13	3			
Total.....	5	41	20	19	3	127	411	136
Vessels, motor.....							98	29
Net tonnage.....							1,011	401
Boats:								
Motor.....		31	6	5		117	80	5
Other.....	4	11	13	11	3			
Apparatus:								
Number.....	5	740	734	245	35	170	296	67
Yards at mouth.....						194	485	108

Item	Tongs		Rakes		Picks	By hand		Total, exclusive of duplication
	Oyster	Other	Oyster	Other		Oyster	Other	
Fishermen:	Number	Number	Number	Number	Number	Number	Number	Number
On vessels.....	6							1,789
On boats and shore:								
Regular.....	1,772	227	172	241	100	204	666	4,217
Casual.....	638	19	20				177	2,834
Total.....	2,416	246	192	241	100	204	843	8,840
Vessels:								
Steam.....								25
Net tonnage.....								2,850
Motor.....	3							149
Total net tonnage.....	20							2,598
Total vessels.....	3							174
Total net tonnage.....	20							5,478
Boats:								
Motor.....	1,303	167	73	32	35	81	124	3,324
Other.....	304	95	152	241	100	204	427	3,687
Accessory boats.....								99
Apparatus, number.....	2,098	241	192	241	100			

CATCH: BY GEAR

Species	Purse seines		Haul seines		Gill nets			
					Drift		Runaround	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....			100,700	\$1,289	12,500	\$237		
Bluefish.....			75,200	3,843	1,200	60	100	\$5
Butterfish.....			96,800	794				
Cable or crab eater.....			200	10				
Carp.....			462,000	30,326	2,700	81		
Catfish and bullheads.....			106,200	4,470			700	35
Croaker.....			4,635,900	55,602	26,700	437	39,000	875
Drum, red or redfish.....			23,800	811				
Eels, common.....			25,300	2,502				
Flounders.....			28,900	1,147				
Gizzard shad.....			141,700	2,001	300	6	20,000	300
Harvestfish.....			40,000	600				
Hickory shad.....			200	6	1,200	50		
King whiting or "kingfish".....			59,200	2,890				
Menhaden.....	93,612,000	\$358,798						
Mullet.....			1,600	64	2,500	150	2,600	84

Fisheries of Virginia, 1938—Continued

CATCH: BY GEAR—Continued

Species	Purse seines		Haul seines		Gill nets			
	Pounds	Value	Pounds	Value	Drift		Runaround	
					Pounds	Value	Pounds	Value
Pike or pickerel.....			1,300	\$242				
Shad.....			5,300	495	205,500	\$19,335		
Sharks.....			86,400	864				
Skates.....			2,400	82				
Spanish mackerel.....			4,600	337				
Spot.....			2,188,000	40,760	27,000	918	5,300	\$106
Squeteagues or "sea trout":								
Gray.....			325,100	5,997	4,500	224	500	20
Spotted.....			356,500	29,313	100	10		
Striped bass.....			105,900	8,246	6,500	612		
Swellfish.....			2,200	25				
White perch.....			33,100	1,140			500	15
Yellow perch.....			11,200	472				
Crabs, soft and peelers.....			17,700	2,480				
Total.....	93,612,000	\$358,798	8,936,400	195,808	290,700	22,020	68,700	1,140

Species	Gill nets—Con.		Lines					
	Stake		Hand		Trot with baits or snoods		Trot with hooks	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	900	\$21						
Bluefish.....			30,000	\$3,000				
Cable or crab eater.....			100	7				
Carp.....							2,300	\$69
Catfish and bullheads.....	500	20					2,000	70
Croaker.....			16,000	480				
Eels, common.....							200	14
Flounders.....			4,000	320				
King whiting or "kingfish".....			800	48				
Scup.....			30,000	600				
Sea bass.....			70,000	2,800				
Shad.....	125,100	13,864						
Spanish mackerel.....			2,000	160				
Squeteagues or "sea trout," gray.....			80,000	8,000				
Striped bass.....	205,100	18,076					500	50
White perch.....	1,600	128						
Crabs:								
Hard.....					22,434,000	\$324,614		
Soft and peelers.....					606,000	36,113		
Turtle, snapper.....			3,500	140				
Total.....	333,200	32,109	236,400	15,555	22,940,000	360,727	5,000	203

Species	Pound nets		Fyke nets				Dip nets	
	Pounds	Value	Crab		Fish		Pounds	Value
			Pounds	Value	Pounds	Value		
Alewives.....	17,504,900	\$161,386						
Bluefish.....	193,700	10,320			58,500	\$856		
Bonito.....	34,800	1,044			100	10		
Butterfish.....	2,850,900	36,216						
Cable or crab eater.....	22,400	1,044						
Carp.....	27,500	730	2,100	\$48	41,100	1,849		
Catfish and bullheads.....	177,900	6,889	16,300	815	231,300	8,874		
Croaker.....	33,080,800	407,019			43,600	850		
Drum:								
Black.....	116,700	1,022						
Red or redfish.....	78,800	995			500	7		
Eels, common.....	78,300	9,166	300	27	3,600	282		
Flounders.....	298,200	12,293			2,600	133		
Gizzard shad.....	166,600	1,765	600	10	97,400	1,148		
Harvestfish.....	448,500	7,693						
Hickory shad.....	135,600	2,505			2,500	61		
King whiting or "kingfish".....	101,700	4,689						
Mackerel.....	12,300	438						
Menhaden.....	1,408,500	2,150						

Fisheries of Virginia, 1938—Continued

CATCH: BY GEAR—Continued

Species	Pound nets		Fyke nets				Dip nets	
			Crab		Fish			
			Pounds	Value	Pounds	Value		
Mullet.....	13,800	\$546						
Pike or pickerel.....	200	30			700	\$98		
Scup.....	12,500	200						
Sea bass.....	1,100	44						
Shad.....	3,242,100	296,598			29,400	2,496		
Sharks.....	10,700	105						
Skates.....	6,200	33						
Spanish mackerel.....	430,400	29,039						
Spot.....	1,601,200	29,218			900	21		
Squeteagues or "sea trout":								
Gray.....	10,577,400	169,890			25,700	747		
Spotted.....	36,900	2,985			100	9		
Striped bass.....	774,400	59,001	200	\$14	62,400	5,394		
Sturgeon.....	9,400	1,460						
Swellfish.....	21,600	478						
White perch.....	187,500	4,533	4,700	141	80,500	2,822		
Whiting.....	1,200	36						
Yellow perch.....	4,600	310	300	24	36,500	2,463		
Crabs:								
Hard.....	100,700	1,058	49,900	1,207			172,500	\$3,019
Soft and peelers.....			206,300	27,873			677,300	59,762
Shrimp.....	8,000	980						
Squid.....	165,900	1,842						
Total.....	73,923,900	1,265,750	280,600	30,159	717,400	28,120	849,800	62,781

Species	Otter trawls		Slat traps		Pots			
					Crab		Eel	
					Pounds	Value	Pounds	Value
Alowives.....	400	\$3						
Bluefish.....	2,800	176	13,000	\$265				
Butterfish.....	192,800	4,950						
Carp.....			1,500	48				
Catfish and bullheads.....			700	36				
Cod.....	400	13						
Croaker.....	5,442,500	93,856						
Drum:								
Black.....	100	2						
Red or redfish.....	31,000	476						
Eels:								
Common.....							48,700	\$4,726
Conger.....	3,700	45						
Flounders.....	438,400	28,436						
Hake.....	12,100	179						
Hickory shad.....	100	1	800	28				
Hogfish.....	400	8						
King whiting or "kingfish".....	99,300	3,795						
Mackerel.....	5,100	451						
Mullet.....	2,900	101						
Pollock.....	100	1						
Sand perch.....	7,300	97						
Scup.....	2,301,300	37,450						
Sea bass.....	230,500	10,163						
Sea robin.....	3,000	30						
Shad.....	200	11						
Sharks.....	140,200	1,787						
Spot.....	43,400	851						
Squeteagues or "sea trout":								
Gray.....	1,534,200	40,987						
Spotted.....	100	5						
Sturgeon.....	6,300	776						
Swellfish.....	10,000	277						
Tautog.....	1,100	18						
Tomcod.....	7,400	79						
White perch.....	2,100	26	200	12				
Whiting.....	138,300	2,534						
Crabs, hard.....					251,700	\$4,450		
Lobsters.....	1,400	157						
Squid.....	67,100	1,009						
Total.....	10,726,000	228,750	16,200	389	251,700	4,450	48,700	4,726

Fisheries of Virginia, 1938—Continued

CATCH: BY GEAR—Continued

Species	Pots—Continued				Scrapes		Dredges	
	Fish		Turtle		Pounds	Value	Pounds	Value
Catfish and bullheads.....	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Eels, common.....	128,600	\$5,238						
Crabs:	6,300	281						
Hard.....					280,000	\$3,820	5,391,600	\$147,780
Soft and peelers.....					542,300	34,971		
Oysters, market:								
Private, spring.....					46,000	4,500	1,482,600	127,719
Private, fall.....					48,200	4,680	2,992,800	225,280
Turtle, snapper.....			7,100	\$850				
Total.....	133,900	5,519	7,100	850	916,500	47,871	9,867,000	500,779

Species	Tongs		Rakes		Picks		By hand	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Crabs:								
Hard.....							10,000	\$150
Soft and peelers.....							833,000	49,980
Clams:								
Hard, public.....	984,500	\$92,548	344,000	\$47,080	420,000	\$78,750	1,009,300	151,670
Hard, private.....	52,200	5,000						
Soft, public.....							2,500	1,000
Mussels, sea.....							30,000	900
Oysters, market:								
Public, spring.....	1,562,700	138,645					48,500	3,210
Public, fall.....	2,634,800	238,856					67,000	5,740
Private, spring.....	1,157,300	102,780	618,500	47,625			202,300	14,799
Private, fall.....	1,722,800	156,041	1,093,100	74,815			322,700	27,023
Terrapin, diamond-back.....							4,300	150
Total.....	8,164,300	733,870	2,055,600	169,420	420,000	78,750	2,529,600	254,619

OPERATING UNITS: BY COUNTIES

Item	Acco- mac	Caro- line	Charles City	Ches- terfield	Din- widdle	Eliza- beth City	Essex	Fairfax
Fishermen:	Number	Number	Number	Number	Number	Number	Number	Number
On vessels.....	12					116		
On boats and shore:								
Regular.....	1,014		4	13		182	67	2
Casual.....	262	6	77	46	4	19	51	60
Total.....	1,288	6	81	58	4	317	118	62
Vessels, motor.....	3					26		
Net tonnage.....	52					443		
Boats:								
Motor.....	791		3	1		63	53	22
Other.....	741	2	58	26	3	30	26	26
Apparatus:								
Haul seines.....	14		6	11			6	8
Length, yards.....	8,770		1,600	4,750			1,250	1,800
Gill nets:								
Drift.....	2	3	57	13	1			15
Square yards.....	900	2,250	61,000	10,660	500			12,000
Stake.....	60						170	
Square yards.....	1,440						5,181	
Lines:								
Hand.....	100							
Hooks.....	200							
Trot with baits or snoods.....	394					30	7	
Baits or snoods.....	233,700					18,800	1,600	
Trot with hooks.....				2			1	
Hooks.....				600			300	
Pound nets.....	208					168	3	
Fyke nets, fish.....	5	1	13	1			3	232
Dip nets.....	198						3	
Otter trawls.....						10		
Yards at mouth.....						290		
Slat traps.....				2	3			

Fisheries of Virginia, 1938—Continued
OPERATING UNITS: BY COUNTIES—Continued

Item	Mathews	Middlesex	Nansemond	New Kent	Norfolk	Northampton	Northumberland	Prince George
	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Fishermen:								
On vessels.....	79	5	4		54	3	753	
On boats and shore:								
Regular.....	471	220	125	2	43	523	318	
Casual.....	300	208	8	36	68	80	352	27
Total.....	850	433	137	38	163	606	1,433	27
Vessels:								
Steam							16	
Net tonnage.....							1,924	
Motor							6	
Net tonnage.....	23	2	1		9	12	490	
.....	279	35	8		219	1		
Total vessels.....	23	2	1		9	1	22	
Total net tonnage.....	279	35	8		219	12	2,414	
Boats:								
Motor.....	207	261	60	4	16	160	354	2
Other.....	302	125	29	27	98	521	590	17
Accessory boats.....							60	
Apparatus:								
Purse seines, menhaden.....							20	
Length, yards.....							6,800	
Haul seines.....	7	8		2	3	4	10	2
Length, yards.....	5,625	6,625		425	1,600	1,300	475	1,000
Gill nets:								
Drift.....	3			19			2	17
Square yards.....	2,700			17,300		756		12,500
Runaround.....			4	1				
Square yards.....			1,422	180				
Stake.....			38	106				
Square yards.....			1,300	2,568				
Lines:								
Trot with baits or snoods.....	71	84	28	2	69	115	162	
Baits or snoods.....	31,400	40,700	9,000	700	20,100	51,500	108,200	
Trot with hooks.....				1				1
Hooks.....				300				300
Pound nets.....	544	14			32	121	291	
Fyke nets:								
Crab.....	62	16					227	
Fish.....	2		30	21				4
Dip nets.....	80	45			15	50	320	
Otter trawls.....	4				3			
Yards at mouth.....	115				90			
Pots:								
Crab.....							683	
Fish.....				15				45
Scrapes.....		6						
Yards at mouth.....		8						
Dredges:								
Crab.....	32	4			2	2	4	
Yards at mouth.....	59	7			3	4	8	
Oyster.....	10		2		16	5		
Yards at mouth.....	16		3		32	6		
Tongs:								
Oyster.....	134	383	112			32	155	
Other.....	20					5		
Rakes:								
Oyster.....							112	
Other.....						200		

Fisheries of Virginia, 1938—Continued

OPERATING UNITS: BY COUNTIES—Continued

Item	Princess Anne	Prince William	Richmond	Stafford	Surry	Warwick	Westmoreland	York
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....						9		170
On boats and shore:								
Regular.....	52		59	28		8	252	164
Casual.....	32	51	58	44	18	12	299	36
Total.....	84	51	117	72	18	29	551	370
Vessels, motor						2		53
Net tonnage.....						34		527
Boats:								
Motor.....	7	18	33	20	5	6	367	133
Other.....	54	25	52	26	9	19	140	56
Apparatus:								
Haul seines.....	8	11	1	11	3		8	13
Length, yards.....	1,775	3,050	200	3,050	900		2,600	12,100
Gill nets:								
Drift:		3			2			
Square yards.....		2,560			2,560			
Runaround:								
Square yards.....								3,600
Stake:		284	712	64	20		8	
Square yards.....		13,680	20,720	35,632	800		800	
Lines:								
Trot with baits or snoods.....	37		5	9		12	201	47
Baits or snoods.....	11,100		1,500	3,800		4,300	103,400	39,600
Pound nets.....	4		40	7		16	58	34
Fyke nets:								
Crab:								
Fish.....		53	2	38	26	23	37	10
Dip nets.....						5	24	10
Otter trawls.....						1	60	10
Yards at mouth.....						25		256
Pots:								
Crab.....							57	
Eel.....		40		370			300	
Fish.....					40			
Dredges:								
Crab.....						2		148
Yards at mouth.....						4		239
Oyster.....								6
Yards at mouth.....								9
Tongs:								
Oyster.....	15		50				305	30
Other.....	2							94

CATCH: BY COUNTIES

Species	Accomac		Caroline		Charles City		Chesterfield	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	546,100	\$4,273			2,400	\$24	15,800	\$324
Bluefish.....	45,200	3,840						
Bonito.....	700	21						
Butterfish.....	535,100	8,438						
Cable or crab eater.....	7,800	442						
Carp.....			300	\$18	52,200	1,566	91,000	2,730
Catfish and bullheads.....			500	25	83,200	3,328	9,300	872
Croaker.....	2,633,200	26,907						
Drum:								
Black.....	92,200	878						
Red or redfish.....	51,700	651						
Eels, common.....	10,400	1,224			2,500	116	400	16
Flounders.....	41,100	1,996						
Gizzard shad.....					6,500	97	8,300	166
Harvestfish.....	19,100	382						
Hickory shad.....	7,600	155					200	10
King whiting or "kingfish".....	11,400	578						
Mackerel.....	12,300	438						
Menhaden.....	33,000	109						
Scup.....	42,500	800						
Sea bass.....	70,000	2,800						
Shad.....	197,800	18,915	600	90	65,900	5,272	10,300	1,030
Sharks.....	500	5						
Skates.....	1,200	8						
Spanish mackerel.....	7,100	509						
Spot.....	123,700	3,098						

Fisheries of Virginia, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Accomac		Caroline		Charles City		Chesterfield	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Squeteagues or "sea trout":								
Gray	1,813,200	\$55,235						
Spotted	40,000	3,600						
Striped bass	31,700	2,536	100	\$15	3,600	\$432	9,400	\$752
Sturgeon	600	90						
White perch	18,200	314	300	45	2,300	115	4,000	160
Whiting	1,200	36						
Yellow perch					300	15		
Crabs:								
Hard	7,385,500	96,954						
Soft and peelers	1,587,300	100,122						
Clams, hard, public	1,226,000	224,050						
Mussels, sea	30,000	900						
Oysters, market:								
Public, spring	153,500	11,810						
Public, fall	336,500	24,515						
Private, spring	427,000	32,770						
Private, fall	919,600	61,380						
Squid	25,300	436						
Total	18,463,300	691,215	1,800	193	218,900	10,985	148,700	5,660

Species	Dinwiddle		Elizabeth City		Essex		Fairfax	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives	1,600	\$37	865,500	\$6,924	2,400	\$51		
Bluefish			27,800	1,987				
Butterfish			263,700	3,640				
Cable or crab eater			4,900	147				
Carp	300	12	400	4	3,600	144	64,200	\$6,196
Catfish and bullheads	400	24	14,500	447	5,200	208	115,100	4,709
Cod			200	4				
Croaker			7,250,200	103,903	10,000	500		
Drum:								
Black			3,800	39				
Red or redfish			11,900	160				
Eels:								
Common			2,600	194	200	20	25,700	2,570
Conger			2,200	27				
Flounders			235,600	13,619				
Gizzard shad			4,800	72	8,200	82		
Hake			6,000	74				
Harvestfish			117,100	1,758				
Hickory shad	800	28	9,000	179	200	8		
Hogfish			100	2				
King whiting or "kingfish"			67,600	2,641				
Mackerel			4,400	416				
Menhaden			235,800	472				
Mullet			2,900	101				
Pike or pickerel							300	42
Pollock			100	1				
Sand perch			3,300	44				
Scup			873,700	13,281				
Sea bass			60,100	2,615				
Sea robin			500	5				
Shad			270,400	29,731	3,200	395	37,400	3,900
Sharks			34,600	425				
Spanish mackerel			37,200	2,904				
Spot			193,200	2,890	800	24		
Squeteagues or "sea trout," gray			2,211,200	35,344	1,200	36		
Striped bass			134,400	12,096	2,400	240	8,500	595
Sturgeon			5,400	764				
Swallowfish			13,500	408				
Tautog			800	10				
Tomcod			1,600	19				
White perch	200	12	52,100	1,442	4,300	298	42,200	1,266
Whiting			121,900	2,282				
Yellow perch					100	15	21,400	1,498
Crabs, hard			1,218,000	28,542	42,000	745		
Lobsters			600	61				
Shrimp			1,000	100				
Clams, hard, public			20,600	1,610				
Oysters, market:								
Public, spring					110,000	11,775		
Public, fall					110,000	11,775		
Private, spring			347,000	30,118	56,000	6,000		
Private, fall			730,500	57,512	98,000	10,500		
Squid			26,000	426				
Total	3,300	113	15,481,700	362,010	457,800	42,816	314,800	20,776

Fisheries of Virginia, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Gloucester		Henrico		Isle of Wight		James City	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives	378,200	\$2,890	700	\$14	33,500	\$508	8,600	\$108
Bluefish	1,600	80					100	7
Butterfish	84,900	630						
Cable or crab eater	1,300	60						
Carp			3,300	102	16,300	489	8,900	847
Catfish and bullheads	200	10	2,000	80	40,300	1,339	77,000	3,080
Croaker	6,044,900	75,306			13,000	280	700	14
Eels, common	2,500	250			2,200	132	3,200	202
Flounders	13,400	670			1,800	90	200	12
Gizzard shad	400	8	3,100	81	44,000	440	5,000	25
Harvestfish	17,900	267						
Hickory shad	8,500	70			900	27	1,200	24
King whiting or "kingfish"	1,400	70						
Menhaden	9,600	48						
Mullet					2,000	60		
Shad	92,600	8,667	3,700	300	42,500	4,539	47,200	4,910
Spanish mackerel	2,400	168						
Spot	43,000	651						
Squeteagues or "sea trout":								
Gray	719,400	10,760			7,000	210	200	12
Spotted	300	24						
Striped bass	16,700	1,340	2,100	168	35,700	2,901	18,500	1,480
White perch	1,600	33	2,300	92	9,800	892	3,100	116
Yellow perch					600	36	100	6
Crabs:								
Hard	2,477,000	38,924			633,000	12,660	800	16
Soft and peelers	26,700	2,200						
Clams:								
Hard, public	362,700	27,200						
Soft, public	2,500	1,000						
Oysters, market:								
Public, spring	10,000	800					2,400	180
Public, fall	33,000	2,600					1,200	90
Private, spring	94,100	8,242						
Private, fall	265,100	22,647			8,600	256		
Terrapin, diamond-back	4,800	150						
Turtle, snapper							10,600	990
Total	10,661,200	205,666	17,200	787	886,200	24,338	189,000	11,610

Species	King and Queen		King George		King William		Lancaster	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives			16,300	\$163	25,700	\$288	4,811,000	\$48,110
Bluefish							8,100	405
Butterfish							8,600	94
Cable or crab eater							2,100	86
Carp			3,700	111			500	15
Catfish and bullheads			30,700	1,228	500	15	200	8
Croaker							1,480,200	16,939
Drum:								
Black							3,700	20
Red or redfish							2,800	28
Eels, common			2,500	260			3,000	300
Flounders							17,700	708
Gizzard shad			64,100	641	1,200	12	5,300	35
Harvestfish							5,900	94
Hickory shad					200	6	13,200	260
King whiting or "kingfish"							700	21
Menhaden							33,576,000	128,966
Pike or pickerel			1,600	290				
Shad	17,800	\$2,136	2,500	246	31,900	3,482	397,100	31,768
Spanish mackerel							400	28
Spot							69,800	863
Squeteagues or "sea trout":								
Gray							1,027,400	15,507
Spotted							6,000	438
Striped bass	500	50	30,700	2,763	1,700	136	90,000	6,200
Sturgeon							200	26
White perch			20,800	1,040	200	10	13,500	282
Yellow perch			4,400	308	300	27	700	42
Crabs:								
Hard			294,000	7,350	40,000	800	2,652,500	46,419
Soft and peelers							247,800	19,570
Oysters, market:								
Public, spring							234,000	23,400
Public, fall	1,800	150					623,000	62,300
Private, spring							306,000	30,600
Private, fall							353,100	35,310
Total	20,100	2,336	461,300	14,290	101,700	4,776	45,950,000	468,826

Fisheries of Virginia, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Mathews		Middlesex		Nansemond		New Kent	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	2,968,000	\$20,776	44,600	\$565			83,300	\$1,166
Bluefish.....	49,100	2,461	12,700	716				
Butterfish.....	271,700	4,747						
Carp.....			10,200	304			200	6
Catfish and bullheads.....	500	15	9,000	240	2,400	\$103	23,100	753
Cod.....	100	6						
Croaker.....	15,921,900	201,731	356,400	3,481	24,000	480		
Drum:								
Black.....	900	6						
Red or redfish.....	2,000	13	600	36				
Eels:								
Common.....							600	30
Conger.....	1,000	11						
Flounders.....	153,500	8,803	1,300	68			400	20
Gizzard shad.....	14,200	102	24,900	345	51,000	765	7,800	65
Hake.....	800	12						
Harvestfish.....	161,100	3,022						
Hickory shad.....	34,700	694	400	8			200	6
King whiting or "kingfish".....	4,800	208						
Mackerel.....	200	6						
Menhaden.....	372,000	465						
Mullet.....	14,300	572					600	24
Scup.....	181,400	4,578						
Sea bass.....	81,900	3,890						
Shad.....	1,387,100	124,839	6,200	680	7,100	819	18,800	1,986
Skates.....			2,400	82				
Spanish mackerel.....	164,300	10,008						
Spot.....	940,100	19,049	40,500	958				
Squeteagues or "sea trout":								
Gray.....	2,142,900	23,669	23,900	733	15,000	450	700	21
Spotted.....	34,200	2,733	20,100	1,400				
Striped bass.....	69,000	4,830	29,800	2,076	10,000	900	3,600	365
Sturgeon.....	4,800	759						
Tautog.....	100	2						
Tomcod.....	200	2						
White perch.....	5,000	147	3,500	58	8,000	250	2,500	100
Whiting.....	4,700	56						
Yellow perch.....			8,500	294			300	15
Crabs:								
Hard.....	1,988,700	36,673	1,181,000	16,040	235,000	3,525	12,000	240
Soft and peolers.....	160,800	25,697	75,500	7,046				
Lobsters.....	700	86						
Clams, hard, public.....	56,000	5,900						
Oysters, market:								
Public, spring.....	115,200	9,600	397,300	39,730	25,000	2,000		
Public, fall.....	203,800	18,496	436,300	43,630	150,900	12,000		
Private, spring.....	100,900	9,692	200,800	19,780	75,000	6,000		
Private, fall.....	217,800	19,808	230,600	22,620	124,000	9,800		
Squid.....	11,800	170						
Total.....	27,832,200	563,723	3,125,500	160,890	726,500	37,092	154,100	4,797

Species	Norfolk		Northampton		Northumberland		Prince George	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	245,400	\$1,841	203,900	\$1,526	6,833,700	\$68,437	3,100	\$62
Bluefish.....	37,900	1,903	25,200	1,260	20,700	1,030		
Bonito.....			34,100	1,023				
Butterfish.....	651,400	5,185	780,900	11,714	9,400	146		
Cabio or crab eater.....	1,000	60	1,700	85	2,400	106		
Carp.....					22,600	541	16,000	480
Catfish and bullheads.....					1,500	60	18,600	744
Croaker.....	1,829,300	26,653	888,800	8,888	436,400	6,099		
Drum:								
Black.....			11,000	55	5,200	26		
Red or redfish.....	16,700	271	14,300	143	3,900	28		
Eels:								
Common.....			22,400	4,860	12,900	1,032	300	9
Conger.....	300	4						
Flounders.....	77,100	4,184	12,000	483	30,100	1,108		
Gizzard shad.....			1,200	12	13,900	143		
Hake.....	3,200	69						
Harvestfish.....	112,500	1,691	800	16	6,900	138		
Hickory shad.....	26,500	400	2,500	38	33,300	563	1,000	40
Hogfish.....	100	3						
King whiting or "kingfish".....	58,900	2,788	5,100	255	300	11		

Fisheries of Virginia, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Norfolk		Northampton		Northumberland		Prince George	
	Pounds 200	Value \$17	Pounds	Value	Pounds	Value	Pounds	Value
Mackerel.....								
Menhaden.....					60,794,100	\$230,888		
Mullet.....			3,000	\$170	600	18		
Scup.....	628,800	12,520						
Sea bass.....	64,400	2,478	1,100	44				
Sea robin.....	700	9						
Shad.....	102,000	9,680	33,300	3,500	618,600	50,555	24,100	\$1,928
Sharks.....	2,500	56	10,200	100				
Skates.....					5,000	25		
Spanish mackerel.....	86,500	6,525	80,000	5,600	2,700	146		
Spot.....	1,181,800	23,029	89,200	1,900	24,400	367		
Squeteaguos or "sea trout":								
Gray.....	362,800	8,118	2,621,200	39,333	430,700	8,615		
Spotted.....	61,600	5,585	3,300	330	8,900	712		
Striped bass.....	1,700	136	42,000	3,360	264,600	17,822	800	64
Sturgeon.....	400	60	200	36	400	60		
Swallowfish.....	10,000	150						
Tautog.....	100	5						
White perch.....			10,500	105	13,700	318	400	20
Whiting.....	3,500	60						
Yellow perch.....					300	24		
Crabs:								
Hard.....	628,400	9,795	1,208,000	15,689	3,188,300	55,709		
Soft and peelers.....	1,800	360	490,100	29,406	187,000	22,546		
Lobsters.....	100	10						
Shrimp.....	7,000	880						
Clams:								
Hard, public.....			698,600	80,500				
Hard, private.....			52,200	5,000				
Oysters, market:								
Public, spring.....			20,000	1,600	210,000	16,000		
Public, fall.....			60,000	5,250	325,200	24,400		
Private, spring.....	803,300	66,048	509,800	40,299	191,400	13,333		
Private, fall.....	1,573,100	112,255	648,200	54,155	315,200	24,423		
Squid.....	14,200	229	140,600	1,408				
Total.....	8,593,100	304,503	8,735,400	318,100	74,004,300	551,429	64,300	3,347

Species	Princess Anne		Prince William		Richmond		Stafford	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	2,700	\$13	500	\$8	14,000	\$280		
Bluefish.....	18,400	920						
Butterfish.....	516,900	5,714						
Cabio or crab eater.....	500	25						
Carp.....			149,200	12,908	5,000	150	71,500	\$5,800
Catfish and bullheads.....			14,900	745	20,600	824	126,400	5,096
Croaker.....	654,000	7,869			20,800	624		
Drum, red or redfish.....	15,500	238						
Eels, common.....			900	101	3,600	300	30,100	3,085
Flounders.....	6,300	189			600	30		
Gizzard shad.....			2,300	46	33,800	340	84,500	1,270
Harvest fish.....	40,000	600						
Hickory shad.....					400	12		
King whiting or "kingfish".....	60,000	2,400						
Pike or pickerel.....								
Shad.....	3,800	342	13,900	1,390	25,300	2,450	200	23
Shad.....	53,100	3,717					9,600	936
Spanish mackerel.....	566,100	8,402			1,200	36		
Spot.....								
Squeteaguos or "sea trout":								
Gray.....	219,800	3,176			5,000	120		
Spotted.....	36,400	2,912			300	27		
Striped bass.....	5,700	450	40,600	3,248	17,700	1,720	155,200	18,997
White perch.....			9,100	273	12,900	463	5,400	235
Yellow perch.....			4,400	396	1,800	91	9,500	470
Crabs, hard.....	555,000	8,325			30,000	600	48,000	1,440
Clams, hard, public.....	300	42						
Oysters, market:								
Public, spring.....					58,800	5,800		
Public, fall.....					86,800	8,680		
Private, spring.....	35,000	4,000			49,000	4,900		
Private, fall.....	70,000	8,000			70,000	7,000		
Total.....	2,859,500	57,285	235,800	19,115	457,100	34,447	540,400	32,350

Fisheries of Virginia, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Surry		Warwick		Westmoreland		York	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	2,500	\$50	19,900	\$159	503,500	\$5,035	58,000	\$420
Bluefish.....	100	10	300	21	4,400	200	51,500	2,574
Butterfish.....			7,500	182	1,400	21	68,800	1,549
Cabio or crab eater.....							1,000	50
Carp.....	2,000	60	4,000	160	13,500	1,008		
Catfish and bullheads.....	29,600	1,327	6,300	192	32,200	1,475		
Cod.....							100	3
Croaker.....			255,400	5,484	49,600	720	5,415,700	73,041
Drum, red or redbfish.....			2,500	40			11,700	181
Eels:								
Common.....					25,600	2,304	100	3
Conger.....			100	2			100	1
Flounders.....			17,300	982	1,200	60	162,500	9,407
Gizzard shad.....	4,000	60	3,000	43	45,000	530		
Hake.....			200	4			1,900	20
Harvestfish.....			2,200	25			16,000	300
Hickory shad.....	100	3	1,200	18	3,200	100	100	2
Hogfish.....							200	3
King whiting or "kingfish".....			5,600	234	400	8	44,800	1,708
Mackerel.....							300	13
Pike or pickerel.....	100	15						
Sand perch.....			700	10			3,300	43
Scup.....			56,400	774			563,000	6,297
Sea bass.....			2,900	133			21,200	1,059
Sea robin.....			900	6			900	10
Shad.....	5,000	481	14,200	1,528	73,400	5,874	44,300	4,430
Sharks.....			33,200	387			156,300	1,783
Spanish mackerel.....					400	28	2,900	203
Spot.....			2,900	56	1,700	42	588,900	9,889
Squeteagues or "sea trout":								
Gray.....	200	4	64,200	1,541	118,400	2,072	763,000	17,909
Spotted.....							182,700	14,616
Striped bass.....	10,100	874	28,100	2,529	80,400	5,621	19,700	1,591
Sturgeon.....							3,700	443
Swellfish.....			500	42			9,800	180
Tautog.....							100	1
Tomcod.....							5,600	58
White perch.....	2,900	116	5,200	104	36,100	983	2,100	30
Whiting.....			300	6			7,900	130
Yellow perch.....					400	32		
Crabs:								
Hard.....			82,200	1,546	1,485,900	26,071	3,305,100	78,035
Soft and peelers.....			300	55	24,100	4,017	1,200	160
Clams, hard, public.....							393,600	30,746
Oysters, market:								
Public, spring.....					272,000	19,040	3,000	220
Public, fall.....					380,000	30,400	4,200	310
Private, spring.....					84,000	5,880	227,400	19,363
Private, fall.....					54,000	4,320	508,800	37,851
Squid.....			1,200	18			10,900	166
Total.....	56,600	3,000	618,700	16,261	3,291,100	115,841	12,659,100	314,798

SHAD AND ALEWIFE FISHERIES OF THE POTOMAC RIVER

The catch of shad in the Potomac River in 1938 amounted to 192,560 in number, 519,635 pounds in weight, and their total value to the fishermen was \$47,385. The catch of alewives for the same season amounted to 9,248,000 in number, with a total weight of 3,695,200 pounds, and a value to the fishermen of \$36,990. These figures show an increase of 19 percent in weight and 17 percent in the value of shad as compared with 1937, and an increase of 22 percent in weight and 27 percent in the value of alewives.

Approximately 84 percent of the shad, in weight, were taken with pound nets, and 16 percent with gill nets. Over 99 percent of the alewives were taken with pound nets, the remainder being taken with gill nets.

Statistics of the catch of shad and alewives in the Potomac River are also included in the catch data for Maryland and Virginia which are published elsewhere in this report.

Shad and alewife fisheries of the Potomac River, 1938

Item	Maryland			Virginia			Total		
	Number	Pounds	Value	Number	Pounds	Value	Number	Pounds	Value
Fishermen on boats and shore:									
Regular.....	27			236			262		
Casual.....	49			128			177		
Total.....	76			363			439		
Boats:									
Motor.....	35			127			162		
Other.....	7			129			136		
Apparatus:									
Haul seines.....	2	.					2		
Length, yards.....	200						200		
Gill nets:									
Drift.....	7			18			25		
S q u a r e									
y a r d s.....	16,682			14,560			31,192		
S t a k e.....	1,022			639			1,661		
S q u a r e									
y a r d s.....	73,436			76,497			148,933		
P o u n d n e t s.....	39			283			302		
F y k e n e t s.....				53			53		
Shad caught:									
With haul seines.....	207	600	\$39				207	600	\$39
With drift gill nets.....	4,475	14,300	1,331	12,845	39,700	\$4,130	17,320	54,000	5,461
With stake gill nets.....	2,160	6,500	758	8,467	22,800	2,282	10,627	29,300	3,020
With pound nets.....	10,136	29,835	3,058	164,137	405,600	35,777	164,273	435,435	38,835
With fyke nets.....				133	300	30	133	300	30
Total.....	16,978	51,235	5,186	175,582	468,400	42,199	192,560	519,635	47,385
Alewives caught:									
With drift gill nets.....	5,000	2,000	20				5,000	2,000	20
With stake gill nets.....	500	200	2	1,250	500	8	1,750	700	10
With pound nets.....	970,000	384,000	8,775	8,271,250	3,308,500	33,185	9,241,250	3,692,500	36,960
Total.....	975,500	386,200	3,797	8,272,500	3,309,000	33,193	9,248,000	3,695,200	36,990

TRADE IN FISHERY PRODUCTS IN WASHINGTON, D. C.

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 15 firms have stalls in this market, 3 are located in the immediate vicinity of the market, 2 have stalls in the market located at Fifth and K Streets NW., and 1 is located in another part of the city. Altogether there are 21 firms which employ 179 persons who received \$206,071 in salaries and wages during 1938. These firms conduct mainly a wholesale business although some retail trade is carried on.

The facilities for handling fish and oysters from boats and vessels that may land at the wharf are good, but only a comparatively small quantity are brought into the city by this method. In the fall and winter, considerable quantities of shell oysters are landed, but most of the oysters handled in Washington are brought in already shucked from Maryland and Virginia by truck and other transportation facilities.

FISHERIES OF THE SOUTH ATLANTIC AND GULF STATES

(South Atlantic, Area XXIV; Gulf, Area XXV) ¹⁰

The yield of the commercial fisheries of the marine areas of the South Atlantic and Gulf States (North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas) during 1938 amounted to 621,858,100 pounds, valued at \$13,073,403 to the fishermen, representing an increase of 14 percent in quantity but a decrease of 8 percent in value as compared with the catch of the previous year. These fisheries provided employment for 29,588 fishermen as compared with 30,244 in 1937.

There were 742 fishery wholesale and manufacturing establishments in these States in 1938, as compared with 725 in 1937. In 1938 these establishments employed 18,167 persons, paid \$3,452,182 in salaries and wages, and produced manufactured products (canned, cured, packaged, and byproducts) valued at \$11,762,783. In 1937 wholesale and manufacturing firms employed 18,534 persons, paid \$3,863,777 in salaries and wages, and produced manufactured products valued at \$15,110,653.

Fisheries of the South Atlantic and Gulf States, 1938

SUMMARY OF CATCH

Product	North Carolina		South Carolina		Georgia	
	Pounds	Value	Pounds	Value	Pounds	Value
Fish.....	188,426,900	\$1,687,299	1,578,700	\$80,104	7,390,800	\$41,335
Shellfish, etc.....	10,337,700	362,777	6,331,900	193,894	12,444,800	339,553
Total.....	198,764,600	1,950,076	7,910,600	273,998	19,835,600	380,888

Product	Florida		Alabama		Mississippi	
	Pounds	Value	Pounds	Value	Pounds	Value
Fish.....	222,349,800	\$3,318,000	5,402,200	\$224,236	1,099,600	\$62,090
Shellfish, etc.....	19,093,100	1,670,084	5,515,100	225,371	13,160,200	540,029
Total.....	241,442,900	4,988,084	10,917,300	449,607	14,259,800	603,019

Product	Louisiana		Texas		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
Fish.....	1,496,100	\$104,746	6,162,200	\$403,949	433,896,300	\$5,321,759
Shellfish, etc.....	102,387,000	3,280,768	18,692,000	632,268	187,961,800	7,251,644
Total.....	103,883,100	3,391,514	24,844,200	1,036,217	621,858,100	13,073,403

OPERATING UNITS: BY STATES

Item	North Carolina	South Carolina	Georgia	Florida	Alabama	Mississippi	Louisiana	Texas	Total
Fishermen:	Number	Number	Number	Number	Number	Number	Number	Number	Number
On vessels.....	1,091	75	205	1,283	235	980	468	228	4,565
On boats and shore:									
Regular.....	4,431	654	552	5,975	652	1,536	4,412	1,310	19,522
Casual.....	1,383	701	416	1,467	253	129	525	627	5,501
Total.....	6,905	1,430	1,173	8,725	1,140	2,645	5,405	2,165	29,588
Vessels:									
Motor.....	166	23	74	226	47	240	196	70	1,042
Net tonnage.....	2,064	191	662	4,025	527	2,889	1,580	718	12,656
Sail.....	64	1	-----	1	-----	7	-----	-----	73
Net tonnage.....	580	12	-----	9	-----	90	-----	-----	691
Total vessels.....	230	24	74	227	47	247	196	70	1,115
Total net tonnage.....	2,644	203	662	4,034	527	2,979	1,580	718	13,347

¹⁰ These are the numbers given to these areas by the North American Council on Fishery Investigations. The catch of the Mississippi River and tributaries is not included in this section.

Fisheries of the South Atlantic and Gulf States, 1938—Continued

OPERATING UNITS: BY STATES—Continued

Item	North Carolina	South Carolina	Georgia	Florida	Alabama	Mississippi	Louisiana	Texas	Total
Boats:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Motor.....	1,298	48	188	2,582	252	444	1,734	606	7,132
Other.....	1,802	591	428	3,462	415	608	1,395	382	9,083
Accessory boats.....	152	10	0	51	10				229
Apparatus:									
Purse seines, menhaden.....	35		2	19					56
Length, yards.....	8,655		600	5,320					14,575
Haul seines:									
Common.....	394	38	10	238	6	6	74	45	811
Length, yards.....	84,255	6,185	898	124,315	3,600	2,400	29,400	15,135	266,188
Long.....	91								91
Length, yards.....	90,900								90,900
Gill nets:									
Anchor.....	1,755	106	16	18					1,895
Square yards.....	909,477	67,880	770	13,500					991,627
Drift.....	106	35	96	71					308
Square yards.....	140,100	49,710	43,110	88,700					321,620
Runaround.....	538	49	28	2,198				114	2,927
Square yards.....	377,945	22,770	8,480	2,325,660				26,850	2,761,705
Stake.....	4,647	16	142	4	10			343	5,162
Square yards.....	306,020	10,925	16,665	3,600	2,000			81,925	420,135
Trammel nets.....				621	167	60	30	107	985
Square yards.....				519,745	87,160	31,500	8,500	55,850	702,755
Lines:									
Hand.....	120	98	150	1,965	116	108	282	380	3,219
Hooks and baits.....	141	130	160	2,600	202	128	351	495	4,197
Trawl.....				35					35
Hooks.....				2,040					2,040
Trot.....	26	8		995		4		6	1,039
Hooks.....	26	8		995		4		6	1,039
Trots with baits or snoods.....	654	125	202	151	87	106	651	43	2,019
Baits or snoods.....	408,000	35,848	82,300	83,550	46,650	88,500	184,005	18,560	947,413
Trot with hooks.....	20		45	219	77			98	467
Hooks.....	1,950		5,325	76,155	23,100			66,000	172,530
Pound nets.....	2,738			24					2,762
Wheels.....	6								6
Fyke nets.....	527			8	130				665
Dip nets:									
Common.....	439	6		57			37	52	591
Drop.....				24		58	0,775		6,857
Cast nets.....		28		205		18			249
Otter trawls, shrimp.....	169	40	229	319	149	590	1,545	432	3,463
Yards at mouth.....	2,902	814	4,657	6,124	2,089	9,245	21,492	6,391	53,714
Traps, brush.....							29,600		29,600
Pots:									
Sea crawfish.....				2,050					2,050
Crab.....			620	6,890				934	8,444
Eel.....	1,679			71					1,750
Fish.....	16	105	44	5,110	380				5,655
Spoars.....	322	97		157	59	59		161	855
Dredges:									
Clam.....				1					1
Oyster.....	274	1		10	37	368	116	58	864
Yards at mouth.....	260	2		10	38	369	115	58	852
Scallop.....				54					54
Yards at mouth.....				50					50
Tongs, oyster.....	180		22	331	621	639	703	166	2,542
Rakes, other than for oysters.....	660								660
Forks.....				11					11
Grabs.....		176	30	21					227
Coquina scoops.....				4					4
Hooks:									
Sponge.....				292					292
Stone crab.....				10					10
Diving outfits.....				72					72

Fisheries of the South Atlantic and Gulf States, 1938—Continued

CATCH: BY STATES

Species	North Carolina		South Carolina		Georgia	
	Pounds	Value	Pounds	Value	Pounds	Value
FISH						
Alewives.....	11, 219, 100	\$112, 211				
Bluefish.....	1, 849, 500	96, 508	42, 600	\$3, 213		
Bonito.....	10, 500	208	300	9		
Bowfin.....	5, 000	84				
Butterfish.....	15, 100	453				
Cabio or crab eater.....	15, 200	8				
Carp.....	224, 500	2, 932				
Catfish and bullheads.....	717, 900	21, 392	73, 000	2, 490	39, 100	\$1, 726
Crapple.....	7, 900	119				
Croaker.....	6, 476, 100	91, 373	1, 100	33	2, 500	100
Drum:						
Black.....	74, 700	2, 988	28, 000	1, 060	5, 000	200
Red or redfish.....	530, 100	18, 000	103, 600	6, 820	27, 500	1, 275
Eels, common.....	111, 900	3, 806			1, 500	165
Flounders.....	501, 400	25, 000	65, 500	5, 140	8, 000	385
Flazard shad.....	63, 200	913				
Grunts.....			2, 500	75		
Harvestfish or "starfish".....	428, 700	12, 941				
Hickory shad.....	111, 100	2, 479	8, 500	200	4, 000	135
Hogfish.....	29, 600	715				
King whiting or "kingfish".....	1, 873, 200	47, 464	86, 000	2, 970	75, 000	1, 125
Menhaden.....	146, 819, 000	426, 503			7, 033, 800	9, 888
Mullet.....	3, 276, 100	127, 959	587, 000	22, 785	17, 000	415
Pigfish.....	21, 400	424				
Pike or pickerel.....	800	12				
Pinfish or sailors choice.....	600	11				
Pompano.....	20, 300	2, 030				
Porgies.....	900	18	1, 000	13		
Sea bass.....	66, 400	3, 320	111, 500	6, 285		
Sea catfish.....			100, 000	3, 000		
Shad.....	1, 031, 800	164, 571	59, 400	12, 010	98, 100	17, 979
Sharks.....	581, 400	1, 744				
Sheepshead, salt-water.....	20, 300	460	2, 900	65	5, 000	160
Snapper, red.....	1, 200	60				
Spadefish.....	6, 200	184				
Spanish mackerel.....	270, 500	13, 520				
Spot.....	5, 737, 800	88, 677	195, 800	4, 636	4, 000	80
Squeteagues or "sea trout":						
Gray.....	5, 094, 900	195, 849	5, 000	350		
Spotted.....	848, 000	67, 131	78, 800	7, 359	62, 500	6, 250
Striped bass.....	522, 700	48, 628	600	108		
Sturgeon.....	400	4	25, 700	2, 503	7, 800	1, 462
Suckers.....	1, 800	32				
Tautog.....	900	45				
Tuna.....	600	18				
White perch.....	145, 500	6, 212				
Yellow perch.....	9, 100	335				
Total.....	188, 426, 900	1, 587, 299	1, 578, 700	80, 104	7, 390, 800	41, 235
SHELLFISH, ETC.						
Crabs:						
Hard ¹	3, 829, 700	72, 455	843, 300	15, 168	1, 854, 200	27, 828
Soft and peelers.....	124, 400	18, 652	4, 800	216		
Shrimp.....	4, 569, 100	137, 469	3, 722, 800	111, 807	10, 425, 700	302, 261
Olams:						
Hard, public ¹	342, 500	26, 570				
Hard, private ¹	15, 400	1, 186				
Oysters, market: ²						
Public, spring.....	519, 200	30, 339				
Public, fall.....	894, 700	67, 269				
Private, spring.....	9, 000	540	964, 800	35, 973	87, 100	4, 566
Private, fall.....	4, 000	320	796, 200	30, 730	66, 900	3, 472
Scallops, bay.....	29, 500	7, 971				
Terrapin, diamond-back.....					10, 900	1, 426
Turtles, snapper.....	200	6				
Total.....	10, 337, 700	362, 777	6, 331, 900	193, 894	12, 444, 800	339, 553
Grand total.....	198, 764, 600	1, 950, 076	7, 910, 600	273, 998	19, 835, 600	380, 888

See footnotes at end of table.

Fisheries of the South Atlantic and Gulf States, 1938—Continued

CATCH: BY STATES—Continued

Species	Florida		Alabama		Mississippi	
	Pounds	Value	Pounds	Value	Pounds	Value
FISH						
Alewives.....	391, 600	\$1, 959				
Amberjack.....	24, 400	541				
Angelfish.....	1, 200	32				
Barracuda.....	500	20				
Bluefish.....	4, 480, 000	205, 316	21, 200	\$1, 076		
Blue runner or hardtail.....	731, 700	9, 080	17, 700	856		
Buffalo fish.....			59, 900	2, 397		
Cable or crab eater.....	7, 400	198				
Catfish and bullheads.....	4, 057, 500	147, 539	73, 600	5, 152		
Cigarfish.....	9, 000	180				
Crappie.....	552, 700	19, 052				
Crevalle.....	190, 500	3, 516				
Croaker.....	13, 000	254	53, 100	1, 066	13, 700	\$411
Dolphin.....	2, 600	123				
Drum:						
Black.....	63, 700	1, 682	5, 000	221	7, 000	237
Red or redfish.....	1, 122, 000	86, 875	31, 800	1, 592	106, 000	6, 546
Eels, common.....	9, 800	243				
Flounders.....	190, 000	8, 769				
Groupers.....	4, 396, 300	138, 412	64, 600	5, 980	42, 800	4, 071
Grunts.....	51, 800	1, 268	222, 300	6, 812	157, 600	4, 370
Hickory shad.....	32, 400	1, 178				
Hogfish.....	15, 800	590				
Jewfish.....	128, 400	4, 659				
Kingfish or "king mackerel".....	3, 665, 200	136, 377				
King whiting or "kingfish".....	330, 800	5, 525	300	16	3, 700	111
Menhaden.....	149, 299, 100	888, 078				
Mojarra.....	333, 500	7, 806				
Moonfish.....		6				
Mullet.....	28, 593, 900	941, 280	3, 364, 500	91, 716	284, 600	8, 438
Muttonfish.....	282, 900	17, 559				
Paddletail or "spoonbill cat".....			40, 100	3, 558		
Permit.....	15, 700	340				
Pigfish.....	49, 200	775				
Pinfish or sailors choice.....	23, 700	299				
Pompano.....	778, 100	161, 631	1, 500	296	600	90
Porgies.....	57, 900	1, 965				
Sea bass.....	25, 400	970				
Sea catfish.....	67, 700	1, 333	10, 200	245	2, 200	54
Shad.....	228, 700	21, 779				
Sharks.....	3, 100, 600	22, 335				
Sheepshead:						
Fresh-water.....			4, 700	235		
Salt-water.....	779, 500	21, 554	58, 700	2, 798	19, 700	981
Snappers:						
Lane.....	2, 200	110				
Mangrove.....	295, 600	9, 473				
Red.....	5, 377, 900	378, 438	1, 193, 100	85, 388	173, 900	12, 173
Snook or sergeantfish.....	610, 100	20, 994				
Spadefish.....	5, 100	102				
Spanish mackerel.....	6, 835, 400	314, 522	39, 000	3, 071	2, 000	255
Spot.....	229, 000	5, 893	3, 500	70	1, 000	30
Squeteagues or "sea trout":						
Spotted.....	3, 413, 200	219, 796	119, 400	11, 670	249, 000	23, 266
White.....	54, 400	2, 188	5, 100	132	85, 300	1, 054
Sturgeon.....	36, 000	3, 220	2, 330	181		
Sunfish.....	867, 800	31, 018				
Swallowfish.....	1, 000	80				
Tenpounder.....	359, 200	6, 854	10, 600	211		
Tripletail.....	18, 100	291			100	8
Turbot.....	1, 800	36				
Yellowtail.....	169, 000	14, 013				
Total.....	222, 849, 800	3, 318, 000	5, 402, 200	224, 236	1, 099, 600	62, 090
SHELLFISH, ETC.						
Crabs:						
Hard ¹	5, 594, 900	76, 270	510, 700	7, 630	1, 018, 400	17, 296
Stone.....	54, 500	11, 998				
Sea crawfish or spiny lobster.....	328, 400	23, 377				
Shrimp.....	10, 142, 600	318, 612	3, 643, 500	145, 740	9, 902, 400	420, 549
Clams:						
Coquina.....	16, 000	300				
Hard, public ¹	747, 000	72, 144				
Conchs.....	7, 800	624				

See footnotes at end of table.

Fisheries of the South Atlantic and Gulf States, 1938—Continued

CATCH: BY STATES—Continued

Species	Florida		Alabama		Mississippi	
	Pounds	Value	Pounds	Value	Pounds	Value
SHELLFISH, ETC.—continued						
Oysters, market: *						
Public, spring.....	341,500	\$22,291	473,300	\$23,637	2,042,500	\$91,793
Public, fall.....	558,100	42,538	788,700	41,812	198,900	11,291
Private, spring.....	130,200	7,287	55,600	3,340		
Private, fall.....	130,700	7,272	41,100	2,992		
Scallops, bay.....	137,400	10,593				
Terrapin, diamond-back.....			2,200	220		
Turtles:						
Green.....	8,200	310				
Loggerhead.....	800	16				
Soft-shell.....	289,000	5,604				
Sponges:						
Grass.....	16,900	12,603				
Sheepswool.....	472,200	997,338				
Wire.....	7,900	6,514				
Yellow.....	109,000	54,393				
Total.....	19,093,100	1,670,084	5,515,100	225,371	13,160,200	540,929
Grand total.....	241,442,900	4,988,084	10,917,300	449,607	14,259,800	603,019

Species	Louisiana		Texas		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
FISH						
Alewives.....					11,610,700	\$114,170
Amberjack.....					24,400	641
Angelfish.....					1,200	32
Barracuda.....					500	20
Bluefish.....					6,392,800	306,112
Blue runner or hardtail.....					749,400	9,435
Bonito.....					10,800	215
Bowfin.....					5,000	54
Buffalofish.....					59,900	2,397
Butterfish.....					15,100	453
Cabio or crab eater.....					7,600	206
Carp.....					224,500	2,932
Catfish and bullheads.....					4,961,100	178,299
Cigarfish.....					9,000	180
Crappie.....					560,600	19,171
Crevaille.....					190,500	3,516
Croaker.....	78,200	\$2,047	55,200	\$1,534	6,691,900	97,418
Dolphin.....					2,600	123
Drum:						
Black.....	117,200	4,640	1,557,500	45,250	1,859,000	56,278
Red or redbfish.....	522,000	88,054	859,800	64,907	3,302,700	173,069
Eels, common.....					123,200	4,214
Flounders.....	36,900	2,722	126,500	12,143	1,035,200	64,210
Gizzard shad.....					63,200	913
Groupers.....	6,000	180	31,600	1,002	4,813,800	150,778
Grunts.....					53,800	1,343
Harvestfish or "starfish".....					428,700	12,941
Hickory shad.....					156,000	3,990
Hogfish.....					45,400	1,305
Jewfish.....			7,900	238	136,300	4,797
Kingfish or "king mackerel".....			1,900	76	3,067,100	136,453
King whiting or "kingfish".....	4,000	151	11,000	448	2,084,000	57,909
Manhaden.....					303,121,900	824,467
Mojarra.....					333,500	7,809
Moonfish.....					300	6
Mullet.....	11,800	392	4,300	155	36,139,200	1,193,119
Muttonfish.....					282,900	17,559
Paddlefish or "spoonbill cat".....					40,100	3,558
Permit.....					15,700	340
Pigfish.....					70,600	1,199
Pike or pickerel.....					800	12
Pinfish or sailors choice.....					24,300	310
Pompano.....	500	90	5,500	1,058	806,500	165,195
Porgies.....					59,800	1,996
Sea bass.....					203,300	10,555
Sea catfish.....	5,700	136	35,100	1,059	220,900	5,827
Shad.....					1,418,000	216,339
Sharks.....					3,082,000	24,079
Sheepshead:						
Fresh-water.....					4,700	235
Salt-water.....	69,000	3,653	20,800	1,118	975,900	39,769

See footnotes at end of table.

Fisheries of the South Atlantic and Gulf States, 1938—Continued

CATCH: BY STATES—Continued

Species	Louisiana		Texas		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
FISH—continued						
Snappers:						
Lane.....					2,200	\$110
Mangrove.....					295,600	9,473
Red.....	85,000	\$5,600	1,279,000	\$103,902	8,110,100	585,556
Snook or sergeantfish.....			6,800	422	616,900	21,416
Spadefish.....					11,300	286
Spanish mackerel.....	16,400	1,760	61,900	3,938	7,225,300	337,066
Spot.....	4,800	188	4,200	136	6,180,100	99,710
Squeteagues or "sea trout":						
Gray.....					5,099,900	196,199
Spotted.....	490,200	42,637	1,977,500	163,291	7,238,600	541,400
White.....	48,400	1,896	105,700	3,272	248,900	8,542
Striped bass.....					523,300	48,736
Sturgeon.....					72,200	7,370
Suckers.....					1,800	32
Sunfish.....					867,800	31,018
Swellfish.....					1,000	80
Tautog.....					900	45
Tenpounder.....					369,800	7,065
Tripletail.....					18,200	294
Tuna.....					600	18
Turbot.....					1,800	36
White perch.....					145,500	6,212
Yellow perch.....					9,100	335
Yellowtail.....					169,000	14,013
Total.....	1,496,100	104,746	6,162,200	403,949	433,896,300	5,621,759
SHELLFISH, ETC.						
Crabs:						
Hard ¹	10,533,200	106,464	971,400	23,850	25,153,800	346,961
Soft and peelers.....	247,700	36,899			370,900	55,767
Stone.....					54,500	11,998
Sea crawfish or spiny lobster.....					328,400	23,377
Shrimp.....	81,378,900	2,602,736	16,384,700	505,757	140,149,700	4,644,931
Clams:						
Coquina.....					16,000	300
Hard, public ²					1,089,500	98,714
Hard, private ³					15,400	1,186
Conchs.....					7,800	624
Oysters, market: ⁴						
Public, spring.....	4,440,300	187,847	555,100	41,724	8,371,900	397,631
Public, fall.....	1,651,800	74,309	614,000	45,888	4,706,200	283,107
Private, spring.....	3,079,900	200,443	79,000	6,344	4,405,600	258,493
Private, fall.....	1,050,300	77,135	107,800	8,705	2,197,000	130,626
Scallops, bay.....					166,900	16,564
Terrapin, diamond-back.....	4,900	935			18,000	2,581
Turtles:						
Green.....					8,200	310
Loggerhead.....					800	16
Snapper.....					200	6
Soft-shell.....					289,000	5,604
Sponges:						
Grass.....					16,900	12,603
Sheepswool.....					472,200	997,338
Wire.....					7,600	6,514
Yellow.....					109,000	54,393
Total.....	102,387,000	3,286,768	18,092,000	632,268	187,961,800	7,251,644
Grand total.....	103,883,100	3,391,514	24,844,200	1,036,217	621,868,100	13,073,403

¹ Statistics on hard crabs used in this table are based on weights of 4 pounds per dozen in North Carolina; 6 pounds in South Carolina and Georgia; 6.79 pounds in Florida; 5 pounds in Alabama; 5.75 pounds in Mississippi; 5.06 pounds in Louisiana; and 5.71 pounds in Texas.

² Statistics on hard clams used in this table are based on yields of 6.14 pounds of meats per standard bushel in North Carolina, and 5.04 pounds in Florida.

³ Statistics on oysters used in this table are based on yields of 4.27 pounds of meats per standard bushel in North Carolina; 3.16 pounds in South Carolina; 2.75 pounds in Georgia; 3.17 pounds in Florida; 3.81 pounds in Alabama; 4.03 pounds in Mississippi; 4.63 pounds in Louisiana; and 3.49 pounds in Texas.

NOTE.—Data on the yield of shellfish meats per bushel are based on U. S. standard bushels of 2,150.4 cubic inches capacity. Prior to 1938 yields were based on bushels of the size prescribed by individual State regulations.

The catch for Louisiana includes the following products taken by Mississippi craft in Louisiana waters: Shrimp, 7,403,400 pounds, valued at \$315,097; oysters, market, spring, 3,751,400 pounds of meats, valued at \$147,863; and oysters, market, fall, 1,462,700 pounds of meats, valued at \$61,626. Prior to 1938 similar catches were included with the catch for Mississippi.

Fisheries of the South Atlantic and Gulf States, 1938—Continued

SUPPLEMENTARY TABLE SHOWING THE PRODUCTION OF CERTAIN SHELLFISH IN NUMBER AND BUSHELS

Product	North Carolina		South Carolina		Georgia	
	Quantity	Value	Quantity	Value	Quantity	Value
Crabs:						
Hard.....number..	11,489,100	\$72,455	1,686,600	\$15,168	3,708,400	\$27,828
Soft and peelers.....do..	870,800	18,652	83,600	216		
Clams:						
Hard, public.....bushels..	55,782	26,570				
Hard, private.....do..	2,508	1,186				
Oysters, market:						
Public, spring.....do..	121,593	30,339				
Public, fall.....do..	209,532	67,269				
Private, spring.....do..	2,108	540	305,316	35,973	31,673	4,566
Private, fall.....do..	937	320	251,962	30,730	24,327	3,472
Scallops, bay.....do..	4,805	7,971				

Product	Florida		Alabama		Mississippi	
	Quantity	Value	Quantity	Value	Quantity	Value
Crabs:						
Hard.....number..	11,595,648	\$76,270	1,225,680	\$7,630	2,119,416	\$17,296
Stone.....do..	51,444	11,998				
Clams, hard, public.....bushels..	148,214	72,144				
Oysters, market:						
Public, spring.....do..	107,729	22,291	124,226	23,637	506,823	91,793
Public, fall.....do..	176,057	42,538	207,068	41,812	49,356	11,291
Private, spring.....do..	41,073	7,287	14,593	3,340		
Private, fall.....do..	41,230	7,272	10,787	2,992		
Scallops, bay.....do..	45,953	10,593				

Product	Louisiana		Texas		Total	
	Quantity	Value	Quantity	Value	Quantity	Value
Crabs:						
Hard.....number..	22,404,803	\$106,464	2,041,248	\$23,850	56,270,965	\$346,961
Soft and peelers.....do..	671,551	36,899			1,575,951	55,787
Stone.....do..					51,444	11,998
Clams:						
Hard, public.....bushels..					203,996	98,714
Hard, private.....do..					2,508	1,186
Oysters, market:						
Public, spring.....do..	959,028	187,847	159,054	41,724	1,978,453	397,631
Public, fall.....do..	356,760	74,309	175,931	45,888	1,174,643	283,107
Private, spring.....do..	665,205	200,443	22,636	6,344	1,082,604	258,493
Private, fall.....do..	226,847	77,135	30,888	8,705	586,978	130,626
Scallops, bay.....do..					50,758	18,564

NOTE.—Bushels represent U. S. Standard Bushels of 2,150.4 cubic inches capacity. Prior to 1938, data on bushels of shellfish were based on bushel measures of the size prescribed by individual State regulations. For more detailed information concerning shellfish measures the reader is referred to the section on conversion factors published on p. 548 of this document.

Industries related to the fisheries of the South Atlantic and Gulf States, 1938

OPERATING UNITS, SALARIES, AND WAGES

Item	North Carolina	South Carolina	Georgia	Florida	Alabama	Mississippi	Louisiana	Texas	Total
Transporting:									
Persons engaged:									
On vessels.....	77	117		42			82		325
On boats.....	12	2		84		7	90		188
Total.....	89	119		126		7	172		513
Vessels:									
Motor.....	41	13		24		3	40		121
Net tonnage..	344	169		269		18	327		1,127
Sail.....	1	32		8					36
Net tonnage..	6	313		40					369
Total ves-									
sels.....	42	45		27		3	40		157
Total net									
tonnage....	350	482		309		18	327		1,486

Industries related to the fisheries of the South Atlantic and Gulf States, 1938—Con.

OPERATING UNITS, SALARIES, AND WAGES—Continued

Item	North Carolina	South Carolina	Georgia	Florida	Alabama	Mississippi	Louisiana	Texas	Total
	Number	Number	Number	Number	Number	Number	Number	Number	Number
Transporting—Con.	8	2		83			45		138
Boats									
Wholesale and manufacturing:									
Establishments	116	23	27	343	27	35	125	46	742
Persons engaged:									
Proprietors	130	16	21	379	30	23	118	53	770
Salaried employees	44	35	32	210	20	56	137	41	575
Wage earners:									
Average for season	1,847	1,299	1,462	2,168	501	2,416	5,735	1,394	16,822
Average for year	560	452	710	971	161	718	1,502	396	5,470
Paid to salaried employees	\$56,121	\$43,500	\$59,673	\$316,852	\$27,394	\$38,500	\$169,588	\$37,600	\$829,225
Paid to wage earners	\$284,232	\$117,108	\$194,002	\$615,522	\$91,525	\$353,274	\$773,644	\$193,650	\$2,622,957
Total salaries and wages	\$370,353	\$160,608	\$253,675	\$932,374	\$118,919	\$441,774	\$943,232	\$231,250	\$3,462,182
Fishermen manufacturing	582	27	17	343	97	128		129	1,323

PRODUCTS MANUFACTURED

Item	North Carolina		South Carolina		Georgia		Florida	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
By manufacturing establishments:								
Alewives:								
Corned.....pounds	3,191,250	\$62,625						
Corned with roe.....do	52,300	2,012						
Roe, canned standard cases	8,538	37,153						
Blue runner, salted.....pounds							325,800	\$12,962
Grouper:								
Fresh steaks.....do							401,130	66,261
Fresh fillets.....do							52,000	8,350
Menhaden products:								
Oil.....gallons	1,301,042	\$46,638			(1)	(1)	231,356	60,743
Meal.....tons	3,891	170,807					2,922	120,769
Acid scrap.....do	7,176	133,481			(1)	(1)	4,964	94,424
Dry scrap.....do	10,447	423,445					4,681	179,188
Mullet:								
Salted.....pounds	384,800	30,784					599,200	82,212
Roe, salted.....do							36,300	8,611
Spanish mackerel, salted.....pounds							88,000	4,973
Spot, salted.....do	96,600	6,209						
Crab meat, packaged, fresh-cooked.....pounds	422,476	124,954	63,912	\$20,154	159,230	\$47,597	631,080	202,108
Shrimp:								
Cooked and peeled.....do			(1)	(1)	(1)	(1)		
Canned standard cases					142,485	725,757	82,206	200,676
Marine-shell novelties								45,756
Oysters:								
Fresh-shucked.....gallons	100,017	87,189	36,732	28,678	10,104	12,080	43,322	59,498
Canned standard cases	(1)	(1)	79,811	297,818	(1)	(1)	(1)	(1)
Shell products:								
Poultry feed.....tons	(1)	(1)	(1)	(1)			(1)	(1)
Lime.....do	775	2,450	(1)	(1)				
Scallops, bay, fresh-shucked.....gallons	2,665	4,664					11,303	20,454
Unclassified products:								
Packaged, fresh and frozen.....pounds	(1)	(1)	(1)	(1)	(1)	(1)	\$ 69,000	\$ 22,730
Salted and smoked.....do	\$ 49,460	\$ 2,124	(1)	(1)	(1)	(1)	\$ 10,500	\$ 1,763
Canned standard cases	(1)	(1)	(1)	(1)	(1)	(1)	\$ 27,768	\$ 147,048
Miscellaneous		\$ 68,665			\$ 30,728		\$ 80,564	\$ 156,245
Total		1,493,200		377,378		865,998		1,444,771

See footnotes at end of table.

Industries related to the fisheries of the South Atlantic and Gulf States, 1938—Con.

PRODUCTS MANUFACTURED—Continued

Item	North Carolina		South Carolina		Georgia		Florida	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
By fishermen:							680	\$170
Amberjack, smoked, pounds.....								
Alewives, corned.....do.....	871,750	\$16,796						
Bluefish, smoked.....do.....							200	16
Grouper:								
Smoked.....do.....							1,100	215
Fillets, salted.....do.....							9,000	900
King mackerel, smoked pounds.....							2,750	730
Mullet:								
Smoked.....do.....							41,600	8,105
Salted.....do.....	325,000	19,500	15,000	\$1,050			28,000	1,551
Roe, salted.....do.....							1,500	380
Saiffish, smoked.....do.....							12,040	2,206
Shark products:								
Hides.....do.....	5,750	672					141,770	16,883
Fins, dried.....do.....	1,070	434					40,800	16,814
Spanish mackerel, smoked pounds.....							950	178
Spot, salted.....do.....	100,000	4,000	5,000	350				
Squeteague or "sea trout," smoked.....pounds.....							1,150	257
Sturgeon, caviar, salted pounds.....			183	183	100	\$100		
Wahoo, salted.....do.....							600	40
Crab meat, packaged, fresh- cooked.....pounds.....			85	26			4,170	1,310
Shrimp, smoked.....do.....							375	113
Clams, hard, fresh-shucked gallons.....	7,400	12,250	102	130			255	500
Oysters, fresh-shucked, do.....	3,900	4,650	3,182	4,471	5,828	4,961	48,031	45,184
Scallops, bay, fresh-shucked gallons.....	610	976					4,961	4,072
Total.....		59,277		6,210		5,061		99,624
Grand total.....		1,552,477		383,588		871,059		1,544,395

Item	Alabama		Mississippi		Louisiana		Texas	
	Quantity (¹)	Value (¹)	Quantity (¹)	Value (¹)	Quantity	Value	Quantity	Value
By manufacturing establishments:								
Grouper, fresh steaks pounds.....								
Mullet:								
Salted.....do.....	527,000	\$32,600						
Roe, salted.....do.....	6,500	2,200						
Squeteague, or "sea trout," salted.....pounds.....					13,306	\$1,995		
Crab meat, packaged, fresh- cooked.....pounds.....	80,752	17,625	146,722	\$32,543	1,237,248	330,047	37,550	\$9,543
Shrimp:								
Cooked and peeled pounds.....	(¹)	(¹)	287,117	71,536	583,903	166,665		
Frozen packaged, do.....					2,128,325	290,384	1,220,175	167,325
Canned								
standard cases.....	(¹)	(¹)	227,106	947,746	565,064	2,534,256	(¹)	(¹)
Bran.....tons.....					1,428	29,763		
Sun-dried.....pounds.....					1,940,575	345,648		
Oysters:								
Fresh-shucked gallons.....	32,440	39,894	42,500	60,850	224,473	354,117	91,971	125,878
Canned								
standard cases.....	(¹)	(¹)	180,328	714,712	61,029	223,199		
Shell products:								
Poultry feed.....tons.....	(¹)	(¹)	17,594	64,335	(¹)	(¹)	(¹)	(¹)
Lime.....do.....	(¹)	(¹)	5,338	4,863	(¹)	(¹)	(¹)	(¹)
Unclassified products:								
Packageo, fresh and frozen.....pounds.....	(²)	(²)	(²)	(²)				
Canned								
standard cases.....	(²)	(²)	(²)	(²)	(²)	(²)	(²)	(²)
Miscellaneous.....		¹¹ 276,111		¹² 1,890		¹³ 338,805		¹⁴ 306,846
Total.....		368,430		1,898,475		4,614,939		699,592

See footnotes at end of table.

Fisheries of North Carolina, 1938—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Lines—Continued			Pound nets	Wheels	Fyke nets	Dip nets	Otter trawls, shrimp
	Troll	Trot with baits or snoods	Trot with hooks					
Fishermen:	Number	Number	Number	Number	Number	Number	Number	Number
On vessels.....	-----	-----	-----	-----	-----	-----	-----	124
On boats and shore:								
Regular.....	26	902	4	486	-----	23	284	244
Casual.....	-----	142	28	172	6	23	155	8
Total.....	26	1,044	32	658	6	46	439	376
Vessels, motor.....	-----	-----	-----	-----	-----	-----	-----	48
Net tonnage.....	-----	-----	-----	-----	-----	-----	-----	300
Boats:								
Motor.....	18	112	10	272	1	21	-----	120
Other.....	-----	429	10	102	1	8	155	1
Apparatus:								
Number.....	26	654	20	2,738	6	527	439	169
Yards at mouth.....	-----	-----	-----	-----	-----	-----	-----	2,902
Hooks, baits, or snoods.....	26	408,000	1,960	-----	-----	-----	-----	-----

Item	Pots		Spears	Dredges, oyster	Tongs, oyster	Rakes, other than for oysters	By hand, oyster	Total, exclusive of duplication
	Eel	Fish						
Fishermen:	Number	Number	Number	Number	Number	Number	Number	Number
On vessels.....	-----	-----	-----	172	4	-----	-----	1,091
On boats and shore:								
Regular.....	62	-----	128	153	141	379	87	4,431
Casual.....	3	2	194	8	15	281	55	1,383
Total.....	65	2	322	333	160	660	92	6,905
Vessels:								
Motor.....	-----	-----	-----	1	1	-----	-----	166
Net tonnage.....	-----	-----	-----	6	6	-----	-----	2,064
Sail.....	-----	-----	-----	64	-----	-----	-----	64
Net tonnage.....	-----	-----	-----	580	-----	-----	-----	580
Total vessels.....	-----	-----	-----	65	1	-----	-----	230
Total net tonnage.....	-----	-----	-----	586	6	-----	-----	2,644
Boats:								
Motor.....	46	-----	-----	60	6	-----	-----	1,298
Other.....	8	2	287	32	150	313	45	1,802
Accessory boats.....	-----	-----	-----	-----	2	-----	-----	152
Apparatus:								
Number.....	1,679	16	322	274	100	660	-----	-----
Yards at mouth.....	-----	-----	-----	260	-----	-----	-----	-----

CATCH: BY GEAR

Species	Purse seines		Haul seines			
			Common		Long	
	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	-----	-----	2,030,300	\$20,300	-----	-----
Bluefish.....	-----	-----	232,300	11,843	724,100	\$34,363
Bonito.....	-----	-----	10,000	196	200	4
Bowfin.....	-----	-----	1,200	12	-----	-----
Butterfish.....	-----	-----	6,800	204	1,100	33
Cabo or crab eater.....	-----	-----	100	5	100	3
Carp.....	-----	-----	41,800	688	-----	-----
Catfish and bullheads.....	-----	-----	112,300	3,302	-----	-----
Crapple.....	-----	-----	-----	-----	7,900	110
Croaker.....	-----	-----	418,900	6,035	2,629,200	35,864

Fisheries of North Carolina, 1938—Continued

CATCH: BY GEAR—Continued

Species	Purse seines		Haul seines					
			Common		Long			
			Pounds	Value	Pounds	Value	Pounds	Value
Drum:								
Black			58, 600	\$2, 344		8, 800	\$392	
Red or redfish			413, 700	15, 781		100, 800	1, 923	
Eels, common			800	32				
Flounders			63, 000	3, 030		29, 700	1, 535	
Gizzard shad			31, 400	335				
Harvestfish or "starfish"			78, 800	2, 414		15, 400	462	
Hickory shad			28, 900	654		3, 200	84	
Hogfish			14, 900	417		3, 600	72	
King whiting or "kingfish"			75, 800	2, 274		357, 900	10, 737	
Menhaden	144, 577, 500	\$419, 753	15, 100	75		2, 195, 900	6, 522	
Mullet			1, 547, 700	60, 891		22, 600	759	
Pigfish			15, 600	309		200	3	
Pinfish or sailors choice			400	7		200	4	
Pompano			10, 400	1, 940		400	40	
Porgies						900	18	
Sea bass						200	10	
Shad			46, 500	7, 440		500	80	
Sheepshead, salt-water			18, 100	402		1, 700	38	
Spadefish			2, 100	84		4, 100	100	
Spanish mackerel			8, 700	435		4, 400	220	
Spot			2, 355, 500	36, 433		2, 445, 600	33, 674	
Squeteague or "sea trout":								
Gray			181, 900	7, 143		1, 553, 300	54, 388	
Spotted			246, 400	19, 712		355, 800	27, 915	
Striped bass			156, 400	14, 489		59, 000	5, 390	
Sturgeon						300	3	
Tautog						45		
White perch			53, 500	2, 189				
Yellow perch			3, 800	152				
Crabs, soft and peelers			27, 300	4, 087				
Turtles, snapper			200	6				
Total	144, 577, 500	419, 753	8, 319, 100	225, 714	10, 525, 100	214, 755		

Species	Gill nets							
	Anchor		Drift		Runaround		Stake	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives	91, 300	\$913	45, 000	\$450			21, 800	\$227
Bluefish	23, 100	2, 058			632, 100	\$35, 798	198, 900	10, 521
Bonito	300	6						
Bowfin	1, 200	12					100	2
Carp	19, 900	199	500	5			3, 900	79
Catfish and bullheads	18, 700	561					1, 500	30
Croaker	1, 266, 200	17, 189			21, 400	294	309, 600	4, 643
Drum:								
Black							200	8
Red or redfish					10, 600	212	400	8
Gizzard shad	16, 500	319					100	2
Hickory shad	16, 700	338	1, 000	20			25, 100	492
Hogfish					200	8		
King whiting or "kingfish"	401, 600	12, 048			576, 100	17, 283	2, 700	81
Mullet	3, 400	146			1, 048, 500	63, 997	51, 400	2, 066
Pigfish					600	12		
Shad	128, 300	20, 126	21, 400	3, 402			480, 200	76, 832
Sharks	881, 400	1, 744						
Spanish mackerel					20, 200	1, 000		
Spot	50, 500	744			646, 400	11, 228	209, 300	6, 293
Squeteagues or "sea trout":								
Gray	529, 800	21, 091			208, 700	8, 239	421, 400	16, 996
Spotted	20, 500	1, 040			149, 900	11, 832	29, 400	2, 352
Striped bass	73, 400	6, 051	1, 100	104			10, 200	956
Sturgeon							100	1
Suckers	100	1					100	1
Tuna	600	18					100	1
White perch	15, 900	674	4, 500	180	400	16	20, 700	1, 018
Total	3, 259, 100	85, 878	73, 500	4, 161	3, 915, 100	149, 919	1, 787, 100	122, 608

Fisheries of North Carolina, 1938—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
Catfish and bullheads.....							32,000	\$920
Sea bass.....	66,200	\$3,310						
Snapper, red.....	1,200	60						
Spanish mackerel.....	35,000	1,750	148,500	\$7,425				
Crabs, hard.....					3,829,700	\$72,455		
Total.....	102,400	5,120	148,500	7,425	3,829,700	72,455	32,000	920

Species	Pound nets		Wheels		Fyke nets		Dip nets	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	8,958,100	\$89,585	10,000	\$100	52,600	\$526	10,000	\$100
Bluefish.....	38,500	1,925						
Bowfin.....	100	1			2,400	27		
Butterfish.....	7,200	216						
Carp.....	52,200	544			105,400	1,385		
Catfish and bullheads.....	376,100	11,260			162,300	4,869		
Croaker.....	1,809,800	27,148						
Drum:								
Black.....	6,100	244						
Red or redbfish.....	4,600	76						
Eels, common.....	7,000	330			1,400	56		
Flounders.....	98,200	4,910						
Gizzard shad.....	12,400	198			2,800	59		
Harvestfish or "starfish".....	334,500	10,065						
Hickory shad.....	34,600	859			1,600	32		
Hogfish.....	10,900	218						
King whiting or "kingfish".....	12,800	384						
Menhaden.....	30,500	153						
Mullet.....	2,500	100						
Pigfish.....	5,000	100						
Pike or pickerel.....	400	4			400	8		
Pompano.....	500	50						
Shad.....	354,900	56,691						
Sheepshead, salt-water.....	500	10						
Spanish mackerel.....	53,800	2,690						
Spot.....	30,500	305						
Squetcagues or "sea trout":								
Gray.....	2,199,800	87,992						
Spotted.....	46,000	3,680						
Striped bass.....	205,900	19,777			19,700	1,861		
Suckers.....	300	4			1,300	26		
White perch.....	19,600	861	1,200	48	10,000	426		
Yellow perch.....	900	38			4,400	145		
Crabs, soft and peelers.....							97,100	14,565
Shrimp.....	15,000	450						
Total.....	14,729,200	320,869	11,200	148	364,300	9,420	107,100	14,665

Species	Otter trawls		Pots				Spears	
			Eel		Fish			
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Carp.....					800	\$32		
Catfish and bullheads.....					15,000	450		
Croaker.....	20,000	\$200						
Eels, common.....			102,700	\$3,388				
Flounders.....	152,800	7,640					157,700	\$7,885
King whiting or "kingfish".....	146,300	4,657						
White perch.....					20,000	800		
Shrimp.....	4,554,100	137,019						
Total.....	4,873,200	149,516	102,700	3,388	35,800	1,282	167,700	7,885

Fisheries of North Carolina, 1938—Continued

CATCH: BY GEAR—Continued

Species	Dredges		Tongs		Rakes		By hand	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Clams:								
Hard, public.....					342,500	\$26,570		
Hard, private.....					15,400	1,186		
Oysters, market:								
Public, spring.....	448,600	\$26,156	55,300	\$3,258			16,300	\$925
Public, fall.....	742,900	55,932	120,500	8,921			31,300	2,416
Private, spring.....			9,000	540				
Private, fall.....			4,000	320				
Scallops, bay.....					29,500	7,971		
Total.....	1,191,500	82,088	188,800	13,039	387,400	35,727	46,600	3,341

OPERATING UNITS: BY COUNTIES

Item	Beaufort	Bertie	Brunswick	Camden	Carteret	Chowan	Craven
Fishermen:							
On vessels.....	Number 117	Number	Number 73	Number	Number 762	Number	Number
On boats and shore:							
Regular.....	198	60	403		1,428		32
Casual.....	80		178	15	420	121	18
Total.....	395	60	654	15	2,610	121	50
Vessels:							
Motor.....	3		23		107		
Net tonnage.....	53		206		1,600		
Sail.....	43				7		
Net tonnage.....	392				78		
Total vessels.....	46		23		114		
Total net tonnage.....	445		206		1,678		
Boats:							
Motor.....	71	19	55	13	274	40	13
Other.....	82	2	174		681	20	15
Accessory boats.....			2		130		
Apparatus:							
Purse seines, menhaden.....			1		34		
Length, yards.....			240		8,415		
Haul seines:							
Common.....	12	2	22		160	1	3
Length, yards.....	2,300	2,000	4,400		12,105	350	3,600
Long.....	3				47		
Length, yards.....	3,000				47,000		
Gill nets:							
Anchor.....			25	40	124	105	
Square yards.....			7,000	4,000	255,517	38,750	
Drift.....			9		3		
Square yards.....			3,600		6,900		
Runaround.....	41		99		88		10
Square yards.....	16,300		24,060		159,070		9,600
Stake.....	280			65	1,110		300
Square yards.....	15,120			5,200	63,600		15,000
Lines:							
Hand.....					38		
Hooks.....					55		
Troll.....					26		
Hooks.....					26		
Trot with baits or snoods.....	138		46		174		
Baits or snoods.....	69,000		20,000		174,000		
Pound nets.....	83	359			100	439	26
Fyke nets.....				24			
Dip nets.....					414		
Otter trawls, shrimp.....	3		47		103		
Yards at mouth.....	48		983		1,608		
Pots, eel.....	162						
Spears.....			95		42		
Dredges, oyster.....	106				17		
Yards at mouth.....	118				17		
Tongs, oyster.....					84		
Rakes, other than for oysters.....			8		642		

Fisheries of North Carolina, 1938—Continued

OPERATING UNITS: BY COUNTIES—Continued

Item	Curr- tuck	Dare	Gates	Hert- ford	Hyde	Martin	New Han- over	Onslow
	Number	Number	Number	Number	Number	Number	Number	Number
Fishermen:								
On vessels.....		46			9			14
On boats and shore:								
Regular.....	186	764			167		320	268
Casual.....	9	57	16	36		88	140	58
Total.....	195	867	16	36	176	88	460	340
Vessels:								
Motor.....		16			1			4
Net tonnage.....		96			5			28
Sail.....					2			
Net tonnage.....					14			
Total vessels.....		16			3			4
Total net tonnage.....		96			19			28
Boats:								
Motor.....	74	279	3	4	59	19	82	48
Other.....	61	218	4	1	50	20	123	157
Accessory boats.....		6						2
Apparatus:								
Haul seines:								
Common.....	48	54	2	1	5	2	22	27
Length, yards.....	16,000	25,500	1,200	950	1,450	1,200	2,200	4,100
Long.....		19						
Length, yards.....		19,000						
Gill nets:								
Anchor.....	157	486	2		4			15
Square yards.....	25,220	197,120	400		8,600			29,200
Drift.....		1	2			7	78	
Square yards.....		3,300	400			7,000	109,200	
Runaround.....		45			18		95	93
Square yards.....		95,900			15,200		21,375	880
Stake.....	60	1,890			330		60	
Square yards.....	4,800	111,700			32,000		4,800	
Lines:								
Hand.....							16	62
Hooks.....							16	62
Trot with baits or snoods.....	5	8			33		60	100
Baits or snoods.....	2,500	8,000			16,600		30,000	40,000
Trot with hooks.....						18	2	
Hooks.....						950	1,000	
Pound nets.....	10	1,225	14	43	92			
Wheels.....						6		
Fyke nets.....	257							
Dip nets.....	5					20		
Otter trawls, shrimp.....		2						1
Yards at mouth.....		35						15
Pots:								
Eel.....	1,370	80						
Fish.....						16		
Spears.....		50					75	25
Dredges, oyster.....					5			
Yards at mouth.....					24			
Tongs, oyster.....					26			
Rakes, other than for oysters.....					5			55

Item	Pamlico	Pasquo- tank	Pender	Perqui- mins	Tyrrell	Wash- ington
	Number	Number	Number	Number	Number	Number
Fishermen:						
On vessels.....	70					
On boats and shore:						
Regular.....	245	32	149	78	17	84
Casual.....		27	18	7	95	
Total.....	315	59	167	85	112	84
Vessels:						
Motor.....	12					
Net tonnage.....	76					
Sail.....	12					
Net tonnage.....	96					
Total vessels.....	24					
Total net tonnage.....	172					

Fisheries of North Carolina, 1938—Continued

OPERATING UNITS: BY COUNTIES—Continued

Item	Pamlico	Pasquotank	Pender	Perquimans	Tyrrell	Washington
Boats:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Motor	112	25	4	84	43	27
Other	64	5	49	28	83	15
Accessory boats	12					
Apparatus:						
Haul seines:						
Common	4	5	20	2		2
Length, yards	800	1, 100	3, 200	200		1, 600
Long	22					
Length, yards	21, 900					
Gill nets:						
Anchor		163		384	100	150
Square yards		47, 270		172, 000	60, 000	66, 400
Drift					3	3
Square yards					4, 500	5, 200
Runaround	23	2	24			
Square yards	27, 600	4, 200	3, 840			
Stake	280	30		12	230	
Square yards	22, 400	2, 600		1, 200	27, 600	
Lines:						
Hand				4		
Hooks				8		
Trot with baits or snoods	80			10		
Baits or snoods	43, 000		5, 000			
Pound nets	78			108	72	72
Fyke nets		40		56	150	
Otter trawls, shrimp	13					
Yards at mouth	213					
Pots, eel		12		25	10	
Spears			30			
Dredges, oyster	127					
Yards at mouth	99					
Tongs, oyster	16					

CATCH: BY COUNTIES

Species	Beaufort		Bertie		Brunswick		Camden	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives	1, 000	\$10	6, 030, 000	\$80, 300			10, 000	\$100
Bluefish	14, 200	710			80, 000	\$4, 010		
Bowfin							400	8
Cabio or crab eater	100	3						
Carp	3, 100	93					4, 400	44
Catfish and bullheads	13, 200	366	17, 500	525			5, 000	150
Croaker	140, 000	2, 000			35, 000	360		
Drum:								
Black	100	4						
Red or redfish	5, 400	134			7, 500	175		
Eels, common	14, 000	730						
Flounders	8, 300	415			38, 200	1, 910		
Gizzard shad							300	9
Harvestfish or "starfish"	50, 000	1, 500						
Hickory shad	300	6					800	16
Hogfish	2, 400	48						
King whiting or "kingfish"					25, 300	750		
Menhaden					7, 266, 000	21, 530		
Mullet	74, 900	2, 996			820, 000	32, 800	2, 000	100
Porgies	400	8						
Sea bass	200	10						
Shad	1, 800	288	5, 200	832	6, 200	980	2, 700	432
Sheepshead, salt-water	1, 100	24						
Spadefish	3, 500	82						
Spanish mackerel	8, 500	425						
Spot	10, 000	100			447, 500	8, 950		
Squeteagues or "sea trout":								
Gray	233, 000	9, 320						
Spotted	18, 000	1, 440			3, 800	304		
Striped bass	12, 300	1, 208	10, 600	954			4, 700	470
Suckers:							200	2
White perch	1, 500	60	8, 100	384			400	12
Yellow perch	900	36					100	3
Crabs, hard	1, 159, 800	23, 198			145, 000	2, 700		
Shrimp	165, 900	4, 977			1, 977, 100	59, 709		
Clams, hard, public					2, 000	240		
Oysters, market:								
Public, spring	176, 800	10, 608						
Public, fall	407, 900	32, 632			5, 500	367		
Total	2, 520, 200	93, 427	6, 071, 400	62, 995	10, 859, 100	134, 834	31, 000	1, 346

Fisheries of North Carolina, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Carteret		Chowan		Craven		Currituck	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	700	\$7	3,492,500	\$34,925	2,800	\$42	5,000	\$56
Bluefish.....	1,255,300	66,988						
Bonito.....	6,900	134						
Bowfin.....							1,000	10
Butterfish.....	7,200	216						
Cabio or crab eater.....	100	5						
Carp.....	700	35	3,000	30	1,900	19	84,800	1,406
Catfish and bullheads.....			50,000	1,500	1,500	30	31,900	957
Crapple.....	7,900	119						
Croaker.....	1,488,700	20,676			144,500	2,168	3,000	47
Drum:								
Black.....	58,600	2,344						
Red or redfish.....	391,100	15,644						
Eels, common.....							80,000	2,275
Flounders.....	243,700	12,065					2,300	116
Gizzard shad.....							27,100	271
Harvestfish or "starfish".....	31,200	936						
Hickory shad.....	10,700	214			5,400	108	300	10
King whiting or "kingfish".....	1,359,600	41,056					12,500	375
Menhaden.....	130,607,400	404,695						
Mullet.....	1,120,700	41,801			35,000	1,400		
Pinfish.....	6,600	128						
Pinfish or "sailors choice".....	200	3						
Pompano.....	13,200	1,320						
Sea bass.....	7,800	390						
Shad.....	9,300	1,395	21,000	3,360			25,700	4,112
Sharks.....	581,400	1,744						
Sheepshead, salt-water.....	6,400	160						
Snapper, red.....	1,200	60						
Spanish mackerel.....	183,500	9,175						
Spot.....	2,693,200	44,528						
Squeteagues or "sea trout":								
Gray.....	1,232,500	49,443						
Spotted.....	233,400	18,512			16,700	1,336		
Striped bass.....	500	40	8,600	774	700	70	90,600	9,660
Tuna.....	600	18						
White perch.....	400	20	2,500	110			40,000	1,610
Yellow perch.....							4,500	180
Crabs:								
Hard.....	787,000	11,806					85,000	1,270
Soft and peelers.....	114,400	17,152					10,000	1,500
Shrimp.....	2,193,900	65,817						
Clams:								
Hard, public.....	336,500	26,010						
Hard, private.....	15,400	1,186						
Oysters, market:								
Public, spring.....	43,400	1,791						
Public, fall.....	138,800	6,836						
Scallops, bay.....	29,500	7,971						
Total.....	154,119,900	872,440	3,577,600	40,699	208,500	5,173	509,700	23,854

Species	Dare		Gates		Hertford		Hyde	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	15,900	\$159	225,000	\$2,250	900,000	\$9,000		
Bluefish.....	231,700	11,410					52,000	\$2,600
Bonito.....	3,600	72						
Bowfin.....	400	4						
Butterfish.....	3,900	117						
Carp.....	27,600	276						
Catfish and bullheads.....	19,200	576			7,500	225		
Croaker.....	2,251,400	33,765					607,200	7,616
Drum:								
Black.....	15,800	632						
Red or redfish.....	10,700	240					4,500	51
Eels, common.....	9,000	413						
Flounders.....	109,600	5,530					5,500	275
Gizzard shad.....	8,300	83						
Harvestfish or "starfish".....	164,500	4,935					87,000	2,690
Hickory shad.....	51,300	1,399						
Hogfish.....	27,000	659						
King whiting or "kingfish".....	94,300	2,829						

Fisheries of North Carolina, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Dare		Gates		Hertford		Hyde	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Menhaden.....	45,600	\$228						
Mullet.....	117,500	4,698					5,500	\$185
Pigfish.....	4,000	80						
Pinfish or sailors choice.....	400	8						
Pompano.....	1,800	180						
Porgies.....	500	10						
Shad.....	719,900	115,184	3,600	\$376	5,500	\$880	1,000	160
Sheepshead, salt-water.....	4,200	94						
Spadefish.....	2,700	102						
Spanish mackerel.....	44,300	2,215					24,200	1,200
Spot.....	422,900	4,701					75,000	750
Squeteagues or "sea trout":								
Gray.....	1,950,100	78,004					480,100	19,204
Spotted.....	285,600	22,848					12,500	1,000
Striped bass.....	278,400	26,568	2,200	198	3,000	270	900	90
Sturgeon.....	400	4						
Suckers.....	200	2						
Tautog.....	900	45						
White perch.....	21,700	868	1,200	54				
Yellow perch.....	100	4			500	22		
Crabs, hard.....	42,500	1,275					317,000	6,340
Shrimp.....	30,700	921					5,000	150
Oysters, market:								
Public, spring.....							34,400	2,064
Public, fall.....							55,800	4,464
Turtles, snapper.....	200	6						
Total.....	7,024,800	321,144	232,000	3,078	916,500	10,397	1,667,600	48,819

Species	Martin		New Hanover		Onslow	
	Pounds	Value	Pounds	Value	Pounds	Value
Alewives.....	225,000	\$2,250				
Bluefish.....			13,100	\$655	5,000	\$260
Carp.....	1,300	52				
Catfish and bullheads.....	43,000	1,290	4,000	80		
Croaker.....			10,000	100	33,900	339
Drum, red or redfish.....			5,100	102	3,000	60
Flounders.....			13,900	690	9,500	475
King whiting or "kingfish".....					75,000	2,250
Mullet.....			467,800	18,712	224,000	8,939
Sea bass.....			8,400	420	40,000	2,000
Shad.....	1,000	150	18,000	2,880		
Spot.....			705,100	14,102	365,500	5,360
Squeteagues or "sea trout":						
Gray.....					28,000	840
Spotted.....			700	56	81,200	6,496
Striped bass.....	800	64	500	50		
White perch.....	26,100	1,048				
Crabs, hard.....			372,500	7,450	220,000	4,400
Shrimp.....					7,500	225
Clams, hard, public.....			4,000	320		
Oysters, market:						
Public, spring.....			9,900	594	45,300	2,718
Public, fall.....			19,300	1,544	68,400	5,472
Private, spring.....					9,000	540
Private, fall.....					4,000	320
Total.....	297,200	4,854	1,652,200	47,755	1,219,300	40,684

Fisheries of North Carolina, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Pamlico		Pasquotank		Pender	
	Pounds	Value	Pounds	Value	Pounds	Value
Alewives	2,500	\$25	700	\$7		
Bluefish	181,200	9,060			16,500	\$825
Bowfin			2,100	21		
Butterfish	4,000	120				
Carp			16,800	168		
Catfish and bullheads	6,000	120	226,300	6,789		
Croaker	1,861,400	24,312				
Drum:						
Black			200	8		
Red or redfish	83,900	1,336	400	8	12,500	250
Eels, common	5,000	250	1,700	68		
Flounders	43,200	2,160	1,000	50	25,500	1,275
Gizzard shad			17,100	342		
Harvestfish or "starfish"	96,000	2,880				
Hickory shad	12,000	120	10,900	218	2,500	50
Hogfish			200	8		
King whiting or "kingfish"	3,800	114	2,700	81		
Mullet	50,700	2,028	1,900	76	353,900	14,166
Pigfish			7,800	156		
Pike or pickerel			400	8		
Pompano	5,300	530				
Sea bass					10,000	500
Shad	23,000	3,680	84,100	13,054		
Sheepshead, salt-water	8,600	172				
Spanish mackerel	10,100	505				
Spot	555,500	5,555	16,300	163	446,800	4,468
Squeteagues or "sea trout":						
Gray	1,164,600	28,840	6,600	198		
Spotted	176,800	13,565	2,800	224	16,400	1,312
Striped bass	3,500	350	30,500	2,440		
Suckers			1,300	26		
White perch			1,900	76		
Crabs, hard	650,900	13,018			80,000	1,000
Shrimp	189,000	5,670				
Oysters, market:						
Public, spring	204,400	12,264			5,000	300
Public, fall	196,000	15,714			3,000	240
Total	5,537,400	152,418	433,700	24,189	942,100	24,376

Species	Perquimans		Tyrrell		Washington	
	Pounds	Value	Pounds	Value	Pounds	Value
Alewives	700	\$7	130,400	\$1,304	176,900	\$1,769
Bowfin	1,000	10	100	1		
Carp	15,400	164	52,500	525	13,000	130
Catfish and bullheads	169,600	5,085	76,900	2,307	46,400	1,392
Eels, common	1,300	52	100	6	200	12
Flounders	600	30	200	10		
Gizzard shad	10,200	204	200	4		
Hickory shad	8,700	174	200	4	8,000	160
Mullet	2,000	80	200	8		
Pigfish			3,000	60		
Pike or pickerel	300	3	100	1		
Shad	85,100	13,616	12,200	1,952	6,500	1,040
Squeteagues or "sea trout," spotted			100	8		
Striped bass	29,000	2,320	22,000	1,925	17,600	1,179
Suckers			100	2		
White perch	7,000	300	22,200	1,110	12,500	560
Yellow perch			3,000	90		
Total	330,800	22,035	323,500	9,317	281,100	6,242

SOUTH CAROLINA

Fisheries of South Carolina, 1938

OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets				Lines			Dip nets
		Anchor	Drift	Run-around	Stake	Hand	Troll	Trot with baits or snoods	
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....						22	6		
On boats and shore:									
Regular.....	82			58		34		115	
Casual.....	90	128	70	30	81	20		64	12
Total	172	128	70	88	31	76	6	179	12
Vessels:									
Motor:						3	1		
Net tonnage.....						29	11		
Sail:						1			
Net tonnage.....						12			
Total vessels						4	1		
Total net tonnage						41	11		
Boats:									
Motor.....		2		14		13			
Other.....	42	84	35	49	16	12		93	6
Accessory boats						10			
Apparatus:									
Number.....	38	106	35	49	16	98	8	125	6
Length, yards.....	6,185								
Square yards.....		87,880	49,710	22,770	10,925				
Hooks, baits, or snoods.....						130	8	35,848	

Item	Cast nets	Otter trawls, shrimp	Pots, fish	Spears	Dredges, oyster	Grabs	By hand		Total, exclusive of duplication
							Oyster	Other	
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....		56			3				75
On boats and shore:									
Regular.....		40		52		146	179	47	654
Casual.....	26		20	45		30	70	65	701
Total	26	96	20	97	3	176	249	112	1,430
Vessels:									
Motor:		20			1				23
Net tonnage.....		165			6				191
Sail:									1
Net tonnage.....									12
Total vessels		20			1				24
Total net tonnage		165			6				203
Boats:									
Motor.....		20							48
Other.....	19		10	82		146	105	24	591
Accessory boats									10
Apparatus:									
Number.....	26	40	105	97	1	176			
Yards at mouth.....		814			2				

Fisheries of South Carolina, 1938—Continued

CATCH: BY GEAR

Species	Haul seines		Gill nets					
			Anchor		Drift		Runaround	
			Pounds	Value	Pounds	Value	Pounds	Value
Bluefish	1,500	\$90					6,000	\$315
Catfish and bullheads	1,000	30						
Croaker	1,000	30						
Drum:								
Black	22,500	825					5,500	235
Red or redfish	57,500	2,935					43,000	2,735
Flounders	14,000	1,100					2,500	175
Hickory shad			2,900	\$51	1,400	\$28		
King whiting or "kingfish"	55,000	1,600						
Mullet	413,000	15,855					174,000	6,930
Shad	400	15	16,300	3,260	24,500	5,058		
Sheepshead, salt-water							2,500	50
Spot	159,300	3,580					36,500	1,050
Squeteagues or "sea trout":								
Gray	2,500	175					2,500	175
Spotted	46,300	4,419					22,500	2,040
Sturgeon			16,400	1,476	9,300	1,027		
Total	774,000	30,660	35,600	4,787	35,200	6,113	295,000	13,705

Species	Gill nets—Con.				Lines			
	Stake		Hand		Troll		Trot, with baits or snoods	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Bluefish			28,100	\$2,248	7,000	\$560		
Bonito			300	9				
Croaker			100	3				
Drum, red or redfish			3,000	150				
Grunts			2,500	75				
Hickory shad	4,200	\$121						
King whiting or "kingfish"			25,000	1,250				
Porgies			1,000	13				
Sea bass			111,500	6,265				
Sea catfish			100,000	3,000				
Shad	18,000	3,590						
Squeteagues or "sea trout," spotted			10,000	900				
Striped bass	600	108						
Crabs, hard							714,800	\$13,213
Total	22,800	3,819	281,500	13,913	7,000	560	714,800	13,213

Species	Dip nets		Cast nets		Otter trawls		Pots, fish	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Catfish and bullheads							72,000	\$2,460
Flounders							2,500	175
King whiting or "kingfish"					6,000	\$120		
Shad	600	\$102						
Shrimp			70,900	\$2,127	3,651,900	109,680		
Total	600	102	70,900	2,127	3,657,900	109,800	74,500	2,635

Species	Spears		Dredges		Grabs		By hand	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Flounders	46,500	\$3,090						
Crabs:								
Hard							128,500	\$1,955
Soft and peelers							4,800	216
Oysters, market:								
Private, spring			2,500	\$125	443,600	\$16,780	518,700	19,062
Private, fall			2,500	115	472,300	18,427	321,400	12,188
Total	46,500	3,090	5,000	240	915,900	35,213	973,400	33,421

Fisheries of South Carolina, 1938—Continued

OPERATING UNITS: BY COUNTIES

Item	Beaufort	Charleston	Colleton	Georgetown	Horry	Jasper
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	26	43		6		
On boats and shore:						
Regular.....	319	185		76	54	20
Casual.....	112	207	60	245	74	3
Total	457	435	60	327	128	23
Vessels:						
Motor	10	11		2		
Net tonnage.....	66	109		16		
Sail		1				
Net tonnage.....		12				
Total vessels	10	12		2		
Total net tonnage	66	121		16		
Boats:						
Motor.....	9	16		18	4	1
Other.....	232	171	30	114	35	9
Accessory boats		10				
Apparatus:						
Haul seines.....	2	3		19	14	
Length, yards.....	400	300		2,385	3,100	
Gill nets:						
Anchor.....	40		44	22		
Square yards.....	5,400		28,600	33,880		
Drift.....		6	6	23		
Square yards.....		3,350	3,460	42,900		
Runaround.....	3	4		31	10	1
Square yards.....	1,700	1,370		16,600	2,500	600
Stake.....				9	7	
Square yards.....				9,000	1,925	
Lines:						
Hand.....		76		10	12	
Hooks.....		108		10	12	
Troll.....		8				
Hooks.....		8				
Trot with baits or snoods.....	43	82				
Baits or snoods.....	25,800	10,048				
Dip nets.....		20		6		
Cast nets.....		15		8		
Otter trawls, shrimp.....	17	15		140		
Yards at mouth.....	353	321				
Pots, fish.....	60	10		35		
Spears.....	50			37	10	
Dredges, oyster.....		1				
Yards at mouth.....		2				
Grabs.....	66	110				

CATCH: BY COUNTIES

Species	Beaufort		Charleston		Colleton	
	Pounds	Value	Pounds	Value	Pounds	Value
Bluefish.....			36,100	\$2,808		
Bonito.....			300	9		
Catfish and bullheads.....	10,000	\$600	1,000	30		
Cronker.....			1,100	33		
Drum:						
Black.....	15,000	450	2,500	100		
Red or redfish.....	42,500	2,125	25,500	1,775		
Flounders.....	33,000	2,640	5,500	380		
Grunts.....			2,500	75		
Hokory shad.....	500	10			1,400	\$28
King whiting or "kingfish".....	30,000	600	25,000	1,250		
Mullet.....	43,000	1,400	11,000	445		
Porgies.....			1,000	13		
Sea bass.....			96,000	4,875		
Sea catfish.....			100,000	3,000		
Shad.....	2,500	500	13,600	2,992	13,400	2,680
Sheepshead, salt-water.....			2,600	53		
Spot.....	10,500	210	3,000	60		
Squeteagues or "sea trout," spotted.....	46,500	4,285	15,000	1,400		
Sturgeon.....					8,300	1,027
Crabs:						
Hard.....	626,200	11,884	217,100	3,284		
Soft and peelers.....			4,800	216		
Shrimp.....	2,641,600	79,038	842,000	25,270		
Oysters, market:						
Private, spring.....	610,900	22,832	341,400	12,678		
Private, fall.....	393,800	15,231	379,800	14,621		
Total	4,506,000	141,815	2,125,800	75,367	24,100	3,735

Fisheries of South Carolina, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Georgetown		Horry		Jasper	
	Pounds	Value	Pounds	Value	Pounds	Value
Bluefish.....	7,500	\$405				
Catfish and bullheads.....	62,000	1,860				
Drum:						
Black.....	10,500	510				
Red or redfish.....	29,000	1,605	4,000	\$190	2,500	\$125
Flounders.....	20,000	1,600	7,000	520		
Hickory shad.....	2,900	49	3,700	113		
King whiting or "kingfish".....	6,000	120	25,000	1,000		
Mullet.....	383,000	14,990	145,000	5,750	5,000	200
Sea bass.....	7,500	750	8,000	640		
Shad.....	25,000	4,858	4,900	980		
Sheepshead, salt-water.....	300	12				
Spot.....	110,300	2,456	70,000	1,850	2,000	60
Squeteagues or "sea trout":						
Gray.....	5,000	350				
Spotted.....	13,300	1,264	3,000	300	1,000	100
Striped bass.....	600	108				
Sturgeon.....	16,400	1,476				
Shrimp.....	239,200	7,499				
Oysters, market:						
Private, spring.....	1,600	60			10,900	403
Private, fall.....	3,800	144			18,800	734
Total.....	943,900	40,116	270,600	11,343	40,200	1,622

GEORGIA

Fisheries of Georgia, 1938

OPERATING UNITS: BY GEAR

Item	Purse seines, menhaden	Haul seines	Gill nets				Lines		
			Anchor	Drift	Run-around	Stake	Hand	Trot with baits or snoods	Trot with hooks
Fishermen:	Number	Number	Number	Number	Number	Number	Number	Number	Number
On vessels.....	45								
On boats and shore:									
Regular.....		18		5	12		8	154	
Casual.....		2	8	180	16	68	22	52	26
Total.....	45	20	8	185	28	68	30	206	26
Vessels, motor.....	2								
Net tonnage.....	92								
Boats:									
Motor.....				10	6			16	
Other.....		10	4	86	20	38	12	152	25
Accessory boats.....	6								
Apparatus:									
Number.....	2	10	16	98	28	142	150	202	45
Length, yards.....	600	898							
Square yards.....			770	43,110	8,480	15,665			
Hooks, baits, or snoods.....							150	82,300	5,325

Fisheries of Georgia, 1938—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Otter trawls, shrimp	Pots		Tongs, oyster	Grabs	By hand		Total, exclusive of duplication
		Crab	Fish			Oyster	Other	
Fishermen:	Number	Number	Number	Number	Number	Number	Number	Number
On vessels.....	160							205
On boats and shore:								
Regular.....	316	49		9	15	4		552
Casual.....	3	16	4	13	15	16	12	416
Total.....	479	65	4	22	30	20	12	1,173
Vessels, motor.....	72							74
Net tonnage.....	570							662
Boats:								
Motor.....	157	2						188
Other.....		56	2	22	30	20		428
Accessory boats.....								6
Apparatus:								
Number.....	229	620	44	22	30			
Yards at mouth.....	4,667							

CATCH: BY GEAR

Species	Purse seines		Haul seines		Gill nets			
					Anchor		Drift	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Flounders.....			500	\$10				
Hickory shad.....							2,900	\$92
Menhaden.....	7,033,800	\$9,888						
Mullet.....			1,500	30				
Shad.....					4,200	\$772	70,300	12,952
Spot.....			1,500	30				
Squeteagues or "sea trout," spotted.....			2,500	250				
Sturgeon.....							7,800	1,462
Terrapin, diamond-back.....			6,700	838				
Total.....	7,033,800	9,888	12,700	1,158	4,200	772	81,000	14,506

Species	Gill nets—Continued				Lines			
	Runaround		Stake		Hand		Trot with baits or snoods	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Croaker.....	2,500	\$100						
Drum:								
Black.....	5,000	200						
Red or redfish.....	27,500	1,275						
Hickory shad.....			1,100	\$43				
King whiting or "kingfish".....	5,000	75						
Mullet.....	15,500	385						
Shad.....			23,600	4,255				
Sheepshead, salt-water.....	5,000	150						
Spot.....	2,500	50						
Squeteagues or "sea trout," spotted.....	60,000	6,000						
Crabs, hard.....					90,000	\$1,350	1,397,700	\$20,990
Total.....	123,000	8,235	24,700	4,298	90,000	1,350	1,397,700	20,990

Fisheries of Georgia, 1938—Continued

CATCH: BY GEAR—Continued

Species	Lines—Contd.		Otter trawls		Pots			
	Trot with hooks				Crab		Fish	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Catfish and bullheads.....	7,700	\$470					31,400	\$1,256
Eels, common.....							1,500	165
Flounders.....			7,500	\$375				
King whiting or "kingfish".....			70,000	1,050				
Crabs, hard.....			20,000	300	346,500	\$5,188		
Shrimp.....			10,425,700	302,261				
Total.....	7,700	470	10,523,200	303,986	346,500	5,188	32,900	1,421

Species	Tongs		Grabs		By hand	
	Pounds	Value	Pounds	Value	Pounds	Value
Oysters, market:						
Private, spring.....	20,000	\$1,051	42,500	\$2,341	24,600	\$1,174
Private, fall.....	13,400	674	30,500	1,708	23,000	1,090
Terrapin, diamond-back.....					4,200	588
Total.....	33,400	1,725	73,000	4,049	51,800	2,852

OPERATING UNITS: BY COUNTIES

Item	Bryan	Bullock	Camden	Charlton	Chatham	Effingham
	Number	Number	Number	Number	Number	Number
Fishermen:						
On vessels.....			70		37	
On boats and shore:						
Regular.....			57		94	
Casual.....	32	16	37	10	100	8
Total.....	32	16	164	10	231	8
Vessels, motor.....			13		15	
Net tonnage.....			185		160	
Boats:						
Motor.....			15		31	
Other.....	16	8	58	5	97	4
Accessory boats.....			6			
Apparatus:						
Purse seines, menhaden.....			2			
Length, yards.....			600			
Haul seines.....					6	
Length, yards.....					498	
Gill nets:						
Anchor.....						16
Square yards.....						770
Drift.....	12		7		23	
Square yards.....	5,400		4,150		8,020	
Runaround.....					12	
Square yards.....					6,000	
Stake.....	16	80	6	5		
Square yards.....	1,840	3,200	6,000	2,800		
Lines:						
Hand.....					150	
Hooks.....					150	
Trot with baits or snoods.....			45		25	
Baits or snoods.....			19,500		9,850	
Trot with hooks.....		6				
Hooks.....		600				
Otter trawls, shrimp.....			24		43	
Yards at mouth.....			474		890	
Pots, crab.....			40		370	
Tongs, oyster.....					12	

Fisheries of Georgia, 1938—Continued

OPERATING UNITS: BY COUNTIES—Continued

Item	Glynn	Liberty	Long	McIntosh	Scriven	Tattnall	Wayne
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	75			23			
On boats and shore:							
Regular.....	165	20		210			
Casual.....	55	25	8	70	8	34	13
Total.....	295	51	8	303	8	34	13
Vessels, motor.....	35			11			
Net tonnage.....	239			72			
Boats:							
Motor.....	71			64		5	2
Other.....	64	31	4	116	8	12	5
Apparatus:							
Haul seines.....	4						
Length, yards.....	400						
Gill nets:							
Drift.....	15		2	20		12	5
Square yards.....	9,300		260	11,500		4,080	400
Runaround.....	16						
Square yards.....	2,480						
Stake.....			8		16	10	2
Square yards.....			480		780	500	65
Lines:							
Trot with baits or snoods.....	44	35		53			
Baits or snoods.....	23,700	8,760		20,500			
Trot with hooks.....			8		5	16	10
Hooks.....			800		425	2,500	1,000
Other trawls, shrimp.....	90			72			
Yards at mouth.....	1,894			1,399			
Pots:							
Crab.....	60	50		100			
Fish.....				44			
Tongs, oyster.....	6			4			
Grabs.....				30			

CATCH: BY COUNTIES

Species	Bryan		Bullock		Camden		Charlton	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Catfish and bullheads.....			1,500	\$90				
Hickory shad.....					500	\$20		
Menhaden.....					7,033,800	9,888		
Shad.....	18,900	\$3,308	2,200	440	15,900	2,703	4,800	\$816
Sturgeon.....					1,100	110		
Crabs, hard.....					250,000	3,750		
Shrimp.....					1,725,200	51,756		
Total.....	18,900	3,308	3,700	530	9,020,500	68,227	4,800	816

Species	Chatham		Effingham		Glynn		Liberty	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Croaker.....					2,500	\$100		
Drum:								
Black.....					5,000	200		
Red or redfish.....	7,500	\$375			20,000	900		
Flounders.....	7,500	375			500	10		
Hickory shad.....	500	15			1,300	54		
King whiting or "kingfish".....	50,000	750			25,000	375		
Mullet.....	7,500	225			9,500	190		
Shad.....	26,900	5,380	4,200	\$772	5,900	1,005		
Sheepshead, salt-water.....					5,000	150		
Spot.....	2,500	50			1,500	30		
Squeteagues Δ or "sea trout," spotted.....	35,000	3,500			27,500	2,750		
Crabs, hard.....	448,000	6,720			560,700	8,410	150,000	\$2,280
Shrimp.....	2,739,700	83,591			2,540,800	70,194		
Oysters, market:								
Private, spring.....	32,400	1,620			700	41	5,100	199
Private, fall.....	32,400	1,620			500	29	3,500	115
Terrapin, diamond-back.....	8,400	1,176			2,500	250		
Total.....	3,398,300	105,397	4,200	772	3,208,900	90,668	158,600	2,564

Fisheries of Georgia, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Long		McIntosh		Screven		Tattnall		Wayne	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Catfish and bullheads	500	\$35	31,400	\$1,256	1,200	\$70	2,500	\$125	2,000	\$150
Eels, common			1,500	165						
Hickory shad	200	6	500	20					1,000	40
Shad	1,400	280	7,500	1,275	2,400	400	4,800	960	3,200	640
Sturgeon			6,500	1,300					200	52
Crabs, hard			445,600	6,698						
Shrimp			3,420,000	90,720						
Oysters, market:										
Private, spring			48,900	2,706						
Private, fall			30,500	1,708						
Total	2,100	321	3,992,300	105,848	3,600	470	7,300	1,085	6,400	882

FLORIDA

Fisheries of Florida, 1938

OPERATING UNITS: BY GEAR

Item	Purse seines, men-haden	Haul seines, common	Gill nets				Trammel nets
			Anchor	Drift	Run-around	Stake	
Fishermen:	Number	Number	Number	Number	Number	Number	Number
On vessels	373	8			21		18
On boats and shore:							
Regular		922	14	95	2,504	2	874
Casual		147	4	10	77	4	13
Total	373	1,077	18	105	2,602	6	905
Vessel, motor	19	1			7		6
Net tonnage	827	5			48		43
Boats:							
Motor		202	10	38	1,085	2	354
Other		317	7	64	1,898	2	446
Accessory boats	48				3		
Apparatus:							
Number	19	238	18	71	2,198	4	621
Length, yards	5,320	124,315					
Square yards			13,500	88,700	2,325,660	3,600	519,745

Item	Lines					Pound nets	Fyke nets
	Hand	Trawl	Troll	Trot with baits or snoods	Trot with hooks		
Fishermen:	Number	Number	Number	Number	Number	Number	Number
On vessels	503	2	2				
On boats and shore:							
Regular	857	28	583	180	185	12	2
Casual	805		261	25	45		
Total	1,965	30	846	185	230	12	2
Vessels:							
Motor	63	1	1				
Net tonnage	2,028	15	5				
Sail	1						
Net tonnage	9						
Total vessels	64	1	1				
Total net tonnage	2,037	15	5				
Boats:							
Motor	629	14	467	93	85	10	1
Other	370		14	68	110	1	
Apparatus:							
Number	1,965	35	995	151	219	24	8
Hooks, baits, or snoods	2,600	2,040	995	83,550	76,155		

Fisheries of Florida, 1938—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Dip nets		Cast nets	Otter trawl, shrimp	Pots			
	Common	Drop			Crab	Eel	Fish	Sea crawfish
Fishermen:	Number	Number	Number	Number	Number	Number	Number	Number
On vessels.....				288				
On boats and shore:								
Regular.....	41		87	362	77	4	64	24
Casual.....	22	12	118	25	20		12	4
Total.....	63	12	205	675	97	4	76	28
Vessels, motor.....				123				
Net tonnage.....				972				
Boats:								
Motor.....	20		8	196	49	4	35	18
Other.....	14		107		22		58	
Apparatus:								
Number.....	57	24	205	319	6,800	71	5,110	2,050
Yards at mouth.....				6,124				

Item	Spears	Dredges			Tongs, oyster	Forks	Grabs	Co-quina scoops
		Clam	Oyster	Scallop				
Fishermen:	Number	Number	Number	Number	Number	Number	Number	Number
On vessels.....				6	6			
On boats and shore:								
Regular.....	66	12	9	53	277	4	17	
Casual.....	91				67	7	4	4
Total.....	157	12	13	53	350	11	21	4
Vessels, motor.....				2	2			
Net tonnage.....				14	11			
Boats:								
Motor.....			3	28	91		6	
Other.....	41	1			161		3	4
Apparatus:								
Number.....	157	1	10	54	331	11	21	4
Yards at mouth.....			10	50				

Item	Hooks		Diving outfits	By hand		Total, exclusive of duplication
	Sponge	Stone crab		Oyster	Other	
Fishermen:	Number	Number	Number	Number	Number	Number
On vessels.....			90			1,283
On boats and shore:						
Regular.....	410	13	413	44	32	5,975
Casual.....		3		27	25	1,467
Total.....	410	16	509	71	57	8,725
Vessels:						
Motor.....			13			226
Net tonnage.....			135			4,025
Sail.....						1
Net tonnage.....						9
Total vessels.....			13			227
Total net tonnage.....			135			4,034
Boats:						
Motor.....		6	59		4	2,562
Other.....	290	3		37	16	3,462
Accessory boats.....						51
Apparatus:						
Number.....	292	10	72			9
Hooks, balts, or snoods.....						8

Fisheries of Florida, 1938—Continued

CATCH: BY GEAR

Species	Purse seines		Haul seines		Gill nets			
	Pounds	Value	Pounds	Value	Anchor		Drift	
Alewives			391,600	\$1,959				
Bluefish			520,700	18,276				
Blue runner or hardtail			551,400	5,997				
Cabio or crab eater			200	5				
Catfish and bullheads			2,245,800	77,043				
Cigarfish			9,000	180				
Crappie			209,400	7,284				
Crevalle			80,700	1,353				
Croaker			4,900	93				
Drum:								
Black			27,000	725				
Red or redfish			202,700	6,232				
Flounders			21,100	811				
Groupers			5,000	125				
Grunts			3,000	60				
Hickory shad			31,100	1,137			1,300	\$39
Hogfish			1,000	30				
Jewfish			6,600	213				
Kingfish or "king mackerel"			32,600	865				
King whiting or "kingfish"			65,600	1,025				
Menhaden	149,085,700	\$385,032	183,000	3,040				
Mojarra			68,800	1,495				
Mullet			5,398,700	169,838				
Permit			3,000	60				
Pigfish			22,700	254				
Pinfish or sailors choice			1,500	23				
Pompano			77,100	16,596				
Porgies			900	15				
Sea catfish			10,100	182				
Shad			115,800	9,632	2,200	\$264	106,900	11,275
Sheepshead, salt-water			70,300	1,739				
Snapper, mangrove			26,800	1,177				
Snook or sergeant fish			107,600	3,880				
Spadefish			1,800	33				
Spanish mackerel			906,100	34,373				
Spot			38,200	781				
Squeteagues or "sea trout":								
Spotted			348,600	21,047				
White			6,500	220	8,500	850	25,500	2,210
Sturgeon								
Sunfish			695,200	25,317				
Tenpounder			352,400	6,673				
Tripletail			15,400	231				
Yellowtail			100	6				
Turtles:								
Green					8,200	310		
Loggerhead					800	16		
Soft-shell			80,100	1,591				
Total	149,085,700	385,032	12,970,100	422,516	19,700	1,440	133,700	13,524

Species	Gill nets—Continued				Trammel nets		Lines	
	Runaround		Stake		Hand		Hand	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Amberjack	100	\$2					21,800	\$477
Angelfish	100	4			400	\$14	200	4
Bluefish	3,763,000	177,561			41,500	2,498	63,400	2,801
Blue runner or hardtail	78,700	1,682			40,500	600	2,000	64
Cabio or crab eater	3,300	91					3,900	102
Catfish and bull heads							12,100	392
Crevalle	100,600	1,927			2,500	85	6,700	151
Croaker	8,100	161						
Dolphin							100	3
Drum:								
Black	32,900	843					3,800	114
Red or redfish	465,000	15,291			225,900	8,045	228,400	7,307
Flounders	36,200	1,208			23,200	1,012	6,300	228
Groupers	19,700	1,119					4,348,100	135,906
Grunts	9,300	371					20,000	577
Hogfish	5,000	150					5,800	260
Jewfish	3,900	132					115,900	4,164

Fisheries of Florida, 1938—Continued

CATCH: BY GEAR—Continued

Species	Gill nets—Continued				Trawl nets		Lines	
	Runaround		Stake		Pounds	Value	Hand	
	Pounds	Value	Pounds	Value			Pounds	Value
Kingfish or "king mackerel"	154,200	\$5,397					2,000	\$70
King whiting or "kingfish"	37,400	845			4,500	\$90		
Menhaden	400	4						
Mojarra	249,000	5,876			1,600	58	6,300	166
Moonfish							300	6
Mullet	20,895,400	696,172			2,186,900	70,891		
Muttonfish	72,800	4,878					208,100	12,581
Permit	3,300	81			8,400	178	1,000	21
Pigfish	24,600	459			1,400	52	500	10
Pinfish or sailors choice	22,200	276						
Pompano	144,600	30,937			548,600	112,588	7,800	1,610
Porkies	10,800	369					42,200	1,421
Sea bass	22,500	900					600	24
Sea catfish	2,000	40			5,100	107		
Shad			3,800	\$608				
Sheepshead, salt-water	528,100	14,131			77,200	2,685	100,500	2,890
Snapper:								
Lane							2,200	110
Mangrove	125,500	3,524			16,900	573	126,400	4,199
Red							5,359,600	377,701
Snook or sergeant fish	204,500	7,644			8,500	218	281,300	9,003
Spadefish	3,300	69						
Spanish mackerel	5,538,800	262,027			21,200	813	43,500	1,345
Spot	126,100	2,710			61,400	2,330	2,900	57
Squeteagues or "sea trout":								
Spotted	1,403,300	94,466			434,900	29,784	1,132,100	73,287
White	29,500	1,223			600	20	16,400	697
Sturgeon			2,000	160				
Swellfish							500	40
Tenpounder	2,400	54			2,400	57		
Tripletail	700	21					1,800	35
Turbot							1,800	36
Yellowtail	2,200	193					163,300	13,538
Sea crawfish or spiny lobster	31,300	1,507						
Total	34,251,700	1,334,345	5,800	768	3,713,900	232,688	12,346,500	651,317

Lines Continued

Species	Trawl		Troll		Trot with baits or snoods		Trot with hooks	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Amberjack			2,500	\$62				
Barracuda			500	20				
Bluefish			86,500	3,860				
Catfish and bullheads							1,433,600	\$55,974
Dolphin			2,500	120				
Groupers			3,900	143				
Kingfish or "king mackerel"			3,476,400	130,045				
King whiting or "kingfish"			300	10				
Sea catfish							50,200	1,004
Sharks	3,100,600	\$22,335						
Snook or sergeant fish			7,000	195				
Spanish mackerel			318,800	15,719				
Spot			100	4				
Squeteagues or "sea trout," spotted			2,200	155				
Sunfish							400	14
Crabs, hard					3,996,000	\$49,279		
Turtles, soft-shell							119,800	2,361
Total	3,100,600	22,335	3,900,700	150,333	3,996,000	49,279	1,604,000	59,353

Fisheries of Florida, 1938—Continued

CATCH: BY GEAR—Continued

Species	Pound nets		Fyke nets		Dip nets			
					Common		Drop	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Bluefish	4,000	\$320						
Blue runner or hardtail	3,000	105						
Catfish and bullheads	82,200	3,288	12,000	\$480				
Jewfish	2,000	50						
Spanish mackerel	7,000	245						
Squeteagues or "sea trout," spotted	1,000	80						
Tenpounder	2,000	70						
Crabs:								
Hard					16,500	\$495	5,300	\$245
Stone					7,700	1,386		
Sea crawfish or spiny lobster					44,600	2,428		
Shrimp					45,000	2,925		
Scallops, bay					5,300	391		
Total	101,200	4,188	12,000	480	119,100	7,625	5,300	245

Species	Cast nets		Otter trawls		Pots			
					Crab		Eel	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Blue runner or hardtail	200	\$7						
Eels, common							9,800	\$243
Flounders			29,300	\$1,278				
Groupers			1,600	39				
King whiting or "kingfish"			223,000	3,555				
Mojarra	7,800	224						
Mullet	112,900	4,359						
Sea bass			2,300	46				
Sheepshead, salt-water	1,400	49						
Snapper, red			18,300	732				
Spot	300	11						
Squeteagues or "sea trout":								
Spotted	1,100	77						
White			1,400	28				
Swellfish	500	40						
Crabs:								
Hard			20,000	300	1,557,100	\$25,951		
Stone					37,400	8,192		
Shrimp	157,300	7,733	9,940,300	307,954				
Total	281,500	12,500	10,236,200	313,932	1,594,500	34,143	9,800	243

Species	Pots—Continued				Spears		Dredges	
	Fish		Sea crawfish					
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Angelfish	500	\$10						
Blue runner or hardtail	25,000	625						
Catfish and bullheads	271,800	10,372						
Crappie	343,300	11,768						
Flounders					73,900	\$4,232		
Groupers			18,000	\$1,080				
Grunts	13,000	260						
Hogfish	1,000	30	3,000	90				
Muttonfish	2,000	100						
Porgies	4,000	160						
Sheepshead, salt-water	1,000	30	1,000	30				
Snook or sergeantfish					1,200	54		
Sunfish	172,200	5,687						
Tripletail	200	4						
Yellowtail	3,400	276						
Sea crawfish or spiny lobster			199,800	15,966				
Clams, hard, public							705,600	\$67,550
Oysters, market, public, spring							68,500	2,604
Scallops, bay							112,100	8,723
Turtles, soft-shell	19,100	392			70,000	1,260		
Total	856,500	29,714	221,600	17,166	145,100	5,546	886,200	78,877

Fisheries of Florida, 1938—Continued

CATCH: BY GEAR—Continued

Species	Tongs		Forks		Grabs		Coquina scoops	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Sea crawfish or spiny lobster					27,700	\$2,216		
Clams:								
Coquina							16,000	\$300
Hard, public			2,900	\$322	6,300	945		
Oysters, market:								
Public, spring	253,800	\$18,734						
Public, fall	546,100	41,966						
Private, spring	38,700	2,567						
Private, fall	51,900	3,207						
Total	890,500	66,474	2,900	322	34,000	3,161	16,000	300

Species	Hooks				Diving outfits		By hand	
	Sponge		Stone crab					
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Crabs, stone			3,600	\$1,260			5,800	\$1,160
Sea crawfish or spiny lobster			25,200	1,280				
Clams: hard, public							32,200	3,327
Conchs	7,800	\$624						
Oysters, market:								
Public, spring							19,200	953
Public, fall							12,000	572
Private, spring							91,500	4,720
Private, fall							78,800	4,065
Scallops, bay							20,000	1,479
Sponges:								
Grass	10,200	8,331			6,700	\$4,272		
Sheepswool	95,300	195,842			376,900	801,496		
Wire					7,900	6,514		
Yellow	18,500	8,745			90,500	45,648		
Total	131,800	213,542	28,800	2,520	482,000	857,930	259,500	16,276

OPERATING UNITS: BY COUNTIES

Item	Bay	Brevard	Broward	Charlotte	Citrus	Clay	Collier	Dade
	Number	Number	Number	Number	Number	Number	Number	Number
Fishermen:								
On vessels	109						18	
On boats and shore:								
Regular	238	113	29	180	135	43	294	235
Casual	44	11	21	60	51	4	97	41
Total	391	124	50	240	186	47	409	276
Vessels:								
Motor	15						6	
Net tonnage	239						43	
Sail	1							
Net tonnage	9							
Total vessels	16						6	
Total net tonnage	248						43	
Boats:								
Motor	55	59	25	79	75	18	174	153
Other	44	100	5	120	162	29	191	83
Accessory boats							3	
Apparatus:								
Haul seines, common	14			12		8	5	2
Length, yards	5,700			7,000		4,950	1,900	800
Gill nets, runaround	29	91	6	86	144		194	87
Square yards	103,800	77,280	7,000	96,000	95,100		209,900	182,700
Trammel nets	3			12	38		43	30
Square yards	2,000			25,750	22,800		84,800	33,000

Fisheries of Florida, 1938—Continued
OPERATING UNITS: BY COUNTIES—Continued

Item	Bay	Brevard	Broward	Charlotte	Citrus	Clay	Collier	Dade
Apparatus—Continued.								
Lines:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Hand	103	9	24	46	33		150	71
Hooks	316	9	24	46	33		150	71
Trawl							6	
Hooks							300	
Troll			6	18	3			70
Hooks			6	18	3		73	70
Trot with baits or snoods		17		12				
Baits or snoods		15, 100		6, 000				
Trot with hooks								
Hooks						10, 500		
Dip nets:								
Common	15	7						7
Drop	12							
Cast nets			2	31			9	
Pots:								
Crab		2, 310				85		230
Fish								50
Sea crawfish			280					1, 770
Spears	14							
Dredges:								
Clam							1	
Scallop	30							
Yards at mouth	30							
Tongs, oyster	43				14			
Crabs								13

Item	Dixie	Duval	Escambia	Franklin	Glades	Gulf	Hendry	Hernando
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels		135	248	64		56		
On boats and shore:								
Regular	59	368	91	379	42	43	13	6
Casual	24	62	23	42	16	6		
Total	83	565	362	485	58	105	13	6
Vessels, motor		29	27	15		2		
Net tonnage		359	1, 584	97		93		
Boats:								
Motor	39	160	51	148	8	10	5	2
Other	76	199	34	90	58	26	12	6
Accessory boats		12				6		
Apparatus:								
Purse seines, menhaden		4				2		
Length, yards		1, 100				560		
Haul seines, common		12	2	13	8	3	2	
Length, yards		6, 100	800	5, 700	6, 760	1, 900	1, 900	
Gill nets:								
Anchor	7	3						
Square yards	2, 100	6, 500						
Drift	7	30		20				
Square yards	4, 200	69, 900		6, 600				
Runaround	41	52	12	53		11		6
Square yards	18, 880	36, 510	28, 800	43, 400		11, 000		3, 000
Trawl nets	59		30	12				
Square yards	27, 520		24, 000	14, 400				
Lines:								
Hand	59	34	268	92				
Hooks	59	34	536	141				
Trawl		12						
Hooks		600						
Troll		7	101					
Hooks		7	101					
Trot with baits or snoods		21		21				
Baits or snoods		16, 650		8, 300				
Trot with hooks		93		17	9		1	
Hooks		30, 225		2, 500	1, 800		500	
Dip nets, drop			12					
Cast nets		15						
Otter trawls, shrimp		74	21	77		2		
Yards at mouth		1, 431	210	1, 262		36		
Pots:								
Crab		1, 720						
Fish				120	2, 310		515	
Spears			3	29	16	6		
Dredges, oyster				10				
Yards at mouth				10				
Tongs, oyster		6	12	162		24		

Fisheries of Florida, 1938—Continued

OPERATING UNITS: BY COUNTIES—Continued

Item	Hills-borough	Indian River	Lec	Levy	Manatee	Martin	Monroe	Nassau
Fishermen:								
On vessels	55						5	297
On boats and shore:								
Regular	94	79	295	115	151	178	273	166
Casual	60	1	125	38	31	5	44	18
Total	209	80	420	153	182	183	322	481
Vessels, motor	8						2	39
Net tonnage	80						10	755
Boats:								
Motor	50	41	208	82	67	77	76	51
Other	105	46	244	108	125	70	202	61
Accessory boats								30
Apparatus:								
Purse seines, menhaden								13
Length, yards								3,660
Haul seines, common	2		7		17	15		2
Length, yards	900		2,550		7,250	14,500		500
Gill nets:								
Anchor				2			6	
Square yards				2,400			2,500	
Drift								10
Square yards								5,100
Runaround	76	52	244	87	100	43	39	4
Square yards	59,200	41,850	248,700	40,500	94,400	70,000	72,800	2,300
Stake								2
Square yards								2,000
Trammel nets	2		40	94	6	4	10	
Square yards	2,500		65,600	43,475	14,400	4,400	16,800	
Lines:								
Hand	96	18	81	60	24	33	78	3
Hooks	168	18	81	60	31	33	36	3
Trawl					6	8	1	
Hooks					240	400	100	
Troll	4	2	47	77	22	27	68	
Hooks	4	2	47	77	22	27	68	
Trot with baits or snoods	15		6		2			25
Baits or snoods	13,900		3,000		2,000			5,200
Pound nets				1				
Dip nets, common	6				3		13	
Cast nets	20		49		10			
Otter trawls, shrimp								70
Yards at mouth								1,382
Pots:								
Crab		125			500			
Fish							10	
Dredges, scallop			12					
Yards at mouth			8					
Tongs, oyster	4	1	2	2	2			
Forks					4			
Coquina scoops			4					
Hooks:								
Sponge							170	
Stone crab							6	

Item	Oka-loosa	Okee-chobee	Palm Beach	Pasco	Pin-ellas	Put-nam	St. Johns	St. Lucie
Fishermen:								
On vessels	32				111		144	2
On boats and shore:								
Regular	190	32	292	73	902	124	54	157
Casual	8		131		188	8	13	
Total	230	32	423	73	1,201	132	211	159
Vessels, motor	4				15		61	1
Net tonnage	48				163		507	15
Boats:								
Motor	35	21	174	16	182	49	13	84
Other	30	30	114	73	331	76	37	24
Apparatus:								
Haul seines, common	14	6	3		16	30	6	
Length, yards	6,350	5,400	2,500		6,900	17,820	370	
Gill nets:								
Drift						4		
Square yards						2,900		

Fisheries of Florida, 1938—Continued

OPERATING UNITS: BY COUNTIES—Continued

Item	Oka-loosa	Okeechobee	Palm Beach	Pasco	Pinellas	Putnam	St. Johns	St. Lucie
Apparatus—Continued.								
Gill nets—Continued.	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Runaround.....	2		59	73	194			63
Square yards.....	1,200		141,600	36,500	221,925			154,015
Stake.....	2							
Square yards.....	1,600							
Trammel nets.....	26				4			
Square yards.....	16,000				5,800			
Lines:								
Hand.....	63		120		190		8	54
Hooks.....	126		120		227		8	54
Trawl.....								2
Hooks.....								400
Troll.....			274		151			24
Hooks.....			274		151			24
Trot with baits or snoods.....						14	10	
Baits or snoods.....						5,900	3,700	
Trot with hooks.....		17	3			29		
Hooks.....		10,700	980			12,650		
Pound nets.....						23		
Fyke nets.....						8		
Cast nets.....			31					
Otter trawls, shrimp.....							4	
Yards at mouth.....							69	
Pots:							1,658	
Crab.....								
Eel.....					180		540	
Fish.....		1,590	515			71		
Spears.....	9				39		4	
Dredges, scallop.....					12			
Yards at mouth.....					12			
Tongs, oyster.....	4				12		1	
Grabs.....					8			
Hooks, sponge.....					118			
Diving outfits.....					72			
Item	Santa Rosa	Sarasota	Seminole	Taylor	Volusia	Wakulla	Walton	
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	
On vessels.....					7			
On boats and shore:								
Regular.....	14	150	24	115	113	112	4	
Casual.....	8	105	4	27	32	112	7	
Total.....	22	255	28	142	152	224	11	
Vessels, motor					2			
Net tonnage.....					32			
Boats:								
Motor.....	9	116	12	43	37	49		
Other.....	21	134	21	133	109	128	5	
Apparatus:								
Haul seines, common.....		10			17	12		
Length, yards.....		3,300			9,525	2,850		
Gill nets, runaround.....		107		109	26	105		
Square yards.....		113,800		50,600	21,900	41,000		
Trammel nets.....	16	14		86		90	2	
Square yards.....	6,400	33,600		39,300		36,000	1,200	
Lines:								
Hand.....	9	56		39	32	22		
Hooks.....	9	64		39	32	22		
Troll.....		106		6				
Hooks.....		106		6				
Trot with baits or snoods.....								
Baits or snoods.....					8			
Trot with hooks.....			28		3,800			
Hooks.....			6,300					
Dip nets, common.....					6			
Cast nets.....			6		28			
Otter trawls, shrimp.....					6			
Yards at mouth.....					145			
Pots, crab.....						1,200		
Spears.....	6				21	4	6	
Tongs, oyster.....	10	4			14	11	3	
Forks.....		7						
Hooks, stone crab.....		4						

Fisheries of Florida, 1938—Continued

CATCH: BY COUNTIES

Species	Bay		Brevard		Broward		Charlotte	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Bluefish	362,300	\$10,869	600	\$24	14,000	\$910	30,400	\$839
Blue runner or hardtail	328,600	3,408					5,200	104
Cabio or crab eater							700	14
Cigarfish	2,000	40						
Crevalle			20,400	510				
Croaker	300	9						
Drum:								
Black	1,100	17	3,800	110			900	18
Red or redfish	34,200	1,179	16,800	560			126,600	3,800
Flounders	7,100	395					6,300	126
Groupers	1,185,500	36,587			6,200	315	18,000	360
Grunts			7,800	312				
Jewfish					500	25	2,000	40
Kingfish or "king mackerel"	13,000	390			20,000	1,000	7,400	246
King whiting or "kingfish"	1,400	14	4,000	61			3,500	70
Menhaden	18,000	360						
Mojarra							90,600	1,812
Mullet	1,123,900	33,717	1,164,700	35,531	6,000	180	1,682,700	57,844
Muttonfish					1,200	105		
Permit							3,000	60
Pigfish							2,500	50
Pinfish or sailors choice			7,400	111				
Pompano	11,700	1,990	4,700	1,049	1,300	302	26,400	5,280
Porgies	5,000	150						
Sheepshead, salt-water	3,300	54	10,600	178			49,000	980
Snapper:								
Mangrove					2,000	114	46,800	936
Red	1,263,400	90,984			2,000	135		
Snook or sergeantfish			700	27			87,400	1,748
Spadefish	1,300	20						
Spanish mackerel	599,100	23,664			10,000	480	212,000	9,914
Spot	2,400	46	15,700	288			4,400	88
Squeteagues or "sea trout":								
Spotted	134,300	8,547	129,900	8,370			245,800	15,936
White	2,100	32					4,100	234
Tenpounder	212,000	4,240						
Crabs:								
Hard	1,800	70	773,000	13,190			213,400	4,268
Stone			12,700	1,763				
Sea crawfish or spiny lobster					71,400	5,718		
Oysters, market:								
Public, spring	19,400	1,803						
Public, fall	9,200	950						
Scallops, bay	60,200	4,275						
Total	5,402,600	223,810	2,172,800	62,084	134,600	9,284	2,869,100	104,767

Species	Citrus		Clay		Collier		Dade	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Amberjack							4,000	\$100
Angefish							500	10
Bluefish					42,200	\$1,688	49,100	3,445
Blue runner or hardtail	2,000						42,000	1,060
Catfish and bullheads		80	303,100	\$13,641				
Crappie			5,600	225				
Crevalle					2,700	56	10,800	270
Dolphin							2,000	100
Drum:								
Black					3,800	78	2,300	69
Red or redfish	116,900	4,091			116,100	3,647	2,800	84
Flounders	3,500	123			1,700	46		
Groupers	5,200	182			71,800	2,154	117,200	8,832
Grunts							12,500	250
Hogfish							10,000	300
Jewfish					10,800	324	11,000	385
Kingfish or "king mackerel"					101,000	3,743	489,000	24,450
King whiting or "kingfish"					500	12		
Mojarra					54,600	1,092	3,700	111
Mullet	2,123,100	74,308	800	17	3,120,700	96,807	711,000	24,883
Muttonfish							140,900	10,568
Permit					8,600	171	1,500	45
Pigfish	800	28			300	6		
Pompano					222,800	44,429	98,100	23,583
Sharks					290,000	1,900		

Fisheries of Florida, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Citrus		Clay		Collier		Dade	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Sheepshead, salt-water	15,500	\$542			130,800	\$3,050	29,000	\$870
Snapper, mangrove	28,600	1,003			48,500	1,540	8,800	475
Snook or sergeantfish					139,200	4,951	54,000	2,160
Spadefish					1,000	20		
Spanish mackerel	3,800	136			583,600	24,331	583,500	36,875
Spot					800	20		
Squeteagues or "sea trout":								
Spotted	141,200	9,884			122,800	7,368	25,000	1,750
White					2,000	80		
Sunfish			46,700	\$1,868				
Tripletail							1,200	24
Yellowtail							61,100	5,684
Crabs:								
Hard			1,100	19				
Stone							7,500	2,550
Sea crawfish or spiny lobster							162,500	12,992
Clams, hard, public					705,600	67,550		
Oysters, market:								
Public, spring	6,600	347						
Public, fall	10,200	540						
Private, spring	2,600	135						
Private, fall	6,800	360						
Sponges:								
Grass							100	38
Sheepswool							800	1,809
Yellow							100	40
Total	2,476,800	92,459	357,300	15,770	5,781,900	265,063	2,672,000	163,822

Species	Dixie		Duval		Escambia		Franklin	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Bluefish	12,300	\$723	1,600	\$80	40,500	\$1,114	18,700	\$564
Blue runner or hardtail					34,700	347	24,300	486
Cabio or crab eater			100	5				
Catfish and bullheads	4,000	120	515,400	20,616			19,800	888
Crappie			10,100	606				
Creville	1,300	47	4,400	86				
Croaker			3,400	67				
Drum:								
Black			4,100	123			300	9
Red or redfish	54,500	1,997	20,100	803	2,400	72	23,400	820
Flounders	4,200	158	10,800	449	12,700	568	32,800	1,816
Groupers	200	7	600	18	972,900	34,053	500,000	12,558
Grunts							1,700	51
Hickory shad			1,300	39				
Jewfish			14,100	564			3,000	90
Kingfish or "king mackerel"					2,200	44		
King whiting or "kingfish"			98,000	1,630	4,500	90	2,400	49
Menhaden			39,041,100	102,881	60,000	900	26,900	538
Mullet	434,600	15,211	535,900	20,480	164,500	4,931	1,029,700	36,013
Pigfish	600	24						
Pompano	4,200	756	2,200	438	23,800	4,760	4,600	872
Porgies					6,700	214		
Sea catfish					8,200	164	55,200	1,104
Shad			80,100	8,214				
Sharks			154,600	1,237				
Sheepshead, salt-water	29,700	1,139	2,500	100	5,600	108	1,700	61
Snapper:								
Mangrove	1,100	38						
Red			12,700	762	2,313,500	169,401	431,600	29,991
Spanish mackerel	1,100	43	3,200	224	269,600	15,480	83,300	3,214
Spot	500	17	8,400	168	3,700	74	8,700	276
Squeteagues or "sea trout":								
Spotted	191,500	11,990	26,200	2,126	31,400	2,826	91,200	5,733
White					400	12	7,700	220
Sturgeon	17,000	1,700					17,000	1,360
Sunfish			27,700	1,524				
Tenpounder					75,000	1,125	14,500	290
Turbot			1,800	36				
Crabs, hard			2,894,100	35,792	3,500	175	458,000	4,580
Shrimp			2,281,100	69,306	357,600	16,090	918,100	32,075
Oysters, market:								
Public, spring			10,300	485	11,900	1,116	227,900	12,852
Public, fall			11,100	444	4,200	518	445,400	32,542
Private, spring			25,500	1,326				
Private, fall			37,600	2,444				
Total	756,800	33,880	45,840,100	273,073	4,409,500	254,182	4,447,900	179,052

Fisheries of Florida, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Glades		Gulf		Hendry		Hernando	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Bluefish			35,000	\$1,050				
Blue runner or hardtail			3,800	38				
Catfish and bullheads	366,100	\$11,898			12,200	\$417		
Crappie	191,200	6,215			8,500	255		
Croaker			900	27				
Drum:								
Black			600	18				
Red or redfish			4,000	120			100	4
Flounders			2,100	124			100	4
King whiting or "kingfish"			500	12				
Menhaden			202,500	480				
Mullet			460,000	13,800			28,000	980
Pompano			6,460	1,152				
Sheepshead, salt-water			400	12				
Snapper, mangrove							100	4
Spanish mackerel			102,000	3,235				
Spot			300	9				
Squeteagues or "sea trout":								
Spotted			27,000	1,620			600	42
White			200	6				
Stuzfish	187,300	6,087			13,900	346		
Shrimp			20,000	700				
Oysters, market:								
Public, spring			17,000	1,500				
Public, fall			51,000	5,400				
Turtles, soft-shed	116,000	2,087			3,800	76		
Total	860,600	26,287	933,700	29,303	38,400	1,094	29,200	1,044

Species	Hillsborough		Indian River		Lee		Levy	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Angelfish							500	\$18
Bluefish	3,800	\$155	89,300	\$4,465	22,200	\$1,332	21,400	1,681
Blue runner or hardtail	200	2			800	27	8,000	275
Cabio or crab eater					2,400	72		
Catfish and bullheads							5,000	150
Crevalle	9,200	92	9,100	164	11,100	333	1,100	38
Drum:								
Black	800	8	22,900	582	2,900	87		
Red or redfish	9,200	330	30,000	900	163,900	4,917	54,600	1,761
Flounders	2,900	115			4,900	147	1,300	45
Groupers	401,700	10,040	2,600	125	17,600	528	8,200	240
Jewfish			2,000	50	8,300	249	3,000	75
Kingfish or "king mackerel"	2,000	60			15,900	557	181,500	4,548
King whiting or "kingfish"			800	12	5,100	153		
Mojarra	16,700	224	16,000	240	92,000	2,760		
Mullet	486,300	17,982	535,700	11,393	2,916,600	102,081	959,400	32,315
Muttonfish			2,000	140				
Permit					1,100	33		
Pigfish			16,500	250	2,000	60		
Pinfish or sailors choice			14,800	165				
Pompano	2,100	420	9,000	2,124	94,900	18,980	6,400	1,152
Sea bass			22,500	900				
Sheepshead, salt-water	16,200	563	19,300	364	192,600	5,760	36,000	1,186
Snapper:								
Mangrove	1,000	38	16,600	333	77,800	2,334	4,400	138
Red	593,700	38,588	2,800	168				
Snook or sergeantfish	9,000	360	23,700	1,126	120,900	3,627		
Spanish mackerel	7,600	304	97,600	4,557	288,400	11,536	13,800	481
Spot	15,500	425	43,800	657	7,000	210	500	17
Squeteagues or "sea trout":								
Spotted	99,700	6,979	219,100	12,838	315,200	18,912	205,300	15,411
White	2,000	73			9,600	384		
Tenpounder							3,000	105
Crabs, hard	262,500	3,835	28,800	547	112,000	2,240		
Clams, coquina					16,000	300		
Oysters, market:								
Public, spring	1,000	150	400	8	600	100	100	10
Public, fall	400	55					500	50
Private, spring	2,700	540						
Private, fall	300	60						
Scallops, bay					28,000	2,667		
Turtles, green							5,000	160
Total	1,946,500	81,398	1,225,300	42,108	4,529,200	180,386	1,519,000	59,846

Fisheries of Florida, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Manatee		Martin		Monroe		Nassau	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Amberjack			100	\$2	1,000	\$20		
Bluefish	31,600	\$1,414	664,700	33,235	11,700	423	700	\$42
Blue runner or hardtail	300	3	200	5	1,800	36		
Cabio	1,300	33						
Crevalle	5,700	112	73,000	1,095				
Croaker	800	20	4,000	59				
Drum:								
Black			7,700	231	1,500	45	400	9
Red or redfish	81,100	2,895	17,100	342	3,000	105	700	35
Flounders	5,800	126					15,800	808
Groupers	20,800	548	2,300	138	75,400	3,010		
Grunts			3,000	60	19,500	390		
Hogfish					5,800	290		
Jewish	2,000	50	2,400	72	40,700	1,812		
Kingfish or "king mackerel"	7,900	237	2,700	122	262,300	10,432		
King whiting or "kingfish"	600	6	5,700	86			17,000	300
Menhaden			32,000	320			109,842,100	281,671
Mojarra	19,700	492	6,500	130				
Mullet	1,807,600	62,765	884,700	17,694	352,200	10,566	10,500	336
Muttonfish			5,300	106	79,500	3,900		
Pigfish			20,000	200				
Pompano	24,900	4,684	84,000	19,532	52,200	10,440		
Porgies	3,200	68			18,500	740		
Shad							12,300	1,883
Sharks	600,000	3,800	1,596,000	12,768	60,000	230		
Sheepshead, salt-water	55,500	1,422	2,000	30	5,000	150	400	9
Snapper:								
Lane					2,200	110		
Mangrove	8,100	177	17,200	946	13,900	695		
Red			2,800	196				
Snook or sergeantfish	25,000	865	54,200	2,168	6,500	260		
Spadefish	2,800	62						
Spanish mackerel	222,300	9,232	131,600	6,580	422,200	16,888		
Spot	9,400	115	12,500	250			500	7
Squeteagues or "sea trout":								
Spotted	213,200	12,792	51,100	3,068	27,500	1,650	5,700	557
White	12,500	500						
Tripletail			15,400	231				
Yellowtail			100	6	103,800	8,293		
Crabs:								
Hard	53,000	707					200,000	3,000
Stone	7,500	1,875			5,800	1,160		
Sea crawfish or spiny lobster					63,200	3,160		
Shrimp							1,775,400	53,262
Clams, hard, public	1,600	192						
Conchs					7,800	624		
Oysters, market:								
Public, spring	500	80					5,800	278
Public, fall							1,800	112
Private, spring							83,900	4,325
Private, fall							70,500	3,521
Scallops, bay	300	36						
Turtles:								
Green					3,200	160		
Loggerhead					800	16		
Sponges:								
Grass					6,400	5,950		
Sheepswool					48,500	£7,858		
Yellow					15,100	7,085		
Total	3,225,000	105,308	3,698,300	99,672	1,717,000	186,498	112,043,500	350,159

Species	Oskaloosa		Okeechobee		Palm Beach		Pasco	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Amberjack					2,300	\$58		
Angelfish					200	4		
Barracuda					500	20		
Bluefish	85,400	\$2,562			919,500	36,866	6,000	\$420
Blue runner or hardtail	249,100	2,491			14,300	297		
Cabio or crab eater					200	8		
Catfish and bullheads			732,800	\$29,314	138,700	6,242		
Cigarfish	7,000	140						
Crappie			209,100	7,417	29,800	1,042		

Fisheries of Florida, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Oskaloosa		Okeechobee		Palm Beach		Pasco	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Crevalle					7,200	\$164		
Croaker					1,600	32		
Dolphin					600	23		
Drum, red or redfish	1,800	\$50			3,000	124	7,300	\$256
Flounders	5,900	472					700	26
Groupers	383,500	11,505						
Grunts					35,700	1,218		
Jewfish					3,300	65		
Kingfish or "king mackerel"	19,600	475			4,900	117		
King whiting or "kingfish"					2,258,800	78,883		
Menhaden					1,100	35		
Mojarra	46,100	922			400	4		
Moonfish					4,500	158		
Mullet	902,000	24,830			300	6		
Muttonfish					29,700	948	561,900	19,666
Permit					53,600	2,720		
Pompano	7,700	1,540			1,000	21		
Porgies	15,300	459			15,200	2,961	300	54
Sea bass							300	10
Sea catfish	4,300	65			600	24		
Sheepshead, salt-water	2,300	57						
Snapper					4,600	148	5,400	19
Mangrove								
Red	634,600	44,422			1,800	80	2,500	87
Spotted					1,000	72		
Snook or sergeantfish					7,700	327		
Spanish mackerel	186,100	5,533			385,700	15,486	5,200	208
Spot	200	3			600	22		
Squeteagues or "sea trout," spotted	21,900	1,533			2,900	205	18,100	1,267
Sturgeon	2,000	160						
Sunfish			137,300	\$4,805	22,800	798		
Swellfish					1,000	80		
Tenpounder	54,700	1,094						
Tripletail					800	15		
Yellowtail					4,000	80		
Sea crawfish or spiny lobster					31,200	1,500		
Oysters, market:								
Public, spring	800	80						
Public, fall	200	24						
Turtles, soft-shell			164,700	3,304	500	10		
Total	2,630,500	98,417	1,243,900	44,840	3,991,600	150,863	607,700	22,188

Species	Pinellas		Putnam		St. Johns		St. Lucie	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Alewives			391,600	\$1,959				
Amberjack	17,000	\$361						
Bluefish	73,800	4,139			2,000	\$100	1,878,100	\$93,905
Blue runner or hardtail	700	21					8,700	218
Cabio or crab eater	500	10					2,200	56
Catfish and bullheads			1,618,000	50,069				
Crappie			65,400	1,986				
Crevalle							31,600	474
Croaker							2,000	40
Drum:								
Black					5,000	150		
Red or redfish	50,200	1,706	100	4	5,500	253	5,800	232
Eels, common			9,800	243				
Flounders	7,300	395			10,100	369	3,100	63
Groupers	474,300	14,246			1,600	39	7,600	228
Grunts							3,500	140
Hickory shad			31,100	1,137				
Jewfish							8,400	252
Kingfish or "king mackerel"	63,800	2,506					32,400	1,296
King whiting or "kingfish"	1,000	20			149,500	2,259	17,600	440
Mojarra	1,700	34					20,900	624
Mullet	2,624,400	88,322	2,100	73	10,500	265	262,500	7,876
Muttonfish							400	20
Pigfish	300	6					5,100	129
Pompano	16,300	3,256					21,200	4,241
Porgies	8,900	324						
Sea bass					2,300	46		
Shad			133,800	11,482				
Sharks							400,000	2,400

Fisheries of Florida, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Pinellas		Putnam		St. Johns		St. Lucie	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Sheepshead, salt-water	54,700	\$1,885					23,600	\$355
Snapper:								
Mangrove	6,000	228					3,400	153
Red	24,000	1,560			18,300	\$732	15,500	930
Snook or sergeantfish	67,500	3,013					3,800	152
Spanish mackerel	846,200	37,605					1,433,600	71,685
Spot	3,500	76					11,000	275
Squeteagues or "sea trout":								
Spotted	515,000	32,456			11,700	1,013	35,200	2,467
White	8,000	415						
Sunfish			258,900	\$6,930				
Tripletail							700	21
Crabs:								
Hard			248,700	3,109	170,000	2,550		
Stone	9,600	2,220						
Sea crawfish or spiny lobster							100	7
Shrimp					4,423,800	132,464		
Clams, hard, public	8,400	1,260			30,100	3,012		
Oysters, market:								
Public, spring	7,200	648			3,600	173		
Public, fall					2,100	101		
Private, spring	3,600	324			800	38		
Private, fall	1,900	171			800	41		
Scallops, bay	47,600	3,495						
Turtles, soft-shell			3,100	64				
Sponges:								
Grass	10,400	6,615						
Sheepswool	422,900	897,611						
Wire	7,900	6,514						
Yellow	93,800	47,268						
Total	5,478,400	1,158,710	2,762,600	77,056	4,847,700	143,605	4,238,000	188,679

Species	Santa Rosa		Sarasota		Seminole		Taylor	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Bluefish			26,200	\$1,048			9,700	\$628
Blue runner or hardtail			4,200	84			1,600	50
Catfish and bullheads					206,700	\$8,767	1,000	30
Crevalle							1,800	57
Drum, red or redfish	1,500	\$75	27,200	544			47,900	1,564
Flounders	800	32	4,300	86			9,300	296
Groupers			27,300	546			1,100	35
Jewfish			500	10				
Kingfish or "king mackerel"			177,700	7,108			8,000	280
Mojarra			6,600	132				
Mullet	67,400	2,020	1,180,400	41,302			834,000	26,440
Permit			500	10				
Pigfish			1,100	22				
Pompano			21,300	4,260			7,600	1,468
Sheepshead, salt-water	400	8	46,700	934			7,300	232
Snapper, mangrove			5,900	118			1,100	36
Snook or sergeantfish			10,500	210				
Spanish mackerel			319,200	15,960			16,200	531
Spot	100	2	5,900	118			2,700	85
Squeteagues or "sea trout":								
Spotted	5,500	440	93,300	5,598			267,400	17,144
White	100	4	5,700	228				
Crabs, stone			3,600	1,260				
Clams, hard, public			1,300	130				
Oysters, market:								
Public, spring	5,900	582	6,500	980				
Public, fall	2,200	266	700	100				
Scallops, bay			1,300	120				
Total	83,900	3,429	1,978,200	80,908	206,700	8,767	1,216,700	48,884

Fisheries of Florida, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Volusia		Wakulla		Walton	
	Pounds	Value	Pounds	Value	Pounds	Value
Bluefish.....	8,300	\$385	8,600	\$492		
Blue runner or hardtail.....			3,200	128		
Catfish and bullheads.....	132,700	5,307				
Crappie.....	33,000	1,306				
Crevalle.....	1,100	18				
Drum:						
Black.....	5,600	128				
Red or redfish.....	7,700	236	88,400	3,456	190	\$3
Flounders.....	28,000	1,574	7,200	298	1,300	118
Groupers.....	24,000	725	5,000	175		
Jewfish.....	14,800	444				
King whiting or "kingfish".....	17,600	276				
Mullet.....	208,300	10,256	1,276,100	47,818	48,000	1,610
Pinfish or sailors choice.....	1,500	23				
Pompano.....	8,000	1,764	800	144		
Shad.....	2,500	200				
Sheepshead, salt-water.....	1,500	24	28,400	1,136	100	3
Snapper, red.....	62,000	492				
Spanish mackerel.....			8,500	340		
Spot.....	7,600	113	93,300	2,532		
Squeteagues or "sea trout," spotted.....	43,600	3,068	94,100	6,150	800	56
Sunfish.....	173,200	8,660				
Crabs:						
Hard.....	175,000	2,188				
Stone.....			7,800	1,170		
Shrimp.....	366,600	14,715				
Oysters, market:						
Public, spring.....	11,200	585	4,300	490	200	24
Public, fall.....	13,500	705	5,500	717	100	14
Private, spring.....	11,100	599				
Private, fall.....	12,800	671				
Turtles, soft-shell.....	900	63				
Total	1,462,100	54,525	1,559,200	65,936	48,600	1,828

CATCH: BY DISTRICTS

Species	East Coast		West Coast		Lake Okeechobee	
	Pounds	Value	Pounds	Value	Pounds	Value
Mowies.....	351,600	\$1,959				
Amberjack.....	6,400	160	18,000	\$381		
Angelfish.....	700	14	500	18		
Barracuda.....	500	20				
Bluefish.....	3,627,900	173,457	852,100	31,859		
Blue runner or hardtail.....	65,200	1,580	666,500	7,500		
Cable or crab eater.....	2,500	69	4,900	129		
Catfish and bullheads.....	2,776,900	98,400	31,800	1,268	1,240,800	\$47,871
Cigarfish.....			9,000	180		
Crappie.....	114,100	4,123			438,600	14,929
Crevalle.....	157,600	2,781	32,900	735		
Croaker.....	11,000	198	2,000	56		
Dolphin.....	2,600	123				
Drum:						
Black.....	51,800	1,402	11,900	280		
Red or redfish.....	109,600	3,673	1,012,400	33,302		
Eels, common.....	9,800	243				
Flounders.....	67,800	3,263	122,200	5,506		
Groupers.....	227,800	11,638	4,168,500	126,774		
Grunts.....	30,100	827	21,200	441		
Hickory shad.....	32,400	1,176				
Hogfish.....	10,000	300	5,800	290		
Jewfish.....	68,100	1,900	70,300	2,650		
Kingfish or "king mackerel".....	2,862,900	105,751	802,300	30,626		
King whiting or "kingfish".....	311,300	6,099	19,500	428		
Menhaden.....	148,915,600	384,876	353,500	3,200		
Menhaden.....	51,600	1,263	281,900	6,546		
Moonfish.....	300	6				
Mullet.....	4,452,400	129,932	24,141,500	811,328		
Muttonfish.....	203,400	13,659	79,500	3,900		
Permit.....	2,500	68	13,200	274		
Pigfish.....	41,600	579	7,600	196		
Pinfish or sailors choice.....	23,700	299				

Fisheries of Florida, 1938—Continued

CATCH: BY DISTRICTS—Continued

Species	East Coast		West Coast		Lake Okeechobee	
	Pounds	Value	Pounds	Value	Pounds	Value
Pompano	243, 700	\$55, 994	534, 400	\$105, 637		
Porgies			57, 900	1, 965		
Sea bass	25, 400	970				
Sea catfish			67, 700	1, 333		
Shad	228, 700	21, 779				
Sharks	2, 150, 600	16, 405	950, 000	5, 030		
Sheepshead, salt-water	93, 500	2, 078	686, 000	19, 476		
Snapper:						
Lane			2, 200	110		
Mangrove	49, 800	2, 101	245, 800	7, 372		
Red	117, 100	3, 487	5, 290, 800	374, 946		
Saook or sergeantfish	144, 100	5, 960	466, 000	15, 034		
Spadefish			5, 100	102		
Spanish mackerel	2, 645, 200	135, 887	4, 190, 200	178, 635		
Spot	100, 100	1, 780	128, 900	4, 113		
Squeteagues or "sea trout":						
Spotted	550, 400	35, 462	2, 862, 800	184, 334		
White			54, 400	2, 188		
Sturgeon			36, 000	3, 220		
Sunfish	506, 500	18, 982			361, 300	\$12, 036
Swellfish	1, 000	80				
Tenpounder			359, 200	6, 854		
Tripletail	18, 100	291				
Turbot	1, 800	36				
Yellowtail	65, 200	5, 720	103, 800	8, 293		
Crabs:						
Hard	4, 490, 700	60, 395	1, 104, 200	15, 875		
Stone	20, 200	4, 313	34, 300	7, 688		
Sea crawfish or spiny lobster	265, 200	20, 217	63, 200	3, 160		
Shrimp	8, 846, 900	269, 747	1, 265, 700	48, 863		
Clams:						
Coquina			16, 000	300		
Hard, public	30, 100	3, 012	716, 900	69, 132		
Conchs			7, 800	624		
Oysters, market:						
Public, spring	31, 300	1, 529	310, 200	20, 762		
Public, fall	28, 500	1, 362	529, 600	41, 178		
Private, spring	121, 300	6, 288	8, 900	990		
Private, fall	121, 700	6, 681	9, 000	591		
Scallops, bay			137, 400	10, 593		
Turtles:						
Green			8, 200	310		
Loggerhead			800	16		
Soft-shell	4, 000	127			285, 000	5, 477
Sponges:						
Grass	100	38	16, 800	12, 565		
Sheepswool	800	1, 869	471, 400	995, 469		
Wire			7, 900	6, 514		
Yellow	100	40	108, 900	54, 353		
Total	185, 460, 800	1, 631, 375	53, 647, 400	3, 276, 396	2, 334, 700	80, 313

Sponge fishery of Florida, 1938

OPERATING UNITS: BY GEAR

Item	Sponge hooks	Diving outfits	Total
Fishermen:	Number	Number	Number
On vessels		96	96
On boats and shore, regular	410	413	823
Total	410	509	919
Vessels, motor		13	13
Net tonnage		135	135
Boats:			
Motor		59	59
Other	290		290
Apparatus, number	292	72	

Sponge fishery of Florida, 1938—Continued

CATCH: BY GEAR

Sponges	Sponge hooks		Diving outfits		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
Grass.....	10,200	88,331	6,700	54,272	16,900	\$12,603
Sheepswool.....	95,300	195,842	376,900	801,496	472,200	997,338
Wire.....			7,960	6,514	7,900	6,514
Yellow.....	18,500	8,745	90,500	45,648	109,000	54,393
Total.....	124,000	212,918	482,000	857,930	606,000	1,070,848

SPONGES SOLD ON THE EXCHANGE, TARPON SPRINGS, FLA.

During 1938 sponges sold on the exchange at Tarpon Springs, Fla., amounted to 530,183 pounds, valued at \$952,258. This is a decrease of 6 percent in quantity and of 13 percent in value as compared with the transactions during 1937. Of the total sponges sold on the exchange during 1938, 27,860 pounds, valued at \$78,667, were large wool; 29,660 pounds, valued at \$63,418, were medium and small wool; 363,118 pounds, valued at \$751,176, were wool rags; 92,146 pounds, valued at \$46,460, were yellow; 9,755 pounds, valued at \$6,229, were grass; and 7,644 pounds, valued at \$6,308, were wire. It is estimated that sponges valued at \$2,750 were sold outside of the exchange.

ALABAMA

Fisheries of Alabama, 1938

OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets, stake	Trammel nets	Lines			Fyke nets
				Hand	Trot with baits or snoods	Trot with hooks	
	Number	Number	Number	Number	Number	Number	Number
Fishermen:							
On vessels.....	5		9	80			
On boats and shore:							
Regular.....	24	2	145	29	83	28	9
Casual.....	6		13	7	12	13	1
Total.....	35	2	167	116	95	41	10
Vessels, motor.....	1		3	11			
Net tonnage.....	17		27	200			
Boats:							
Motor.....	5	1	55	13	52	4	4
Other.....	5		157	10	35	37	6
Accessory boats.....	1		9				
Apparatus:							
Number.....	6	10	167	116	87	77	130
Length, yards.....	3,600						
Square yards.....		2,000	87,100				
Hooks, baits, or snoods.....				202	46,660	23,100	

Fisheries of Alabama, 1938—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Otter trawls, shrimp	Pots, fish	Spears	Dredges, oyster	Tongs, oyster	By hand, other than for oysters	Total, exclusive of duplication
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels	47			46	88		235
On boat and shore:							
Regular	269	15	38	28	276	1	652
Casual		23	21		157	3	253
Total	316	38	59	74	521	7	1,140
Vessels, motor	23			14	13		47
Net tonnage	296			132	110		527
Boats:							
Motor	126	3		13	104		252
Other		35			167		415
Accessory boats							10
Apparatus:							
Number	119	380	59	37	521		
Yards at mouth	2,089			38			

CATCH: BY GEAR

Species	Haul seines		Gill nets, stake		Trammel nets		Lines, hand	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Bluefish	8,200	\$396			13,000	\$679		
Blue runner or hardtail	6,800	137			10,900	219		
Buffalo fish					10,200	409		
Catfish and bullheads					900	63		
Croaker	9,400	188			43,700	878		
Drum:								
Black	1,100	42			3,900	179		
Red or redfish	9,200	462			20,000	1,005	2,500	\$125
Flounders	6,500	635			34,000	3,265		
Groupers							222,300	6,812
King whiting or "kingfish"					309	15		
Mullet	\$18,800	21,721			2,545,700	69,994		
Pompano	100	16			1,400	280		
Sea catfish					9,200	215		
Sheepshead, salt-water	15,500	710			43,100	2,083		
Snapper, red							1,193,100	35,388
Spanish mackerel	23,700	1,871			15,300	1,200		
Spot	300	6			3,300	64		
Squeteagues or "sea trout":								
Spotted	21,800	2,104			81,100	7,956	16,500	1,610
White	260	4			4,200	109	700	19
Sturgeon			1,700	\$136				
Tenpounder	6,700	133			3,900	78		
Total	928,300	28,425	1,700	136	2,844,000	88,631	1,435,300	93,959

Lines—Continued

Species	Lines—Continued				Fyke nets		Otter trawls	
	Trot with baits or snoods		Trot with hooks		Pounds	Value	Pounds	Value
Buffalo fish			3,500	\$140	46,200	\$1,848		
Catfish and bullheads			34,800	2,436	4,300	301		
Paddlefish or spoonbill cat			40,100	3,558				
Sea catfish			1,000	30				
Sheepshead, fresh-water					4,700	235		
Sturgeon			600	45				
Crabs, hard	510,700	\$7,630					3,643,500	\$145,740
Shrimp								
Total	510,700	7,630	80,000	6,209	55,200	2,384	3,643,500	145,740

Fisheries of Alabama, 1938—Continued

CATCH: BY GEAR—Continued

Species	Pots		Spears		Dredges		Tongs		By hand	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Catfish and bullheads.....	33,600	\$2,352								
Flounders.....			24,100	\$2,140						
Oysters, market:										
Public, spring.....					610,900	\$29,737	473,360	\$23,637		
Public, fall.....							177,800	12,075		
Private, spring.....							55,600	3,340		
Private, fall.....							41,100	2,992		
Terrapin, diamond-back.....									2,200	\$220
Total	33,600	2,352	24,100	2,140	610,900	29,737	747,800	42,044	2,200	220

OPERATING UNITS: BY COUNTIES

Item	Baldwin	Mobile
	Number	Number
Fishermen:		
On vessels.....	27	208
On boats and shore:		
Regular.....	95	557
Casual.....	36	217
Total	158	982
Vessels, motor.....	5	42
Net tonnage.....	42	485
Boats:		
Motor.....	28	226
Other.....	92	323
Accessory boats.....		10
Apparatus:		
Haul seines.....	2	4
Length, yards.....	1,200	2,400
Gill nets, stake.....	10	
Square yards.....	2,000	
Trammel nets.....	49	118
Square yards.....	24,500	62,660
Lines:		
Hand.....	11	105
Hooks.....	16	186
Trot with baits or snoods.....		87
Baits or snoods.....		46,650
Trot with hooks.....	48	29
Hooks.....	14,400	8,700
Fyke nets.....	25	105
Other trawls, shrimp.....	6	143
Yards at mouth.....	82	2,007
Pots, fish.....	100	280
Spears.....	26	33
Dredges, oyster.....	5	32
Yards at mouth.....	5	33
Tongs, oyster.....	67	454

CATCH: BY COUNTIES

Species	Baldwin		Mobile	
	Pounds	Value	Pounds	Value
Bluefish.....	3,200	\$160	13,000	\$915
Blue runner or hardtail.....	700	14	17,000	342
Buffalofish.....	14,300	572	45,600	1,825
Catfish and bullheads.....	15,600	1,092	58,000	4,060
Croaker.....	18,500	370	34,600	696
Drum:				
Black.....	500	25	4,500	106
Red or redfish.....	6,700	335	25,100	1,257
Flounders.....	18,100	1,479	46,600	4,501
Groupers.....	12,000	290	210,300	6,522
King whiting or "kingfish".....	100	5	200	10
Mullet.....	789,100	20,523	2,575,400	71,192
Paddlefish or spoonbill cat.....	9,000	900	31,100	2,658
Pompano.....	100	20	1,400	276
Sea catfish.....	1,500	30	8,700	215

Fisheries of Alabama, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Baldwin		Mobile	
	Pounds	Value	Pounds	Value
Sheepshead:				
Fresh-water.....	1,000	\$50	3,700	\$185
Salt-water.....	5,800	290	52,900	2,508
Snapper, red.....	15,000	1,069	1,178,100	84,319
Spanish mackerel.....	9,900	792	29,100	2,279
Spot.....	300	6	3,200	64
Squeteagues or "sea trout":				
Spotted.....	24,500	2,246	94,900	9,424
White.....	1,400	42	3,700	90
Sturgeon.....	2,000	167	300	24
Tenpounder.....	2,900	58	7,700	153
Crabs, hard.....			510,700	7,630
Shrimp.....	99,400	3,976	3,544,100	141,764
Oysters, market:				
Public, spring.....	27,300	1,496	446,000	22,141
Public, fall.....	69,500	4,612	719,200	37,200
Private, spring.....	31,000	1,800	24,600	1,540
Private, fall.....	27,500	2,000	13,600	992
Terrapin, diamond-back.....	300	30	1,900	190
Total.....	1,207,200	44,439	9,710,100	405,168

MISSISSIPPI

Fisheries of Mississippi, 1938

OPERATING UNITS: BY GEAR

Item	Haul seines	Trammel nets	Lines			Dip nets, drop
			Hand	Troll	Trot with balts or snoods	
	Number	Number	Number	Number	Number	Number
Fishermen:						
On vessels.....	40		10			
On boats and shore:						
Regular.....	8	78	53	4	110	
Casual.....			41			8
Total.....	48	78	104	4	110	8
Vessels, motor.....	5		2			
Net tonnage.....	92		15			
Boats:						
Motor.....	1	31	23	2	59	
Other.....		58	49		47	
Apparatus:						
Number.....	6	60	108	4	106	58
Length, yards.....	2,400					
Square yards.....		31,500				
Hooks, balts, or snoods.....			128	4	88,500	
Item	Cast nets	Otter trawls, shrimp	Spears	Dredges, oyster	Tongs, oyster	Total, exclusive of duplication
	Number	Number	Number	Number	Number	Number
Fishermen:						
On vessels.....		468		759	5	980
On boats and shore:						
Regular.....	4	849	23	121	604	1,536
Casual.....	14		36		30	129
Total.....	18	1,317	59	880	639	2,645
Vessels:						
Motor.....		192		149	1	240
Net tonnage.....		2,067		2,051	15	2,889
Sail.....				7		7
Net tonnage.....				90		90
Total vessels.....		192		156	1	247
Total net tonnage.....		2,067		2,141	15	2,979
Boats:						
Motor.....		388		28	47	444
Other.....					485	608
Apparatus:						
Number.....	18	580	59	368	639	
Yards at mouth.....		9,245		399		

Fisheries of Mississippi, 1938—Continued

CATCH: BY GEAR

Species	Trammel nets		Lines					
			Hand		Troll		Trot with baits or snoods	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Croaker.....	13,700	\$411						
Drum:								
Black.....	6,200	186	1,700	\$51				
Red or redbfish.....	90,200	5,460	15,800	1,086				
Flounders.....	6,500	635						
Groupers.....			157,600	4,370				
King whiting or "kingfish".....	3,700	111						
Mullet.....	278,600	8,258						
Pompano.....	600	90						
Sea catfish.....	1,200	29	1,000	25				
Sheepshead, salt-water.....	14,900	741	4,800	240				
Snapper, red.....			173,900	12,173				
Spanish mackerel.....	1,500	180			500	\$75		
Spot.....	1,000	30						
Squeteagues or "sea trout":								
Spotted.....	173,900	16,118	75,100	7,148				
White.....	14,100	420	21,200	634				
Tripletail.....	100	3					1,009,000	\$17,163
Crabs, hard.....								
Total.....	606,200	32,672	451,100	25,727	500	75	1,009,000	17,163

Species	Dip nets, drop		Cast nets		Otter trawls	
	Pounds	Value	Pounds	Value	Pounds	Value
Mullet.....			6,000	\$180		
Crabs, hard.....	7,400	\$133				
Shrimp.....					9,902,400	\$420,549
Total.....	7,400	133	6,000	180	9,902,400	420,549

Species	Spears		Dredges		Tongs	
	Pounds	Value	Pounds	Value	Pounds	Value
Flounders.....	35,800	\$3,436				
Oysters, market:						
Public, spring.....			998,000	\$40,173	1,044,500	\$51,620
Public, fall.....			21,400	909	177,500	10,382
Total.....	35,800	3,436	1,019,400	41,082	1,222,000	62,002

NOTE.—The production of fishery products by Mississippi craft in Louisiana waters has been included with the catch for Louisiana. These catches were as follows: Haul seines, shrimp, 30,000 pounds, valued at \$1,277; oyster dredges, spring oysters, 3,626,100 pounds, valued at \$141,423, and fall oysters, 1,463,000 pounds valued at \$61,068; oyster tongs, spring oysters, 125,300 pounds, valued at \$6,440, and fall oysters, 9,700 pounds, valued at \$538; and shrimp trawls, shrimp, 7,373,400 pounds, valued at \$313,820. The entire catch by haul seines was made in Louisiana waters.

OPERATING UNITS: BY COUNTIES

Item	Hancock	Harrison	Jackson
	Number	Number	Number
Fishermen:			
On vessels.....	32	920	28
On boats and shore:			
Regular.....	143	1,219	174
Casual.....	28	64	37
Total.....	203	2,203	239
Vessels:			
Motor.....	8	225	7
Net tonnage.....	90	2,703	96
Sail.....	2	5	
Net tonnage.....	24	66	
Total vessels.....	10	230	7
Total net tonnage.....	114	2,769	96

Fisheries of Mississippi, 1938—Continued

OPERATING UNITS: BY COUNTIES—Continued

Item	Hancock	Harrison	Jackson
Boats:			
Motor.....	50	343	51
Other.....	62	421	125
Apparatus:			
Haul seines.....		6	
Length, yards.....		2,400	
Trammel nets.....	13	22	25
Square yards.....	7,500	11,500	12,500
Lines:			
Hand.....	23	47	38
Hooks.....	23	57	48
Troll.....	4		
Hooks.....	4		
Trot with baits or snoods.....	2	73	81
Baits or snoods.....	1,500	70,200	16,800
Dip nets, drop.....	16	42	
Cast nets.....		14	4
Other trawls, shrimp.....	46	498	36
Yards at mouth.....	725	7,951	569
Spears.....	16	27	16
Dredges, oyster.....	10	350	8
Yards at mouth.....	10	351	8
Tongs, oyster.....	50	506	83

CATCH: BY COUNTIES

Species	Hancock		Harrison		Jackson	
	Pounds	Value	Pounds	Value	Pounds	Value
Croaker.....	5,200	\$156	5,300	\$169	3,200	\$96
Drum:						
Black.....	2,400	72	5,000	150	500	15
Red or redbfish.....	46,200	3,696	56,600	2,700	3,200	150
Flounders.....	9,400	940	19,400	1,940	13,500	1,191
Groupers.....			78,800	2,006	78,800	2,364
King whiting or "kingfish".....	900	27	2,000	60	800	24
Mullet.....	30,000	900	59,200	1,776	195,400	5,762
Pompano.....			400	60	200	30
Sea catfish.....			2,000	50	200	4
Sheepshead, salt-water.....	3,900	195	5,900	295	9,900	491
Snapper, red.....			87,000	6,090	86,900	6,083
Spanish mackerel.....	500	75			1,500	180
Spot.....					1,000	30
Squeteagues or "sea trout":						
Spotted.....	64,800	6,480	81,100	7,461	103,100	9,325
White.....	7,400	222	21,000	630	6,900	202
Tripletail.....			100	3		
Crabs, hard.....	5,600	112	783,800	13,716	227,000	3,468
Shrimp.....	424,000	18,220	8,524,000	361,916	954,400	40,413
Oysters, market:						
Publicspring.....	117,500	5,788	1,834,700	81,786	90,300	4,219
Public, fall.....	17,000	983	123,600	6,900	58,300	3,408
Total.....	734,800	37,866	11,689,900	487,698	1,835,100	77,455

NOTE.—The catch of fishery products by Mississippi craft in Louisiana waters has been included with the catch for Louisiana

LOUISIANA

Fisheries of Louisiana, 1938

OPERATING UNITS: BY GEAR

Item	Haul seines	Trammel nets	Lines		Dip nets	
			Hand	Trot with baits or snoods	Common	Drop
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....			5			
On boats and shore:						
Regular.....	224	44	132	477	20	77
Casual.....	25	10	145	218	17	83
Total	249	54	282	695	37	160
Vessels, motor:						
Net tonnage.....			1			
14.....			14			
Boats:						
Motor.....	37	18	75	75	1	17
Other.....	70	12	130	576	34	133
Apparatus:						
Number.....	74	30	282	651	37	6,775
Length, yards.....	29,400					
Square yards.....		8,500				
Hooks, baits, or snoods.....			351	184,005		

Item	Other trawls, shrimp	Brush traps	Dredges, oyster	Tongs, oyster	By hand, other than for oysters	Total, exclusive of duplication
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	391		86			468
On boats and shore:						
Regular.....	2,775	141	152	615	15	4,412
Casual.....				88		825
Total	3,166	141	238	703	15	5,405
Vessels, motor:						
Net tonnage.....	181		21			196
1,459.....	1,459		169			1,580
Boats:						
Motor.....	1,364	28	37	145		1,734
Other.....		116		375		1,395
Apparatus:						
Number.....	1,545	29,600	116	703		
Yards at mouth.....	21,492		115			

CATCH: BY GEAR

Species	Haul seines		Trammel nets		Lines			
	Pounds	Value	Pounds	Value	Hand		Trot with baits or snoods	
Croaker.....	43,400	\$1,431	19,400	\$697	15,400	\$519		
Drum:								
Black.....	63,100	2,616	16,800	652	37,300	1,372		
Red or redfish.....	307,600	22,729	70,200	5,283	144,200	10,042		
Flounders.....	25,100	1,820	5,600	438	3,000	208		
Groupers.....					6,000	180		
King whiting or "kingfish".....	2,000	66	1,100	51	300	10		
Mullet.....	10,600	354	1,200	38				
Pompano.....			500	90				
Sea catfish.....	1,500	37	1,100	25	3,100	74		
Sheepshead, salt-water.....	40,700	2,242	13,600	698	14,700	713		
Snapper, red.....					85,000	5,600		
Spanish mackerel.....	9,000	990	5,400	540	2,000	230		
Spot.....	3,200	124	900	33	700	31		
Squeteagues or "sea trout":								
Spotted.....	263,300	23,678	102,400	8,571	124,500	10,338		
White.....	20,300	865	11,700	412	16,400	619		
Crabs:								
Hard.....	208,000	2,200					9,767,500	\$98,687
Soft and peelers.....	91,000	13,650						
Shrimp.....	833,000	26,170						
Total	1,921,800	98,972	249,900	17,528	452,600	29,986	9,767,500	98,687

Fisheries of Louisiana, 1938—Continued

CATCH: BY GEAR—Continued

Species	Dip nets				Otter trawls		Brush traps	
	Common		Drop		Pounds	Value	Pounds	Value
	Pounds	Value	Pounds	Value				
Flounders.....					3,200	\$256		
King whiting or "kingfish".....					600	24		
Crabs:								
Hard.....	49,300	\$493	508,400	\$5,084				
Soft and peelers.....	13,500	2,015	62,200	9,234			81,000	\$12,000
Shrimp.....					80,545,900	2,576,566		
Total.....	62,800	2,508	570,600	14,318	80,549,700	2,576,846	81,000	12,000

Species	Dredges		Tongs		By hand	
	Pounds	Value	Pounds	Value	Pounds	Value
Oysters, market:						
Public, spring.....	4,231,300	\$176,603	209,000	\$11,244		
Public, fall.....	1,616,600	72,201	35,200	2,108		
Private, spring.....	809,100	47,887	2,270,800	152,556		
Private, fall.....	108,300	6,600	942,000	70,535		
Terrapin, diamond-back.....					4,900	\$935
Total.....	6,765,300	303,291	3,457,000	236,443	4,900	935

NOTE.—The catch as shown above for Louisiana includes the following products which were taken by Mississippi craft in Louisiana waters: Shrimp, 7,403,400 pounds, valued at \$315,097; oysters, market, spring, 3,751,400 pounds, valued at \$147,863; and oysters, market, fall, 1,462,700 pounds, valued at \$61,626. Prior to 1938 similar catches by Mississippi craft were included with the catch for Mississippi.

OPERATING UNITS: BY PARISHES

Item	As- sump- tion	Calca- sieu	Cam- eron	Iberia	Jeffer- son	La- Four- che	Orle- ans	Plaqui- mines
Fishermen:	Number	Number	Number	Number	Number	Number	Number	Number
On vessels.....			22		50	70	34	40
On boats and shore:								
Regular.....	20	7	213	10	946	357	171	524
Casual.....	60	5	8	9	28	1	60	121
Total.....	80	12	243	19	1,024	428	265	685
Vessels, motor.....			11		21	34	10	16
Net tonnage.....			102		195	236	79	118
Boats:								
Motor.....	10		102	3	354	169	40	167
Other.....	70	11	17	12	241	23	124	315
Apparatus:								
Haul seines.....			1	3	6	2	10	5
Length, yards.....			350	750	2,400	650	3,200	2,150
Trammel nets.....				4	3	1		6
Square yards.....				1,200	600	100		1,500
Lines:								
Hand.....			14	5	41	2	34	31
Hooks.....			32	10	46	2	36	33
Trot with baits or snoods.....	80	11	5	3	115		11	164
Baits or snoods.....	1,600	4,300	1,200	900	36,000		5,550	61,455
Dip nets:								
Common.....							7	
Drop.....							4,005	
Otter trawls, shrimp.....			109		332	194	5	129
Yards at mouth.....			1,626		4,357	2,567	73	1,826
Brush traps.....					29,600			
Dredges, oyster.....					4		20	18
Yards at mouth.....					4		20	18
Tongs, oyster.....			7	3		40	101	209

Fisheries of Louisiana, 1938—Continued

OPERATING UNITS: BY PARISHES—Continued

Item	St. Bernard	St. Charles	St. Mary	St. Tammany	Tangipahoa	Terrebonne	Vermilion
Fishermen:	Number	Number	Number	Number	Number	Number	Number
On vessels.....	24		105			117	6
On boats and shore:							
Regular.....	259	40	743	35	10	1,007	70
Casual.....	91	20	12	32	12	32	34
Total.....	374	60	860	67	22	1,156	110
Vessels, motor.....	7		45			50	2
Net tonnage.....	48		427			357	18
Boats:							
Motor.....	78	10	347	9	4	422	19
Other.....	205	50	71	52	18	143	43
Apparatus:							
Haul seines.....	30		1	2		6	8
Length, yards.....	11,400		350	450		1,800	5,900
Trammel nets.....	6					5	5
Square yards.....	1,700					800	2,600
Lines:							
Hand.....	56		5	17		52	25
Hooks.....	70		10	20		62	30
Trot with baits or snoods.....	99	60	80			3	20
Baits or snoods.....	27,200	21,000	16,000			300	8,500
Dip nets:							
Common.....				20	10		
Drop.....	670			1,500	600		
Otter trawls, shrimp.....	41		357	3		388	7
Yards at mouth.....	573		5,462	44		4,866	98
Dredges, oyster.....	12		4	4		36	18
Yards at mouth.....	12		4	4		36	17
Tongs, oyster.....	5		34	3		289	12

CATCH: BY PARISHES

Species	Assumption		Calcasieu		Cameron		Iberia	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Croaker.....					2,300	\$69	2,100	\$84
Drum:								
Black.....					200	8	600	30
Red or redfish.....					2,600	208	7,400	563
Flounders.....							2,600	130
Sheepshead, salt-water.....					1,000	50	2,100	105
Squeteagues or "sea trout":								
Spotted.....					12,300	1,230	8,700	871
White.....					700	35	600	22
Crabs, hard.....	62,000	\$930	72,000	\$800	30,400	456	36,000	360
Shrimp.....					3,324,700	103,069		
Oysters, market:								
Public, spring.....							2,600	200
Public, fall.....					5,100	414	2,500	220
Total.....	62,000	930	72,000	800	3,379,300	105,539	65,200	2,585

Species	Jefferson		Lafourche		Orleans		Plaquemines	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Croaker.....	6,000	\$180			7,000	\$268	1,300	\$49
Drum:								
Black.....	15,000	450	200	\$8	14,200	502	4,000	140
Red or redfish.....	21,000	1,260	900	54	37,500	2,470	34,600	2,112
Flounders.....	800	64			1,000	80	3,600	288
Groupers.....	6,000	180						
King whiting or "kingfish".....	1,200	48					200	14
Mullet.....					3,000	90		
Pompano.....	500	90						
Sea catfish.....	2,500	50						
Sheepshead, salt-water.....	4,000	160			17,200	983	2,700	164
Snapper, red.....	45,000	3,200						
Spanish mackerel.....	5,000	500					2,400	270
Spot.....	200	6			900	39		
Squeteagues or "sea trout":								
Spotted.....	66,000	5,130	1,200	96	45,000	3,670	37,500	3,620
White.....	10,000	300	200	8	3,300	158	3,300	149

Fisheries of Louisiana, 1938—Continued

CATCH: BY PARISHES—Continued

Species	Jefferson		Lafourche		Orleans		Plaquemines	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Crabs:								
Hard	2,958,200	\$29,582			668,400	\$6,684	578,900	\$5,780
Soft and peelers	81,000	12,000						
Shrimp	16,565,300	513,530	9,680,000	\$294,090	237,800	7,395	5,193,600	160,996
Oysters, market:								
Public, spring					101,700	8,208	7,800	360
Public, fall					63,100	5,280	47,400	2,240
Private, spring	78,200	6,250	67,100	4,680	886,300	67,000	910,500	55,812
Private, fall			54,500	4,600	339,300	28,275	422,100	25,390
Total	19,865,900	572,980	9,804,100	303,536	2,425,700	131,082	7,249,000	257,384

Species	St. Bernard		St. Charles		St. Mary		St. Tammany	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Croaker	44,500	\$1,460					1,000	\$48
Drum:								
Black	56,800	2,456						
Red or redfish	293,700	23,796			25,900	\$1,554	5,400	394
Flounders	25,100	1,857					500	39
King whiting or "kingfish"	2,600	89						
Mullet	8,800	302						
Sea catfish	1,400	32						
Sheepshead, salt-water	27,300	1,418					2,500	125
Snapper, red					40,000	2,400		
Spanish mackerel	9,000	990						
Spot	2,900	111						
Squeteagues or "sea trout":								
Spotted	211,900	18,970			1,200	96	14,200	1,169
White	15,400	660					1,000	30
Crabs:								
Hard	3,140,000	31,700	640,500	\$6,405	2,035,800	20,358	163,200	1,632
Soft and peelers	88,200	13,234					63,200	9,470
Shrimp	9,630,000	384,122			19,042,300	590,396	10,200	316
Oysters, market:								
Public, spring	3,816,100	151,532			26,400	1,760	38,500	1,984
Public, fall	1,462,700	61,626			27,400	2,070	8,800	496
Private, spring	800	77			73,300	5,600		
Private, fall	400	50			50,500	5,000		
Terrapin, diamond-back	2,000	500						
Total	18,839,600	694,972	640,500	6,405	21,322,800	629,234	308,500	15,703

Species	Tangipahoa		Terrebonne		Vermilion	
	Pounds	Value	Pounds	Value	Pounds	Value
Croaker			7,200	\$285	6,800	\$204
Drum:						
Black			24,200	963	2,000	83
Red or redfish			86,700	5,202	6,300	441
Flounders			3,300	264		
Sea catfish			1,800	54		
Sheepshead, salt-water			3,500	140	8,700	508
Spot			800	32		
Squeteagues or "sea trout":						
Spotted			60,600	5,257	31,600	2,528
White			11,300	430	2,600	104
Crabs:						
Hard	15,500	\$155	11,300	146	121,900	1,476
Soft and peelers	15,300	2,195				
Shrimp			17,393,800	539,474	301,200	9,348
Oysters, market:						
Public, spring			144,900	8,183	302,300	15,620
Public, fall			14,300	890	20,500	1,093
Private, spring			738,100	42,418	325,600	18,606
Private, fall			171,500	13,150	12,000	700
Terrapin, diamond-back			2,900	435		
Total	30,800	2,350	18,676,200	617,303	1,141,500	50,711

NOTE.—The catch as shown above for St. Bernard Parish includes the following products which were taken by Mississippi craft in Louisiana waters: Shrimp, 7,403,400 pounds, valued at \$315,097; oysters, market, spring, 3,751,400 pounds, valued at \$147,863; and oysters, market, fall, 1,462,700 pounds, valued at \$61,626. Prior to 1938 similar catches by Mississippi craft were included with the catch for Mississippi.

TEXAS

Fisheries of Texas, 1938

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					95			
On boats and shore:								
Regular	72	70	135	112	67	1	7	36
Casual	48	14	5	115	218	5	36	79
Total	120	84	140	227	380	6	43	115
Vessels, motor					13			
Net tonnage					188			
Boats:								
Motor	12	16	34	103	72	4	6	42
Other	12	5	55	8	176		37	53
Apparatus:								
Number	46	114	343	107	380	6	43	96
Length, yards	15,135							
Square yards		26,850	81,925	55,850				
Hooks, baits, or snoods					495	6	18,560	66,000

Item	Dip nets	Otter trawls, shrimp	Pots, crab	Spoars	Dredges, oyster	Tongs, oyster	By hand, oyster	Total, exclusive of duplication
Fishermen:	Number	Number	Number	Number	Number	Number	Number	Number
On vessels		127			20			228
On boats and shore:								
Regular	15	780	15	16	118	42		1,310
Casual	37	12	25	145	36	124	5	627
Total	52	919	40	161	174	166	5	2,105
Vessels, motor		59			5			70
Net tonnage		543			48			718
Boats:								
Motor		373	9		48	26		606
Other	32		15	23		122		382
Apparatus:								
Number	52	432	934	161	58	166		
Yards at mouth		6,391			58			

CATCH: BY GEAR

Species	Haul seines		Gill nets				Trammel nets	
			Runaround		Stake			
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Croaker	2,000	\$60	4,200	\$114	14,500	\$318	22,800	\$705
Drum:								
Black	170,900	6,836	443,000	9,774	458,100	9,918	142,700	5,708
Red or redbfish	102,600	7,712	108,400	8,222	179,200	12,009	286,200	21,968
Flounders	2,600	253	2,300	230	1,100	110	9,600	949
King whiting or "kingfish"							3,800	160
Mullet	300	9	1,300	52	500	20	2,200	74
Pompano	500	90					3,400	860
Sea catfish	200	6	7,600	228	600	18	11,300	345
Sheepshead, salt-water	3,700	201	1,700	85	2,000	100	11,600	640
Snook or sergeantfish	1,300	91	700	26	1,100	44	4,100	77
Spanish mackerel			2,800	181	1,300	85	10,300	725
Spot			400	12			3,500	115
Squeteagues or "sea trout":								
Spotted	194,300	16,308	487,000	30,399	680,600	55,594	437,800	37,958
White	4,300	130	14,200	443	2,600	85	13,500	467
Total	482,700	31,696	1,073,600	58,768	1,351,600	79,201	959,800	70,571

Fisheries of Texas, 1938—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
Croaker.....	9,200	\$260					2,500	\$77
Drum:								
Black.....	103,000	3,422					239,800	9,592
Red or redfish.....	74,600	5,653					108,800	8,443
Flounders.....	1,300	124					1,200	120
Groupers.....	31,600	1,002						
Jewfish.....	7,600	230						
Kingfish or "king mackerel".....			1,900	\$76				
King whiting or "kingfish".....	7,200	288						
Pompano.....	1,600	248						
Sea catfish.....	2,400	72					13,000	390
Sheepshead, salt-water.....	1,800	92						
Snapper, red.....	1,279,000	103,902						
Snook or sergeantfish.....	2,600	182						
Spanish mackerel.....	45,800	2,862	1,700	85				
Spot.....		9						
Squeteagues or "sea trout":								
Spotted.....	121,500	10,147					46,300	3,885
White.....	52,600	1,590					18,500	557
Crabs, hard.....					331,300	\$6,768		
Total.....	1,742,100	130,123	3,600	161	331,300	6,768	430,100	23,064

Species	Dip nets		Otter trawls		Pots, crab		Spears	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Flounders.....							108,100	\$10,357
Jewfish.....			300	\$8				
Crabs, hard.....	255,000	\$6,559			385,100	\$10,523		
Shrimp.....			16,364,700	505,757				
Total.....	255,000	6,559	16,365,000	505,765	385,100	10,523	108,400	10,357

Species	Dredges		Tongs		By hand	
	Pounds	Value	Pounds	Value	Pounds	Value
Oysters, market:						
Public, spring.....	428,800	\$30,978	122,900	\$10,440	3,400	\$306
Public, fall.....	486,100	34,904	125,800	10,795	2,100	189
Private, spring.....	30,000	2,180	49,000	4,164		
Private, fall.....	48,700	3,682	59,100	5,023		
Total.....	993,600	71,744	356,800	30,422	5,500	495

OPERATING UNITS: BY COUNTIES

Item	Aransas	Brazoria	Calhoun	Cameron	Galveston	Harris
	Number	Number	Number	Number	Number	Number
Fishermen:						
On vessels.....	2		6	14	142	
On boats and shore:						
Regular.....	165	51	211	147	199	13
Casual.....	68	23	52	90	105	25
Total.....	235	77	269	221	446	38
Vessels, motor.....	1		3	2	41	
Net tonnage.....	13		19	20	481	
Boats:						
Motor.....	79	29	91	48	109	11
Other.....	20	15	28	83	50	17
Apparatus:						
Haul seines.....			5		6	
Length, yards.....			550		1,500	
Gill nets:						
Runaround.....	30			65		
Square yards.....	6,200			15,250		
Stake.....	18			264		
Square yards.....	2,900			63,660		

Fisheries of Texas, 1938—Continued

OPERATING UNITS: BY COUNTIES—Continued

Item	Aransas	Brazoria	Calhoun	Cameron	Galveston	Harris
Apparatus—Continued	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Trammel nets	29		24		18	8
Square yards	20,600		11,950		3,700	2,600
Lines:						
Hand	27	16	9	68		98
Hooks	27	16	9	82		179
Troll				6		
Hooks				6		
Trot with baits or snoods					24	16
Baits or snoods					12,800	4,800
Trot with hooks		11	21			3
Hooks		3,700	6,100			900
Dip nets	36					5
Otter trawls, shrimp	28	24	68	24	115	
Yards at mouth	409	335	1,003	350	1,735	
Pots, crab			710		224	
Spears	24	4	19	3		9
Dredges, oyster	19		7			2
Yards at mouth	19		7			2
Tongs, oyster	19	6	16	7	26	12

Item	Jefferson	Kleberg	Mata-gorda	Nueces	San Patricio	Wallacy
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels	16		26	2	20	
On boats and shore:						
Regular	51	10	147	176	132	5
Casual	3	18	48	135	74	16
Total	70	28	221	813	226	21
Vessels, motor	4		8	1	10	
Net tonnage	33		71	7	74	
Boats:						
Motor	22	16	70	47	80	4
Other	3	14	20	100	19	13
Apparatus:						
Haul seines			1	30	3	
Length, yards			175	12,500	350	
Gill nets:						
Runaround			2	17		
Square yards			1,300	4,100		
Stake				53	8	
Square yards				13,800	1,565	
Trammel nets			13		15	
Square yards			6,800		10,200	
Lines:						
Hand	12	17		78	39	16
Hooks	24	17		78	47	16
Trot with baits or snoods						
Baits or snoods	900					
Trot with hooks		20		20	12	9
Hooks		18,300		19,400	5,400	12,200
Dip nets				4		
Otter trawls, shrimp	24		55	21	73	
Yards at mouth	367		790	302	1,100	
Spears			21	60	15	
Dredges, oyster			27	3		
Yards at mouth			27	3		
Tongs, oyster			31	43	6	

CATCH: BY COUNTIES

Species	Aransas		Brazoria		Calhoun		Cameron	
	Pounds	Value \$144	Pounds	Value \$32	Pounds	Value \$144	Pounds	Value \$312
Croaker	3,800		800		4,800		15,600	
Drum:								
Black	64,100	2,564	1,600	64	41,900	1,676	852,000	17,040
Red or redfish	68,200	5,456	13,900	973	63,100	4,504	195,600	13,692
Flounders	29,400	2,940	500	50	18,200	1,820	1,700	170
Groupers			600	24			1,300	38
Jewfish			200	7			1,100	36
Kingfish or "king mackerel"							1,900	76

Fisheries of Texas, 1938—Continued

CATCH: BY COUNTIES—Continued

Species	Aransas		Brazoria		Calhoun		Cameron	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Mullet	600	\$28						
Pompano					3,400	\$680		
Sea catfish	9,400	282			18,900	567		
Sheepshead, salt-water					3,100	155	2,700	\$135
Snapper, red			21,000	\$1,680			98,300	7,064
Snook or sergeantfish					2,400	168	1,800	72
Spanish mackerel	7,600	532			5,800	440	3,900	195
Spot							700	21
Squeteagues or "sea trout":								
Spotted	145,600	13,104	1,200	96	114,200	9,902	1,105,700	88,456
White	2,900	87	300	12	3,400	119	2,600	104
Crabs, hard	213,000	5,538			282,100	8,463		
Shrimp	1,087,100	33,699	660,000	18,460	1,386,400	42,978	451,500	13,982
Oysters, market:								
Public, spring	148,900	11,925	3,800	290	5,500	495	6,600	594
Public, fall	200,700	16,092	4,100	424	8,000	714	4,000	360
Private, spring					79,000	6,344		
Private, fall					107,800	8,705		
Total	1,981,300	92,361	708,000	22,112	2,148,000	87,874	2,746,900	142,347

Species	Galveston		Harris		Jefferson		Kleberg	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Croaker	5,000	\$150	1,300	\$40				
Drum:								
Black	22,900	916	7,800	312			118,800	\$4,752
Red or redfish	126,600	10,128	16,500	1,230			40,100	3,208
Flounders	4,900	441	400	40			1,000	100
Groupers	27,500	859			1,100	\$33		
Jewfish	2,900	86			700	19		
King whiting or "kingfish"	3,200	128						
Mullet	2,100	63						
Sea catfish	500	16	500	20				
Sheepshead, salt-water	7,800	468						
Snapper, red	975,300	80,444			172,000	13,760		
Spanish mackerel	2,100	189						
Spot	2,000	70						
Squeteagues or "sea trout":								
Spotted	178,700	16,001	41,200	2,876			30,000	2,400
White	5,900	177					900	27
Crabs, hard	267,500	5,390	181,000	3,620	6,800	238		
Shrimp	4,171,700	129,323			1,109,400	35,391		
Oysters, market:								
Public, spring	37,300	3,034	18,000	1,763				
Public, fall	20,000	1,774	9,000	915				
Total	5,863,900	249,657	275,700	10,816	1,290,000	49,441	190,800	10,487

Species	Matagorda		Nueces		San Patricio		Wallacy	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Croaker	6,000	\$180	1,100	\$33	16,900	\$529		
Drum:								
Black	49,900	1,996	274,000	10,950	65,500	2,630	59,000	\$2,360
Red or redfish	73,500	5,514	188,700	14,851	54,100	3,791	19,500	1,560
Flounders	18,000	1,800	39,300	3,594	12,900	1,168	200	20
Groupers			900	36	300	12		
Jewfish			3,000	90				
King whiting or "kingfish"	800	40	7,090	280				
Mullet			1,800	64				
Pompano			2,100	378				
Sea catfish			900	27	3,900	117	1,000	30
Sheepshead, salt-water	3,400	170	3,100	155	790	35		
Snapper, red			7,800	678	4,600	276		
Snook or sergeantfish					2,600	182		
Spanish mackerel	2,200	154	32,500	1,960	7,600	456	200	12
Spot	1,500	45						
Squeteagues or "sea trout":								
Spotted	89,000	8,010	142,300	11,384	128,800	10,990	800	72
White	5,500	220	79,700	2,391	4,500	135		
Crabs, hard			17,500	525	3,500	76		
Shrimp	2,886,500	89,484	644,500	19,979	3,967,600	122,461		
Oysters, market:								
Public, spring	303,000	21,085	28,000	2,255	4,000	283		
Public, fall	296,300	19,762	70,100	5,723	1,800	124		
Total	3,735,600	148,460	1,544,100	75,353	4,279,200	143,255	80,700	4,054

FISHERIES OF THE PACIFIC COAST STATES ¹¹

The yield of the commercial fisheries of the Pacific Coast States (Washington, Oregon, and California) during 1938 amounted to 1,525,884,600 pounds, valued at \$26,086,301 to the fishermen, representing a decrease of 3 percent in volume and 9 percent in value as compared with the catch in the previous year. These fisheries gave employment to 23,635 fishermen as compared with 21,555 in 1937.

There were 341 fishery wholesale and manufacturing establishments in the 3 States in 1938 as compared with 330 in 1937. During 1938 these establishments employed 18,115 persons, paid \$10,282,514 in salaries and wages, and produced manufactured products (canned, cured, packaged, and byproducts) valued at \$48,621,239. In 1937 the wholesale and manufacturing firms employed 19,792 persons, paid \$10,669,409 in salaries and wages, and produced manufactured products valued at \$56,149,695.

Fisheries of the Pacific Coast States, 1938

SUMMARY OF CATCH

Product	Washington		Oregon	
	Pounds	Value	Pounds	Value
Fish.....	146,254,300	\$5,542,490	64,825,700	\$2,054,579
Shellfish, etc.....	13,376,700	1,089,688	6,902,300	345,006
Total.....	159,631,000	6,632,178	71,728,000	2,399,585

Product	California		Total	
	Pounds	Value	Pounds	Value
Fish.....	1,285,239,500	\$16,389,719	1,496,319,500	\$23,986,788
Shellfish, etc.....	9,286,100	664,819	23,565,100	2,099,513
Total.....	1,294,525,600	17,054,538	1,523,884,600	26,086,301

OPERATING UNITS: BY STATES

Item	Washington				Oregon		
	Puget Sound district	Coastal district	Columbia River district	Total	Columbia River district	Coastal district	Total
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	3,547	103	21	3,671	110	91	201
On boats and shore.....	2,130	5,134	1,015	8,279	1,900	1,440	3,340
Total.....	5,677	5,237	1,036	11,950	2,010	1,531	3,541
Vessels:							
Motor.....	573	72	13	658	58	30	88
Net tonnage.....	12,002	565	92	12,659	523	381	904
Sail.....	3			3			
Net tonnage.....	1,421			1,421			
Total vessels.....	576	72	13	661	58	30	88
Total net tonnage.....	13,423	565	92	14,080	523	381	904
Boats:							
Motor.....	769	466	721	1,956	1,023	947	1,970
Other.....	444	243	33	720	74	114	188
Accessory boats.....	321			321	1	1	2

¹¹ 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, 1939, except that statistics of the halibut fishery in these latter States are for the calendar year.

Fisheries of the Pacific Coast States, 1938—Continued

OPERATING UNITS: BY STATES—Continued

Item	Washington				Oregon		
	Puget Sound district	Coastal district	Columbia River district	Total	Columbia River district	Coastal district	Total
Apparatus:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Purse seines:							
Salmon	229			229			
Length, yards	125,950			125,950			
Pilchard or sardine	46			46	1	1	2
Length, yards	18,390			18,390	460	470	930
Haul seines	177	4	3	184	31	8	39
Length, yards	13,008	280	500	13,788	17,393	1,336	18,729
Gill nets:							
Drift	452	217	474	1,143	710	437	1,156
Square yards	682,520	418,376	1,312,032	2,412,928	2,291,044	616,733	2,907,827
Set	5	120		125	153	859	1,012
Square yards	1,200	26,500		27,700	42,840	309,240	352,080
Lines:							
Trawl, set, and hand	26,655		369	27,024	1,153	361	1,514
Hooks	587,283		28,290	615,573	28,790	9,860	38,650
Troll	1,245	1,045	400	2,690	965	650	1,615
Hooks	5,503	4,702	1,768	11,973	4,265	2,815	7,080
Pound nets	2			2	32		32
Brush weirs	4			4			
Dip nets	14	76	287	377	144		144
Reef nets	74			74			
Beam trawls	8			8			
Yards at mouth	53			53			
Otter trawls	61			61		1	1
Yards at mouth	915			915		20	20
Traps:							
Crab	2,673	3,185		5,858		19,825	19,825
Crawfish, fresh-water					1,395		1,395
Octopus	270			270			
Dredges, oyster		2		2			
Yards at mouth		4		4			
Tongs and rakes	149	220		369		23	23
Shovels	476	4,453		4,929		276	276

Item	California						Grand total
	North-ern district	San Fran-cisco district	Mon-terey district	San Pedro district	San Diego district	Total	
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels	40	1,197	627	2,290	1,209	5,363	9,235
On boats and shore	265	838	423	993	262	2,781	14,400
Total	305	2,035	1,050	3,283	1,471	8,144	23,635
Vessels:							
Steam		1				1	1
Net tonnage		32				32	32
Motor	21	124	66	263	121	595	1,341
Net tonnage	185	5,201	2,740	9,724	7,712	25,562	39,125
Sail							3
Net tonnage							1,421
Total vessels	21	125	66	263	121	596	1,345
Total net tonnage	185	5,233	2,740	9,724	7,712	25,594	40,578

¹ Used in the pilchard fishery of the Washington and Oregon coasts by Puget Sound purse-seine vessels. See separate sections for catch statistics.

² Fished only on Indian reservations.

NOTE.—Statistics on the operating units for Washington include 50 motor vessels having a total capacity of 2,344 net tons and a total crew of 512 men, which also fished in California water and contributed to the catch in that State. The following gear was operated by these craft: 46 pilchard or sardine purse seines and 124 set and hand lines. Operating units for Oregon include 26 motor vessels, having a total capacity of 348 net tons, 18 motor boats, and 68 fishermen, which also operated in California waters and contributed to the catch in that State. These craft operated the following gear: 2 pilchard or sardine purse seines, and 192 troll lines. Statistics on the operating units for California include 32 motor vessels having a total capacity of 2,073 net tons, and a total crew of 360 men, which also operated pilchard or sardine purse seines in Washington and Oregon waters and contributed to the catch in those States. Thirteen of these vessels operated in Washington, 11 in Oregon, and 8 in both States.

Fisheries of the Pacific Coast States, 1938—Continued

OPERATING UNITS: BY STATES—Continued

Item	California					Total	Grand total
	North- ern district	San Fran- cisco district	Mon- terey district	San Pedro district	San Diego district		
Vessels—Continued.							
Boats:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Motor.....	211	524	214	588	120	1,657	5,583
Other.....	3	41	9	27	1	81	969
Accessory boats.....		101	68	294	138	601	924
Apparatus:							
Purse seines:							
Mackerel.....			2	10		18	18
Length, yards.....			850	7,129		7,979	7,979
Salmon.....							229
Length, yards.....			44	94		225	125,950
Pilehard or sardine.....		87	44	94		225	278
Length, yards.....		34,245	16,458	37,618		88,321	107,641
Tuna.....		4	10	79		93	93
Length, yards.....		1,080	6,075	47,480		54,635	54,635
Lampara and ring nets:							
Mackerel.....		1		51	14	66	66
Length, yards.....		550		20,138	4,970	34,658	34,658
Pilehard or sardine.....		12	13	64	18	107	107
Length, yards.....		3,451	3,628	33,323	4,680	45,082	45,082
Tuna.....				17	2	19	19
Length, yards.....				9,775	640	10,415	10,415
Other.....			15	25	1	41	41
Length, yards.....			3,896	6,671	200	10,766	10,766
Haul seines.....	3					3	226
Length, yards.....	400					400	32,917
Gill nets:							
Drift:							
Barracuda.....				17	7	24	24
Square yards.....				106,012	29,625	135,638	135,638
Salmon.....		144				144	2,443
Square yards.....		465,332				465,332	5,785,087
Sea bass.....		6	19			25	25
Square yards.....		12,800	35,720			48,520	48,520
Shad.....		137				137	137
Square yards.....		389,113				389,113	389,113
Set:							
"California halibut".....			18			18	18
Square yards.....			55,392			55,392	55,392
Crab.....			33			33	33
Square yards.....			55,994			55,994	55,994
Salmon.....							1,137
Square yards.....							379,780
Sea bass.....				22	10	32	32
Square yards.....				73,040	41,703	114,743	114,743
Miscellaneous.....	12	55	32	26	6	131	131
Square yards.....	9,600	86,075	37,110	28,798	8,318	169,901	169,901
Trammel nets.....				24	10	34	34
Square yards.....				121,733	96,613	218,346	218,346
Lines:							
Trawl, set, and hand.....	316	1,600	764	2,837	1,387	6,904	35,442
Hooks.....	24,159	140,596	58,564	496,379	31,257	750,995	1,405,178
Troll.....	1,299	992	1,362	2,792	608	7,053	11,358
Hooks.....	5,436	2,855	3,682	2,842	608	15,423	34,476
Pound nets.....							34
Brush weirs.....							4
Fyke nets.....		1,680				1,680	1,680
Dip nets.....	29	4				33	554
Bag nets, shrimp.....						9	9
Length, yards.....		6,496				6,496	6,496
Reef nets.....				3		12	12
Paranzella nets.....				50		200	200
Yards at mouth.....		150				13	21
Beam trawls.....						87	140
Yards at mouth.....		13				12	74
Otter trawls.....			9			140	1,075
Yards at mouth.....		35	105				
Traps:							
Crab.....	993	4,950	68			5,981	31,664
Crawfish, fresh-water.....						94	1,395
Octopus.....			94				364
Sea crawfish.....				4,498	963	5,461	5,461
Harpoons, swordfish.....				47	25	72	72
Dredges, oyster.....							2
Yards at mouth.....							4
Tongs and rakes.....	3	54	4	4		65	457
Shovels.....	10	78	30	66		184	5,389
A balone outfits.....			13	5		18	18

Fisheries of the Pacific Coast States, 1938—Continued

CATCH: BY STATES

Species	Washington		Oregon	
	Pounds	Value	Pounds	Value
FISH				
Carp.....	90,800	\$2,724		
Cod.....	10,351,800	141,666		
Flounders:				
"Sole".....	4,476,700	130,935	32,800	\$1,187
Other.....	606,500	14,384	185,200	1,963
Halibut.....	23,084,600	1,875,944	409,300	27,326
Herring.....	341,400	3,824	25,500	338
"Lingcod".....	2,893,700	71,147	270,300	7,047
Perch.....	152,800	4,966	4,200	92
Pilchard or sardine.....	52,976,100	291,894	34,035,700	187,196
Rockfishes.....	722,800	30,071	139,700	3,018
Sablefish.....	2,768,900	113,607	124,400	3,778
Salmon:				
Blueback, red, or sockeye.....	10,598,700	809,933	292,700	35,124
Chinook or king.....	9,488,600	934,667	11,038,600	963,561
Chum or keta.....	10,353,000	241,439	1,977,700	23,906
Humpback or pink.....	39,500	1,185		
Silver or coho.....	9,101,900	567,928	7,512,800	362,053
Shad.....	52,700	1,749	406,700	16,034
Sharks, including grayfish.....	578,100	4,153		
Smelts:				
Eulachon.....	2,556,900	65,920	527,300	35,856
Other.....	438,600	21,055	1,000	35
Steelhead trout.....	403,800	25,668	1,860,200	114,199
Striped bass.....			44,100	2,192
Sturgeon.....	43,600	1,655	68,600	1,255
Tuna, albacore.....	4,132,800	185,976	5,868,900	268,284
Total	146,264,300	5,542,490	64,825,700	2,054,579
SHELLFISH, ETC.				
Crabs.....	2,612,600	116,676	6,408,800	291,311
Crawfish, fresh-water.....			93,700	8,435
Shrimp.....	25,100	3,622		
Clams:				
Hard.....	862,600	66,680		
Razor.....	1,125,100	187,512	103,300	24,595
Mixed.....			92,700	7,961
Octopus.....	64,200	3,007		
Oysters, market:				
Pacific.....	8,378,300	523,217	195,100	8,240
Western or native.....	262,200	182,299	8,700	4,464
Scallops, bay.....	20,400	5,147		
Squid.....	15,600	998		
Trepang.....	10,600	530		
Total	13,376,700	1,089,688	6,902,300	345,006
Grand total	159,631,000	6,632,178	71,728,000	2,399,585

Species	California ¹		Total	
	Pounds	Value	Pounds	Value
FISH				
Anchovies.....	735,200	\$9,306	735,200	\$9,306
Barracuda.....	2,529,500	158,677	2,529,500	158,677
Cabrilla.....	145,100	7,337	145,100	7,337
Carp.....	38,900	847	129,700	3,571
Catfish.....	312,300	40,537	312,300	40,537
Cod.....			10,351,800	141,666
Flounders:				
"California halibut".....	1,094,400	87,521	1,094,400	87,521
"Sole".....	7,737,600	444,442	12,247,100	576,564
Other.....	1,268,000	58,009	2,059,700	74,356
Flyingfish.....	62,900	2,337	62,900	2,337
Groupers.....	68,000	3,499	68,000	3,499
Hake.....	36,400	368	36,400	368
Halibut.....	405,800	27,952	23,899,700	1,931,222
Hardhead.....	12,900	1,401	12,900	1,401
Herring.....	504,900	2,759	871,800	6,966
Horse mackerel.....	4,133,900	45,651	4,133,900	45,651
Kingfish.....	493,200	13,014	493,200	13,014
"Lingcod".....	646,000	26,808	3,810,000	105,002
Mackerel.....	79,848,000	858,865	79,848,000	858,865

¹ Includes the catch taken off Latin America.

Fisheries of the Pacific Coast States, 1938--Continued

CATCH: BY STATES--Continued

Species	California		Total	
	Pounds	Value	Pounds	Value
FISH--continued				
Mullet.....	3,800	\$295	3,800	\$295
Perch.....	155,800	7,028	312,800	12,086
Pilchard or sardine.....	1,023,389,500	5,832,273	1,110,401,300	6,311,363
Pompano.....	1,200	356	1,200	356
Rock bass.....	286,100	16,112	286,100	16,112
Rockfishes.....	3,643,100	157,331	4,505,600	190,420
Rudderfish.....	27,600	1,482	27,600	1,482
Sablefish.....	415,800	19,400	3,309,100	136,785
Salmon:				
Blueback, red, or sockeye.....			10,891,400	845,057
Chinook or king.....	3,831,700	285,583	24,358,900	2,183,811
Chum or keta.....			12,330,700	265,435
Humpback or pink.....			39,500	1,185
Silver or coho.....			16,614,700	929,981
Sculpin.....	155,400	9,411	155,400	9,411
Sea bass:				
Black.....	407,500	23,937	407,500	23,937
White.....	628,900	54,393	628,900	54,393
Shad.....	1,338,700	50,646	1,798,100	68,429
Sharks, including grayfish.....	7,513,800	137,343	8,091,900	141,498
Sheepshead.....	72,000	2,787	72,000	2,787
Skates.....	528,300	5,006	528,300	5,006
Smelts:				
Eulachon.....			3,084,200	101,776
Other.....	567,900	26,911	1,007,500	48,001
Spanish mackerel.....	12,300	716	12,300	716
Splittail.....	11,100	398	11,100	398
Squawfish.....	1,000	37	1,000	37
Steelhead trout.....			2,264,000	139,867
Striped bass.....			44,100	2,192
Sturgeon.....			112,200	2,910
Suckers.....	500	17	500	17
Swordfish.....	722,500	80,802	722,500	80,802
Tomcod.....	3,100	49	3,100	49
Tuna and tunalike fishes:				
Albacore.....	7,724,600	511,819	17,726,300	966,079
Bluefin.....	17,728,000	983,051	17,728,000	983,051
Bonito.....	7,753,000	285,615	7,753,000	285,615
Skipjack or striped tuna.....	22,653,600	1,132,680	22,653,600	1,132,680
Yellowfin.....	78,317,800	4,705,092	78,317,800	4,705,092
Whitebait.....	106,700	6,909	106,700	6,909
Whitefish.....	68,000	3,493	68,000	3,493
Yellowtail.....	6,812,300	253,225	6,812,300	253,225
Other fish.....	284,900	6,192	284,900	6,192
Total.....	1,285,239,500	16,389,719	1,406,319,500	23,986,788
SHELLFISH, ETC.				
Crabs.....	3,877,500	249,835	12,898,900	657,822
Crawfish, fresh-water.....			93,700	8,435
Sea crawfish or spiny lobster.....	1,198,000	178,634	1,198,000	178,634
Shrimp.....	1,847,400	36,841	1,872,500	40,463
Abalone.....	424,300	91,979	424,300	91,979
Clams:				
Hard.....	12,400	2,705	875,000	69,385
Pismo.....	53,600	11,391	53,600	11,391
Razor.....			1,228,400	212,107
Soft.....	27,900	5,835	27,900	5,835
Mixed.....			92,700	7,961
Octopus.....	32,600	2,103	96,800	5,110
Oysters, market:				
Eastern.....	48,200	17,677	48,200	17,677
Pacific.....	161,000	30,688	8,734,400	562,145
Western or native.....	3,900	1,288	274,800	188,051
Scallops, bay.....			20,400	5,147
Squid.....	1,599,300	35,843	1,614,900	30,841
Trepang.....			10,600	530
Total.....	9,286,100	664,819	29,565,100	2,099,513
Grand total.....	1,294,525,600	17,054,538	1,525,884,600	26,086,301

Industries related to the fisheries of the Pacific Coast States, 1938

OPERATING UNITS, SALARIES, AND WAGES

Item	Washington	Oregon	California	Total
Transporting:				
Persons engaged:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	134	41	15	190
On boats.....	1			1
Total.....	135	41	15	191
Vessels, motor.....	51	20	3	74
Net tonnage.....	1,227	257	55	1,539
Boats.....	1			1
Wholesale and manufacturing:				
Establishments.....	117	50	174	341
Persons engaged:				
Proprietors.....	67	33	215	315
Salaried employees.....	275	108	772	1,155
Wage earners:				
Average for season.....	3,007	1,449	12,189	16,645
Average for year.....	1,237	718	4,110	6,065
Paid to salaried employees.....	\$636,310	\$266,757	\$2,122,430	\$3,025,497
Paid to wage earners.....	\$1,318,575	\$735,704	\$5,202,738	\$7,257,017
Total salaries and wages.....	\$1,954,885	\$1,002,461	\$7,325,168	\$10,282,514
Fishermen manufacturing.....	60	32	41	133

PRODUCTS MANUFACTURED

Item	Washington		Oregon		California	
	<i>Quantity</i>	<i>Value</i>	<i>Quantity</i>	<i>Value</i>	<i>Quantity</i>	<i>Value</i>
By manufacturing firms:						
Barracuda, fresh fillets..... pounds					300,000	\$44,575
Cabrilla, fresh fillets..... do					85,000	16,300
Cod:						
Fresh fillets..... do	118,635	\$11,946				
Salted:						
Dry, partly boned..... do	1,714,005	109,660			(1)	(1)
Boneless and absolutely boneless..... pounds	837,497	126,258			(1)	(1)
Flounders:						
Fresh fillets..... do	829,977	98,447	(1)	(1)	1,564,000	243,445
Fresh steaks..... do					420,000	86,500
Halibut, frozen steaks..... do	33,147	4,770				
"Lingcod," fresh fillets..... do	117,992	9,505	(1)	(1)	140,000	22,500
Mackerel:						
Canned..... standard cases					949,736	2,757,004
Meal..... tons					1,574	59,580
Oil..... gallons					86,364	25,878
Pilchard or sardine:						
Canned..... standard cases					2,261,678	7,102,358
Meal..... tons	4,633	161,752	2,941	\$102,602	82,353	3,173,538
Oil..... gallons	1,213,639	360,896	718,830	213,525	15,607,098	4,630,916
Rockfishes, fresh fillets..... pounds	(1)	(1)	(1)	(1)	1,145,000	179,850
Sablefish:						
Salted..... do	182,740	10,107				
Kipperd..... do	450,149	33,558			238,875	48,122
Salmon:						
Frozen steaks..... do	7,386	1,025	(1)	(1)		
Salted, mild-cured ¹ do	3,211,825	671,480	1,233,310	254,923	1,377,675	242,471
Kipperd..... do	2,002,805	252,500	(1)	(1)		
Smoked..... do	336,394	57,191	52,671	15,505	187,522	70,724
Canned:						
Blueback, red, or sockeye standard cases	138,232	1,903,772	11,931	220,158		
Chinook, or king..... do	29,953	404,756	141,102	2,042,511		
Chum or keta..... do	25,058	95,299	33,542	125,827		
Humpback or pink..... do	380	2,376				
Silver or coho..... do	13,495	123,141	63,772	638,850		
Steelhead trout..... do	1,611	16,996	13,645	156,206		
Eggs for bait..... do	4,454	80,436	(1)	(1)		
Oil..... gallons			24,287	34,904		

¹ The production of this item has been included under "Unclassified products."

² This item is usually an intermediate product and although included in the total, may be shown in its final stage of processing in this or another State.

³ Includes the production of both edible and industrial salmon oils.

Industries related to the fisheries of the Pacific Coast States, 1938—Continued

PRODUCTS MANUFACTURED—Continued

Item	Washington		Oregon		California	
	Quantity	Value	Quantity	Value	Quantity	Value
By manufacturing firms—Continued.						
Sea bass:					210,000	\$33,600
Black, fresh steaks pounds						28,600
White, fresh filets do						
Shad:						
Canned standard cases	(1)	(1)	2,280	\$5,840	7,655	20,390
Roe, canned do	69	\$1,726	895	29,330	2,051	64,853
Sharks, including grayfish, fresh filets pounds					50,000	5,000
Sheepshead, fresh filets do					25,000	3,750
Swordfish, fresh steaks do					116,400	28,280
Totauva, fresh steaks do					1,790,000	358,000
Tuna and tunalike fishes:						
Canned:						
Albacore standard cases	(1)	(1)	43,834	281,247	324,184	1,928,556
Bluefin do					312,748	1,580,114
Bonito do					167,979	676,595
Striped do					848,254	1,729,108
Tonno do					140,400	946,735
Yellowfin do					1,306,132	7,461,671
Yellowtail do					83,819	363,908
Meal tons			(1)	(1)	9,553	347,206
Oil gallons			(1)	(1)	178,334	52,109
Crabs:						
Meat, packaged, fresh-cooked pounds	136,038	52,230	806,975	266,725		
Canned standard cases	(1)	(1)	3,138	68,949		
Abalone steaks pounds					429,343	151,666
Clams, hard:						
Fresh-shucked gallons	3,493	4,473				
Canned:						
Whole standard cases	16,551	66,080				
Minced do	12,948	60,356				
Juice do	2,507	5,876				
Shells crushed for poultry feed tons	3,019	23,524				
Clams, razor, canned, whole and minced standard cases	53,439	438,041	(1)	(1)		
Oysters:						
Pacific:						
Fresh-shucked gallons	306,365	330,753	69,398	73,678	(1)	(1)
Canned standard cases	105,672	437,157	(1)	(1)		
Western or native, fresh-shucked gallons	18,391	143,633	7,082	55,809	(1)	(1)
Shell products:						
Poultry feed tons	5,336	49,459	(1)	(1)	11,696	53,433
Lime do	3,304	21,293			(1)	(1)
Unclassified:						
Packaged pounds	156,225	15,523	(1)	(1)	(1)	(1)
Salted do	138,885	13,375	(1)	(1)	682,908	782,938
Canned:						
Cat and dog food standard cases					183,006	540,098
Other do	18,015	127,563	9,790	68,897	12,118	61,318
Meal tons	11,798	39,855	(1)	(1)	12,427	77,972
Oil gallons	151,927	777,269	(1)	(1)	133,878	896,514
Miscellaneous do		13,771		71,696		532,074
Total		7,165,828		4,728,182		36,727,229

1 The production of this item has been included under "Unclassified products."
 2 Includes frozen filets of flounders, halibut, and "lingcod"; fresh filets of rockfishes; and fresh-shucked bay scallops.
 3 This item has been included with "Miscellaneous."
 4 Includes salted cod tongues, salmon bellies, and salmon eggs for caviar; and spiced sea herring.
 5 Includes dry salted barracuda, bonito, cod, mackerel, pilchards, black and white sea bass, tuna and yellowtail; salted, boneless, and absolutely boneless cod; and mild-cured shad.
 6 Includes canned albacore tuna, shad, crabs, hard clam chowder, and smoked Pacific oysters.
 7 Includes canned salmon eggs for bait, kippered sturgeon, razor clams, razor clam juice, Pacific oysters, and cat and dog food.
 8 Includes canned swordfish, tuna roe, squid, shore dinners, and salted cod.
 9 Includes salmon, salmon egg and shark meal.
 10 Includes shrimp, shark and miscellaneous fish meals; and miscellaneous green scrap.
 11 Includes salmon, shark, shark liver, tuna liver, halibut viscera, and miscellaneous liver oils.
 12 Includes salmon, shark, shark liver, tuna liver, miscellaneous fish and miscellaneous fish liver oils.
 13 Includes shark body, shark liver, tuna liver, miscellaneous fish and miscellaneous fish liver oils.
 14 Includes smoked sea herring blotters, and clam-shell lime.
 15 Includes fresh filets of flounders, "lingcod", and rockfishes; frozen filets of salmon; frozen steaks of salmon; kippered salmon and sturgeon; salmon, salmon egg and tuna meals; tuna oil; and oyster-shell poultry feed.
 16 Includes fresh filets of sablefish; fresh-shucked Pacific and native oysters; smoked barracuda, ohubs, sea herring blotters, mackerel, bonito, and yellowtail; sun-dried shrimp; marine-shell novelties; oyster-shell lime; kelp products, and liquid glue.

Industries related to the fisheries of the Pacific Coast States, 1938—Continued

PRODUCTS MANUFACTURED—Continued

Item	Washington		Oregon		California	
	Quantity	Value	Quantity	Value	Quantity	Value
By fishermen:						
Cod, green salted ¹ pounds.	3,065,450	\$129,480				
Cod tongues, salted..... do.	14,325	1,340				
Crab meat, packaged, fresh-cooked pounds			8,735	\$2,621		
Shrimp:						
Sun-dried..... do.					86,634	\$12,129
Bran..... tons					80	1,600
Clams, mixed, fresh-shucked gallons			1,392	1,740		
Scallops, bay, fresh-shucked..... do.	872	1,962				
Total.....		132,782		4,361		13,729
Grand total.....		7,298,610		4,732,543		36,740,958

¹ This item is usually an intermediate product and although included in the total, may be shown in its final stage of processing in this or another State.

NOTE.—The total value of manufactured products in the Pacific Coast States was as follows: By manufacturing establishments, \$48,621,239; and by fishermen, \$150,872. Some of the above products may have been imported from another State or foreign country; therefore, they cannot be correlated directly with the catch within the State. All of the persons engaged in the preparation of fishermen's manufactured products have also been included as fishermen.

WASHINGTON

Fisheries of Washington, 1938

CATCH: BY DISTRICTS

Species	Puget Sound district		Coastal district		Columbia River district	
	Pounds	Value	Pounds	Value	Pounds	Value
FISH						
Carp.....					90,500	\$2,721
Cod ¹	10,351,800	\$141,666				
Flounders:						
"Solé".....	4,470,600	130,718	4,700	\$189	1,400	28
Other.....	556,300	13,982			40,200	402
Grayfish.....	578,100	4,153				
Halibut.....	23,068,800	1,874,949	7,200	440	8,600	555
Herring.....	341,400	3,824				
"Lingcod".....	2,816,900	69,933	74,100	1,152	2,700	62
Perch.....	152,800	4,966				
Pilchard or sardine.....	10,300	582				
Rockfishes.....	704,500	29,745	52,965,800	291,312		
Sablefish.....	2,715,200	111,060	7,100	124	11,200	202
Salmon:			700		53,000	1,633
Blueback, red, or sockeye.....	9,865,300	723,127	601,000	70,918	132,400	15,888
Chinook or king.....	4,239,900	478,501	1,827,500	165,227	3,321,200	290,939
Chum or keta.....	8,248,200	206,204	1,323,200	27,410	781,600	7,816
Humpback or pink.....	39,500	1,185				
Silver or coho.....	5,798,600	392,067	1,691,600	89,207	1,011,800	86,654
Shad.....					52,700	1,749
Smelt:						
Eulachon.....					2,556,900	65,920
Surf or silver.....	160,500	12,039	258,100	9,016		
Steelhead trout.....			36,000	3,800	367,800	22,068
Sturgeon.....			12,000	1,050	31,600	575
Tuna, albacore.....	1,192,100	53,559	2,251,600	101,132	680,100	31,268
Total.....	75,440,700	4,253,160	61,060,600	760,830	9,753,000	528,500
SHELLFISH, ETC.						
Crabs.....	512,400	15,026	2,100,200	101,650		
Shrimp.....	25,100	3,622				
Clams:						
Hard:						
Butter.....	421,300	26,963				
Little neck.....	441,300	39,717				
Razor.....			1,125,100	187,512		
Octopus.....	64,200	3,007				
Oysters, market:						
Pacific.....	894,000	67,052	7,484,300	456,165		
Western or native.....	281,300	181,804	900	495		
Scallops, bay.....	20,400	5,147				
Squid.....	15,600	998				
Trepang.....	10,600	530				
Total.....	2,666,200	343,866	10,710,500	745,822		
Grand total.....	78,106,900	4,597,026	71,771,100	1,506,652	9,763,000	528,500

¹ Nearly all of the cod were taken off Alaska.

Fisheries of the Puget Sound district of Washington, 1938

OPERATING UNITS: BY GEAR

Item	Purse seines		Haul seines	Gill nets		Lines		Pound nets ¹	Brush weirs
	Salmon	Pilchard or sardine ¹		Drift	Set ²	Trawl, set, and hand	Troll		
Fishermen:	Number	Number	Number	Number	Number	Number	Number	Number	Number
On vessels	1,724	485	44	1,227	44	1,227	312		
On boats and shore	52		408	484	5	305	124	4	4
Total	1,776	485	452	484	5	1,532	436	4	4
Vessels:									
Motor	216	46	11			147	166		
Net tonnage	4,732	2,263	68			4,272	1,264		
Sail						3			
Net tonnage						1,421			
Total vessels	216	46	11			150	186		
Total net tonnage	4,732	2,703	68			5,693	1,264		
Boats:									
Motor	13		114	452	5	80	83	2	2
Other			63			141			2
Accessory boats	229	46				62			
Apparatus:									
Number	229	46	177	452	5	26,655	1,245	2	4
Length, yards	125,950	18,390	13,008	682,520	1,200				
Square yards						587,283	5,503		
Hooks									

Item	Dip nets	Reef nets	Beam trawls	Otter trawls	Traps		Tongs and rakes, oyster	Shovels	Total, exclusive of duplication
					Crab	Octopus			
Fishermen:	Number	Number	Number	Number	Number	Number	Number	Number	Number
On vessels			15	196	2				3,547
On boats and shore	14	296	9	9	81	15	149	476	2,130
Total	14	296	24	199	83	15	149	476	5,677
Vessels:									
Motor			5	58	1				573
Net tonnage			43	1,057	9				12,002
Sail									3
Net tonnage									1,421
Total vessels			5	58	1				576
Total net tonnage			43	1,057	9				13,423
Boats:									
Motor	14		3	3	67	10	37		769
Other		148			14	5	105		444
Accessory boats									321
Apparatus:									
Number	14	74	8	61	2,673	270	149	476	
Yards at mouth			53	915					

¹ Operated in the Washington coast, Oregon, and California pilchard or sardine fishery. See separate sections for catch statistics. Of the total vessels, 15 operated in the pilchard or sardine fishery exclusively in California. These vessels also engaged in the halibut and salmon fisheries from Puget Sound earlier in the year. The remaining vessels operated in the Northwest pilchard or sardine fishery, as well as in California.

² Fished only on Indian reservations.

Fisheries of the Puget Sound district of Washington, 1938—Continued

CATCH: BY GEAR

Species	Purse seines		Haul seines ¹		Gill nets			
	Pounds	Value	Pounds	Value	Drift		Set ²	
FISH								
Cod			2,100	\$55				
Flounders, "sole"	1,000	\$29	50,200	1,466				
Herring	46,600	522	48,200	540				
"Lingcod"	1,100	19	7,500	133	400	\$7		
Perch			139,600	4,534				
Pilchard or sardine			10,300	582				
Rockfishes	700	17	19,600	470				
Salmon: ⁴								
Blueback, red, or sockeye	9,152,700	670,893	300	22	540,700	39,633		
Chinook or king	382,600	22,191	6,800	476	924,100	64,687	9,400	\$658
Chum or keta	7,030,000	175,750	10,000	250	712,700	17,818	400,100	10,002
Humpback or pink	17,400	522			21,700	651		
Silver or coho	1,500,300	82,516	4,700	282	1,418,000	85,080	10,100	606
Smelt, surf or silver			177,300	11,826				
Total	18,132,400	962,459	476,500	20,636	3,617,600	207,876	419,600	11,266
SHELLFISH, ETC.								
Octopus			100	4				
Squid			15,600	998				
Trepang			10,600	530				
Total			26,300	1,532				
Grand total	18,132,400	962,459	502,800	22,168	3,617,600	207,876	419,600	11,266

Species	Lines				Pound nets ²		Brush weirs	
	Trawl, set and hand ³		Troll		Pounds	Value	Pounds	Value
FISH								
Cod	9,888,500	\$129,480						
Flounders, "sole"	100	3						
Grayfish	558,900	3,980						
Halibut	22,931,200	1,866,144	114,500	\$7,607				
Herring							245,100	\$2,745
"Lingcod"	2,319,800	57,743	173,200	3,389				
Rockfishes	403,900	20,775	1,100	23				
Sablefish	2,685,100	111,391						
Salmon: ⁴								
Blueback, red, or sockeye			900	45				
Chinook or king			2,896,300	382,312	98,000	\$6,860		
Chum or keta			100	2	18,000	450		
Silver or coho			2,595,100	208,392	64,900	3,894		
Tuna, albacore			1,192,100	53,559				
Total	38,787,500	2,189,516	6,973,000	655,329	180,900	11,204	245,100	2,745

See footnotes at end of table.

Fisheries of the Puget Sound district of Washington, 1938—Continued

CATCH: BY GEAR—Continued

Species	Dip nets		Reef nets		Beam trawls		Otter trawls	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
FISH								
Cod.....							461,200	\$12,131
Flounders:								
"Sole".....							4,419,300	129,220
Other.....							566,300	13,982
Grayfish.....							19,200	173
Halibut.....	1,500	\$17					23,100	1,198
Herring.....							314,900	8,642
"Lingcod".....							13,300	432
Perch.....							279,200	8,460
Rockfishes.....							30,100	569
Sablefish.....								
Salmon: ⁶								
Blueback, red, or sockeye.....			171,000	\$12,534				
Chinook or king.....			22,700	1,317				
Chum or keta.....			77,300	1,932				
Humpback or pink.....			400	12				
Silver or coho.....			205,400	11,297				
Smelt, surf or silver.....	3,200	213						
Total.....	4,700	230	476,800	27,092			6,128,600	174,807
SHELLFISH, ETC.								
Shrimp.....						25,100	\$3,622	
Octopus.....						20,400	5,147	88
Scallops, bay ¹⁰							2,200	
Total.....						45,500	8,769	88
Grand total.....	4,700	230	476,800	27,092		45,500	8,769	174,895

SPECIES	Traps				Tongs and rakes		Shovels	
	Crab		Octopus		Pounds	Value	Pounds	Value
SHELLFISH, ETC.								
Crabs ⁷	512,400	\$15,026						
Clams, hard: ⁸							421,300	\$26,963
Butter.....							441,300	39,717
Little neck.....			61,900	\$2,915				
Octopus.....								
Oysters, market: ⁹								
Pacific.....					894,000	\$67,052		
Western or native.....					261,300	181,804		
Total.....	512,400	15,026	61,900	2,915	1,155,300	248,856	862,600	66,680

¹ Includes the catch of smelt by drag bag nets.

² Fished only on Indian reservations.

³ In addition, vessels in the Pacific coast halibut fleet landed approximately 540,000 pounds of halibut, sablefish, and "lingcod" livers at Seattle, valued at \$250,600. Vessels of the halibut fleet also landed 606,164 pounds of halibut and sablefish viscera, valued at \$60,616.

⁴ Most of the cod were taken off Alaska.

⁵ Caught almost entirely for the utilization of the livers for dogfish oil. Most of the fish carcasses were discarded.

⁶ Statistics on the catch of salmon except those taken by troll lines, are reported to the State in number rather than pounds. The factors used in the above table for converting number of salmon to weight in pounds were as follows: Blueback, red, or sockeye, 7 pounds; chinook or king, 24.9 pounds; chum or keta, 10 pounds; humpback or pink, 5 pounds; and silver or coho, 9.9 pounds.

⁷ The weight of crabs shown is based on an average of 20 pounds per dozen.

⁸ Statistics on hard clams are based on yields of 28 percent edible meats for butter clams and 24 percent for little neck clams.

⁹ Statistics on oysters shown are based on yields of 18 percent edible meats for native oysters and 10 percent for Pacific oysters.

¹⁰ The weight of bay scallops is based on a yield of 17 percent edible meat.

NOTE.—The catch of salmon by haul seines was made by Indians on their reservations.

Fisheries of the coastal district of Washington, 1938

OPERATING UNITS: BY GEAR¹

Item	Haul seines	Gill nets		Lines, troll	Dip nets	Traps, crab	Tongs and rakes, oyster	Dredges, oyster	Shovels	Total, exclusive of duplication
		Drift	Set ²							
Fishermen:	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
On vessels				95		6		8		103
On boats and shore	22	263	120	162	76	58	253		4,453	5,134
Total	22	263	120	257	76	64	253	8	4,453	5,237
Vessels, motor				70		3		2		72
Net tonnage				552		29		13		565
Boats:										
Motor		217	35	139		46	71			466
Other	4		80		14		157	2		243
Apparatus:										
Number	4	217	120	1,045	76	3,185	220	4	4,453	
Length, yards	280									
Square yards		418,376	26,500							
Yards at mouth								8		
Hooks				4,702						

¹ In addition a combined fleet of 48 Puget Sound, Oregon, and California purse seine vessels operated in the Washington coast pilchard fishery. These vessels were manned by a total of 491 fishermen and had an aggregate capacity of 2,954 net tons. Of the total vessels 26 were from Puget Sound, 1 from Oregon, and 21 from California. Twenty-one of these vessels were duplicated in the Oregon coast pilchard fishery. For detailed statistics regarding the operating units in this fishery, refer to the gear tables in the Puget Sound, Oregon and California sections of this report.

² Fished by Indians on reservations.

CATCH: BY GEAR

Species	Purse seines		Haul seines		Gill nets			
	Pounds	Value	Pounds	Value	Drift		Set ¹	
FISH								
Pilchard or sardine	52,965,800	\$291,312						
Salmon: ²								
Blueback, red, or sockeye							601,000	\$70,918
Chinook or king					652,800	\$30,029	159,900	4,797
Chum or keta					955,400	20,063	367,800	7,356
Silver or coho					582,600	29,130	440,200	17,608
Smelt, surf or silver			26,200	\$1,572				
Steelhead trout ³							36,000	3,600
Sturgeon					12,000	1,080		
Total	52,965,800	291,312	26,200	1,572	2,202,800	80,302	1,604,900	104,279

Species	Lines, troll		Dip nets		Otter trawls	
	Pounds	Value	Pounds	Value	Pounds	Value
FISH						
Flounders, "sole"	100	\$4			4,600	\$185
Halibut	7,200	440				
"Lingcod"	74,100	1,152				
Rockfishes	7,100	124				
Sablefish						
Salmon: ²					700	14
Chinook or king	1,014,800	130,401				
Silver or coho	668,800	42,469				
Smelt, surf or silver			231,900	\$7,444		
Tuna, albacore	2,251,600	101,132				
Total	4,023,700	275,722	231,900	7,444	5,300	199

¹ Fished by Indians on their reservations.

² Statistics on the catch of salmon except those taken by troll lines are reported to the State in number rather than pounds. The factors used in the above table for converting number of salmon to weight in pounds were as follows: Blueback, red, or sockeye, 5 pounds; chinook or king, 22.53 pounds; chum or keta, 11.13 pounds; silver or coho, 11.06 pounds; and steelhead trout, 9 pounds.

³ Steelhead trout shown in this table were taken on Indian reservations.

Fisheries of the coastal district of Washington, 1938—Continued

CATCH: BY GEAR—Continued

Species	Traps		Dredges, tongs, and rakes		Shovels	
	Pounds	Value	Pounds	Value	Pounds	Value
SHELLFISH						
Crabs ⁴	2, 100, 200	\$101, 650				
Clams, razor ⁵					1, 125, 100	\$187, 512
Oysters, market: ⁶						
Pacific			7, 484, 300	\$456, 165		
Western or native			900	495		
Total	2, 100, 200	101, 650	7, 485, 200	456, 660	1, 125, 100	187, 512

⁴ The weight of crabs shown is based on an average of 22 pounds per dozen.

⁵ The weight of razor clams shown is in pounds of edible meats, based on a yield of 42 percent of the round weight.

⁶ The statistics on oysters used in this table are based on a yield of 12 percent of edible meats from Pacific and native oysters.

NOTE.—The catch by otter trawls was made by fishermen from the Puget Sound district.

Fisheries of the Columbia River district of Washington, 1938

OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets, drift	Lines		Dip nets	Total, exclusive of duplication
			Trawl and set	Troll		
Fishermen:	Number	Number	Number	Number	Number	Number
On vessels			4	17		21
On boats and shore	9	633	106	90	287	1, 015
Total	9	633	110	107	287	1, 036
Vessels, motor			1	12		13
Net tonnage			7	85		92
Boats:						
Motor	3	474	85	68	143	721
Other	3		21		9	33
Apparatus:						
Number	3	474	369	400	287	
Length, yards	500					
Square yards		1, 312, 032				
Hooks			28, 290	1, 708		

CATCH: BY GEAR

Species	Haul seines		Gill nets, drift		Lines				Dip nets	
	Pounds	Value	Pounds	Value	Trawl and set		Troll		Pounds	Value
Carp	90, 800	\$2, 724								
Flounders:										
" Sole "					1, 400	\$28				
Other			40, 200	\$402						
Halibut					8, 600	555				
" Lingcod "					2, 700	62				
Rockfishes			5, 200	52	6, 000	150				
Sablefish					53, 000	1, 633				
Salmon:										
Blueback, red, or sockeye			92, 200	11, 064					40, 200	\$4, 824
Chinook or king			2, 995, 000	260, 565			116, 700	\$12, 148	209, 500	18, 226
Chum or keta			781, 600	7, 816						
Silver or coho			741, 800	30, 191			870, 000	56, 463		
Shad			51, 000	1, 693					1, 700	56
Sineit, eulachon			184, 400	12, 539					2, 372, 500	53, 381
Steelhead trout			324, 200	19, 452			100	6	43, 500	2, 610
Sturgeon			13, 300	242	18, 300	333				
Tuna, albacore							689, 100	31, 285		
Total	90, 800	2, 724	5, 228, 900	344, 016	90, 000	2, 761	1, 675, 900	99, 902	2, 267, 400	79, 097

OREGON

Fisheries of Oregon, 1938

CATCH: BY DISTRICTS

Species	Columbia River district		Coastal district	
	Pounds	Value	Pounds	Value
FISH				
Flounders:				
" Sole "	19, 100	\$473	13, 700	\$714
Other	177, 800	1, 778	7, 400	185
Hallbut	317, 900	21, 795	91, 400	5, 531
Herring			25, 500	383
" Lincood "	177, 700	4, 703	92, 600	2, 344
Perch			4, 200	92
Pilchard or sardine			34, 035, 700	187, 196
Rockfishes	130, 400	2, 772	9, 300	246
Sablefish	124, 300	3, 776	100	2
Salmon:				
Blueback, red, or sockeye	292, 700	35, 124		
Chinook or king	9, 468, 000	626, 916	1, 570, 600	136, 645
Chum or keta	1, 133, 900	11, 339	843, 800	12, 657
Silver or coho	2, 907, 000	150, 849	4, 605, 800	211, 204
Shad	118, 600	3, 934	288, 100	12, 100
Smelt:				
Fulachon	527, 300	35, 856		
Other			1, 000	35
Steelhead trout	1, 639, 700	98, 323	220, 500	15, 878
Striped bass			44, 100	2, 192
Sturgeon	65, 900	1, 199	2, 800	56
Tuna, albacore	5, 162, 600	234, 382	708, 300	33, 902
Total	22, 262, 800	1, 433, 219	42, 562, 900	621, 360
SHELLFISH				
Crabs			6, 408, 800	291, 311
Crawfish, fresh-water	93, 700	8, 435		
Clams:				
Razor			103, 300	24, 595
Mixed			92, 700	7, 961
Oysters, market:				
Pacific			195, 100	8, 240
Western or native			8, 700	4, 464
Total	93, 700	8, 435	6, 808, 600	336, 571
Grand total	22, 356, 500	1, 441, 654	49, 371, 500	957, 931

Fisheries of the Columbia River district of Oregon, 1938

OPERATING UNITS: BY GEAR

Item	Purse seines, pilchard	Haul seines	Gill nets		Lines		Pound nets	Dip nets	Traps, crawfish	Total, exclusive of duplication
			Drift, salmon	Set, salmon	Trawl and set	Troll				
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels	10				36	84				110
On boats and shore		360	1, 037	87	86	192	53	144	31	1, 900
Total	10	360	1, 037	87	122	276	53	144	31	2, 010
Vessels, motor	1				9	53				58
Net tonnage	71				103	393				523
Boats:										
Motor		16	719	78	74	140	25		21	1, 023
Other		31		9	8		25		9	74
Accessory boats	1									1
Apparatus:										
Number	1	31	719	153	1, 153	965	32	144	1, 395	
Length, yards	480	17, 393								
Square yards			2, 291, 064	42, 840						
Hooks					28, 790	4, 265				

Fisheries of the Columbia River district of Oregon, 1938—Continued

CATCH: BY GEAR¹

Species	Haul seines		Gill nets				Lines	
			Drift		Set		Trawl and set	
			Pounds	Value	Pounds	Value			Pounds	Value
FISH								
Flounders:								
"Sole".....			166,400	\$1,664			19,000	\$471
Other.....								
Hallibut.....							137,900	4,132
"Lingcod".....							53,800	1,684
Rockfishes.....							124,300	3,776
Sablefish.....								
Salmon:								
Blueback, red, or sockeye.....	46,700	\$5,604	179,100	21,492	8,100	\$972		
Chinook or king.....	1,784,400	155,243	5,971,100	519,486	31,500	2,740	100	10
Chum or keta.....	124,000	1,240	941,500	9,415	6,100	61		
Silver or coho.....	154,500	6,288	1,192,100	48,518	4,400	179		
Shad.....	43,700	1,451	74,500	2,473	100	3		
Smelt, outachon.....			527,300	35,856				
Steelhead trout.....	514,700	30,882	698,000	41,880	10,800	648		
Sturgeon.....	1,200	22	32,500	592	9,100	166	22,400	408
Total.....	2,689,200	200,730	9,782,500	681,376	70,100	4,769	671,900	32,050

Species	Lines		Pound nets		Dip nets		Traps	
	Troll		Pounds	Value	Pounds	Value	Pounds	Value
	Pounds	Value						
FISH								
Flounders:								
"Sole".....	100	\$2						
Other.....	700	7	10,700	\$107				
Hallibut.....	3,500	226						
"Lingcod".....	39,800	571						
Rockfishes.....	44,400	551	32,200	537				
Salmon:								
Blueback, red, or sockeye.....			12,400	1,488	46,400	\$5,568		
Chinook or king.....	187,000	19,467	391,400	34,052	1,102,500	95,918		
Chum or keta.....			57,200	572	5,100	51		
Silver or coho.....	1,342,200	87,162	213,800	8,762				
Shad.....			300	7				
Steelhead trout.....	500	30	196,100	11,707	219,600	13,176		
Sturgeon.....			400	7	200	4		
Tuna, albacore.....	5,162,600	234,382						
Total.....	6,780,800	342,398	914,500	57,179	1,373,800	114,717		
SHELLFISH								
Crawfish, fresh-water.....							93,700	\$8,435
Grand total.....	6,780,800	342,398	914,500	57,179	1,373,800	114,717	93,700	8,435

¹ Of the above species the following were taken off the Oregon and Washington coasts but landed in the Columbia River district: "Sole," halibut, "lingcod", rockfishes, sablefish, and tuna. Most of the troll-caught salmon were also taken in coastal waters.

Fisheries of the coastal district of Oregon, 1938

OPERATING UNITS: BY GEAR

Item	Purse ¹ seines, pilchard or sardine	Haul seines	Gill nets		Lines		Otter trawls	Traps, crab	'Tongs and rakes, oyster	Shov- els	Total, exclu- sive of duplica- tion
			Drift	Set	Trawl and set	Troll					
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Fishermen:											
On vessels	12				8	55	3	38			91
On boats and shore		24	502	296	39	117		292	23	276	1,440
Total	12	24	502	296	47	172	3	330	23	276	1,531
Vessels, motor	1				2	21	1	19			30
Net tonnage	104				24	198	15	173			381
Boats:											
Motor		8	437	189	35	108		286	6		947
Other		8		77					9	28	114
Accessory boats	1										1
Apparatus:											
Number	1	8	437	859	361	650	1	19,825	23	276	
Length, yards	470	1,336									
Square yards			615,733	309,240							
Yards at mouth							20				
Hooks					9,860	2,815					

¹ In addition there was a combined fleet of 37 Washington, Columbia River district of Oregon, and California purse seine vessels operated in the Oregon Coast pilchard or sardine fishery. These vessels were manned by a total crew of 357 fishermen and had an aggregate tonnage of 2,274 net tons. Of the total vessels, 1 was from the Columbia River district of Oregon, 16 from Washington, and 20 from California. 21 of these craft were duplicated in the Washington Coast pilchard fishery. For detailed statistics regarding the operating units in this fishery, refer to the gear tables in the Oregon Columbia River, Washington, and California sections of this report.

CATCH: BY GEAR

Species	Purse seines, pilchard ¹		Haul seines		Gill nets, drift and set		Lines	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
FISH								
Flounders:								
"Solé"							700	\$21
Other					4,500	\$112	2,900	\$73
Halibut							81,000	4,908
Herring					25,500	383		
"Lingcod"							34,500	925
Perch					4,200	92		
Pilchard or sardine	34,035,700	\$187,196						
Rockfishes							8,300	217
Sablefish							100	2
Salmon:								
Chinook or king						1,019,300	73,797	
Chum or keta						843,800	12,667	
Silver or coho						3,257,200	130,288	
Shad						288,100	12,100	
Smelts						1,000	35	
Steelhead trout						220,500	15,876	
Striped bass						44,100	2,192	
Sturgeon						2,800	56	
Total	34,035,700	187,196	34,200	587	5,679,700	247,074	124,600	6,073

¹ The Oregon coast pilchard fishery was prosecuted almost entirely by Washington and California purse-seine vessels. See separate sections for data on operating units in this fishery.

Fisheries of the coastal district of Oregon, 1938—Continued

CATCH: BY GEAR—Continued

Species	Lines—Contd.		Otter trawls		Traps		Tongs and rakes		Shovels	
	Pounds	Value								
FISH										
Flounders, "sole".....			13,000	\$893						
Halibut.....	10,400	\$623								
"Lingcod".....	58,100	1,419								
Rockfishes.....	1,000	29								
Salmon:										
Chinook or king.....	551,300	62,848								
Silver or coho.....	1,348,600	80,916								
Tuna, albacore.....	706,300	33,902								
Total.....	2,675,700	179,737	13,000	693						
SHELLFISH										
Crabs.....					6,408,800	\$291,311				
Clams:										
Razor ¹									103,300	\$24,595
Mixed ²									92,700	7,951
Oysters, market: ⁴										
Pacific.....							195,100	\$8,240		
Western or native.....							8,700	4,464		
Total.....					6,408,800	291,131	203,800	12,704	196,000	32,556
Grand total.....	2,675,700	179,737	13,000	693	6,408,800	291,311	203,800	12,704	196,000	32,556

¹ The weight of razor clams is that of edible meats, based on a yield of 42 percent of the round weight.
² Mixed clams consist principally of Eastern soft-shell clams. The weight shown is that of edible meats, based on a yield of 21 percent of the round weight.
⁴ Statistics on oysters used in this table are based on yields of 12 percent of edible meats for both Pacific and native oysters.

CALIFORNIA

Fisheries of California, 1938

CATCH: BY DISTRICTS

Species	Northern district		San Francisco district		Monterey district	
	Pounds	Value	Pounds	Value	Pounds	Value
FISH						
Anchovies.....			251,800	\$3,776	34,100	\$719
Carp.....			37,000	762	1,400	55
Catfish.....			312,200	40,530	100	7
Flounders:						
"California halibut".....	3,100	\$248	14,600	1,836	39,600	3,299
"Sole".....	3,883,200	228,840	3,192,700	190,390	452,800	18,859
Other.....	505,900	22,537	686,200	30,751	69,400	3,425
Hake.....	1,700	17	18,000	180	10,400	164
Halibut.....	405,500	27,923	300	29		
Hardhead.....			12,900	1,401		
Herring.....	5,100	39	495,600	2,645		
Horse mackerel.....					800	19
Kingfish.....			6,200	249	98,600	7,682
"Lingcod".....	384,900	15,675	173,900	6,472	146,800	5,516
Mackerel.....			1,000	30	85,300	4,558
Perch.....	8,900	290	69,300	2,243	1,482,200	38,309
Pilchard or sardines.....			446,631,600	2,501,136	15,700	743
Rockfishes.....	548,400	21,321	660,400	29,948	311,385,700	1,785,299
Sablefish.....	217,400	11,129	8,500	199	1,852,600	75,204
Salmon.....	1,853,700	158,274	1,778,300	106,430	38,400	939
Sea bass, white.....			11,100	997	199,500	20,861
Shad.....			1,338,700	50,646	23,900	2,450
Sharks, including grayfish.....	140,400	2,092	4,318,800	69,517	1,769,800	33,330
Skates.....	60,000	601	329,400	3,294	92,600	490
Smelt.....	13,200	473	236,000	12,189	92,800	4,180
Splittail.....			11,100	398		
Squawfish.....			1,000	37		
Suckers.....			500	17		

Fisheries of California, 1938—Continued

CATCH: BY DISTRICTS—Continued

Species	Northern district		San Francisco district		Monterey district	
	Pounds	Value	Pounds	Value	Pounds	Value
FISH—continued						
Tomcod	2, 200	\$32	900	\$17		
Tuna, albacore	22, 300	1, 539	7, 000	407	2, 591, 400	\$142, 068
Whitebait	96, 100	6, 076	8, 100	592	2, 500	241
Other fish	85, 400	1, 704	75, 600	1, 512	9, 000	344
Total	8, 237, 600	498, 810	460, 588, 700	3, 058, 630	320, 501, 400	2, 118, 761
SHELLFISH						
Crabs	534, 500	30, 322	3, 171, 100	210, 778	168, 000	8, 612
Shrimp			1, 844, 100	36, 170	3, 300	671
Abalone					240, 800	58, 586
Clams:						
Hard	5, 000	787	1, 600	381	200	40
Pismo					5, 000	1, 221
Soft	200	63		5, 782		
Octopus	1, 900	110	27, 700	5, 782	24, 400	1, 647
Oysters, market:						
Eastern	5, 100	1, 702	43, 100	15, 975		
Pacific			156, 800	29, 400	1, 100	160
Western or native			3, 900	1, 288		
Squid					1, 472, 000	31, 621
Total	546, 700	32, 974	5, 254, 500	300, 111	1, 914, 800	100, 458
Grand total	8, 784, 200	531, 784	465, 843, 200	3, 358, 741	322, 416, 200	2, 219, 219

Species	San Pedro district					
	Off California		Off Latin America		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
FISH						
Anchovies	449, 300	\$4, 811			449, 300	\$4, 811
Barracuda	897, 800	54, 519	774, 500	\$58, 629	1, 672, 300	113, 148
Cabrilla			84, 000	4, 575	84, 000	4, 575
Carp	500	30			500	30
Flounders:						
"California halibut"	606, 500	50, 623	8, 500	909	615, 000	51, 532
"Sole"	208, 700	6, 349			208, 700	6, 349
Other	6, 500	1, 296			6, 500	1, 296
Flyingfish	62, 900	2, 337			62, 900	2, 337
Groupers			21, 500	1, 374	21, 500	1, 374
Hake	300	7			300	7
Herring	100	2			100	2
Horse mackerel	3, 954, 000	36, 891			3, 954, 000	36, 891
Kingfish	339, 500	7, 234			339, 500	7, 234
"Lingcod"	1, 900	103			1, 900	103
Mackerel	74, 007, 500	775, 182	300	5	74, 007, 800	775, 187
Mullet	300	26			300	26
Perch	61, 200	3, 738			61, 200	3, 738
Pilchard or sardines	259, 859, 200	1, 550, 300			259, 859, 200	1, 550, 300
Pompano	600	273			600	273
Rock bass	132, 100	9, 072	7, 300	435	139, 400	9, 507
Rockfishes	438, 400	19, 486	8, 600	415	447, 000	19, 901
Rudderfishes	27, 600	1, 482			27, 600	1, 482
Sablefish	151, 500	7, 133			151, 500	7, 133
Salmon	200	18			200	18
Sculpin	94, 100	7, 221			94, 100	7, 221
Sea bass:						
Black	31, 000	1, 695	217, 800	13, 360	248, 800	15, 055
White	186, 200	19, 325	47, 600	3, 875	233, 800	23, 200
Sharks, including grayfish	1, 221, 500	31, 129	1, 400	52	1, 222, 900	31, 181
Sheepshead	58, 300	2, 284	800	29	59, 100	2, 313
Skates	45, 500	612			45, 500	612
Smelt	220, 200	9, 794			220, 200	9, 794
Spanish mackerel			7, 000	552	7, 000	552
Swordfish	266, 700	33, 461	38, 400	4, 022	305, 100	37, 483
Tuna and tunaliko fishes:						
Albacore	4, 160, 900	299, 511			4, 160, 900	299, 511
Bluefin	14, 541, 700	806, 575	527, 400	28, 009	15, 069, 100	833, 584
Bonito	2, 997, 400	112, 290	2, 651, 900	96, 558	5, 649, 300	208, 848
Skipjack or striped tuna	100	3	7, 783, 200	389, 163	7, 783, 300	389, 166
Yellowfin	3, 400	207	19, 513, 400	1, 172, 047	19, 516, 800	1, 172, 254
Whitefish	23, 200	1, 314	2, 600	142	25, 800	1, 456
Yellowtail	55, 600	2, 817	2, 288, 900	81, 583	2, 344, 500	84, 400
Other fish	113, 000	2, 518	1, 500	97	114, 500	2, 615
Total	365, 225, 400	3, 860, 668	33, 986, 600	1, 855, 831	399, 212, 000	5, 716, 499

Fisheries of California, 1938—Continued

CATCH: BY DISTRICTS—Continued

Species	San Pedro district					
	Off California		Off Latin America		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
SHELLFISH						
Crabs.....	3,900	\$123			3,900	\$123
Sea crawfish or spiny lobsters.....	253,200	50,559			253,200	50,559
Abalone.....	183,500	35,393			183,500	35,393
Clams:						
Hard.....	5,600	1,497			5,600	1,497
Pismo.....	48,600	10,170			48,600	10,170
Octopus.....	100	9			100	9
Oysters, market, Pacific.....	3,100	1,128			3,100	1,128
Squid.....	122,400	4,146			122,400	4,146
Total.....	620,400	103,025			620,400	103,025
Grand total.....	365,845,800	3,963,693	33,986,600	\$1,855,831	399,832,400	5,819,524
	San Diego district					
Species	Off California		Off Latin America		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
FISH						
Barracuda.....	363,000	\$15,085	494,200	\$30,444	857,200	\$45,529
Cabrilla.....			61,100	2,762	61,100	2,762
Flounders:						
"California halibut".....	174,800	14,568	247,300	16,038	422,100	30,606
"Sole".....	100	4			100	4
Groupers.....			46,500	2,125	46,500	2,125
Herring.....	8,800	54			8,800	54
Horse mackerel.....	81,300	1,078			81,300	1,078
Kingfish.....	700	15			700	15
Mackerel.....	4,366,000	45,320	1,000	19	4,367,000	45,339
Mullet.....	3,500	269			3,500	269
Perch.....	700	14			700	14
Pilchard or sardines.....	5,512,900	25,537	100	1	5,513,000	25,538
Pompano.....	600	83			600	83
Rock bass.....	123,500	5,322	23,200	1,283	146,700	6,605
Rockfishes.....	74,500	3,532	160,200	7,425	234,700	10,957
Sculpin.....	61,200	2,185	100	5	61,300	2,190
Sea bass:						
Black.....	3,800	167	154,000	8,715	158,700	8,882
White.....	51,100	4,794	309,000	22,962	360,100	27,746
Sharks, including grayfish.....	51,200	1,033	10,700	190	61,900	1,223
Sheepshead.....	2,800	95	10,100	379	12,900	474
Skates.....	700	8	100	1	800	9
Smelt.....	4,800	218	900	57	5,700	275
Spanish mackerel.....			5,300	154	5,300	164
Swordfish.....	53,900	6,831	363,500	36,488	417,400	43,319
Tuna and tunalike fishes:						
Albacore.....	913,100	65,342	29,900	2,952	943,000	68,294
Bluefin.....	1,970,500	111,834	688,400	38,133	2,658,900	149,467
Bonito.....	1,600,200	58,238	503,500	18,529	2,103,700	76,767
Skipjack or striped tuna.....	2,700	136	14,867,600	743,378	14,870,300	743,514
Yellowfin.....	7,200	429	68,793,800	3,532,409	68,801,000	3,532,838
Whitefish.....	900	42	41,300	1,995	42,200	2,037
Yellowtail.....	190,600	7,688	4,277,200	161,137	4,467,800	168,825
Other fish.....	100	3	300	14	400	17
Total.....	15,609,700	369,424	81,090,200	4,627,595	96,699,900	4,997,019
SHELLFISH						
Sea crawfish or spiny lobster.....	55,200	10,857	889,600	117,718	944,800	128,075
Squid.....	4,700	185	200	11	4,900	176
Total.....	59,900	10,522	889,800	117,729	949,700	128,251
Grand total.....	15,669,600	379,946	81,980,000	4,745,324	97,649,600	5,125,270

Fisheries of California, 1938—Continued

CATCH: BY WATERS

Species	Off California		Off Latin America	
	Pounds	Value	Pounds	Value
FISH				
Anchovies	735, 200	\$9, 306		
Barracuda	1, 260, 800	69, 604	1, 268, 700	\$89, 073
Cabrilla			145, 100	7, 337
Carp	38, 900	847		
Catfish	312, 300	40, 537		
Flourishers:				
"California halibut"	838, 600	70, 574	255, 800	16, 947
"Sole"	7, 737, 600	444, 442		
Other	1, 268, 000	58, 009		
Flyingfish	62, 900	2, 337		
Groupers			68, 000	3, 499
Hake	36, 400	368		
Halibut	405, 800	27, 952		
Hardhead	12, 900	1, 401		
Herring	504, 900	2, 759		
Horse mackerel	4, 133, 900	45, 651		
Kingfish	493, 200	13, 014		
"Lingcod"	646, 000	26, 808		
Mackerel	79, 846, 700	858, 841	1, 300	24
Mullet	3, 800	295		
Perch	155, 800	7, 028		
Pilchard or sardines	1, 023, 389, 400	5, 832, 272	100	1
Pompano	1, 200	356		
Rock bass	255, 600	14, 394	30, 500	1, 718
Rockfishes	3, 474, 300	149, 491	168, 800	7, 840
Rudderfishes	27, 600	1, 482		
Sablefish	415, 800	19, 400		
Salmon	3, 831, 700	285, 583		
Sculpin	155, 300	9, 406	100	5
Sea bass:				
Black	34, 800	1, 862	372, 700	22, 075
White	272, 300	27, 566	356, 600	26, 827
Shad	1, 338, 700	50, 646		
Sharks, including grayfish	7, 501, 700	137, 101	12, 100	242
Sheepshead	61, 100	2, 379	10, 900	408
Skates	528, 200	5, 005	100	1
Smelt	567, 000	26, 854	900	57
Spanish mackerel			12, 300	716
Splittail	11, 100	398		
Squawfish	1, 000	37		
Suckers	500	17		
Swordfish	320, 600	40, 292	401, 900	40, 510
Tomcod	3, 100	49		
Tuna and tunalike fishes:				
Albacore	7, 694, 700	508, 867	29, 900	2, 952
Bluefin	16, 512, 200	916, 909	1, 215, 800	66, 142
Bonito	4, 597, 600	170, 528	3, 155, 400	115, 087
Skipjack or striped tuna	2, 800	139	22, 650, 800	1, 132, 641
Yellowfin	10, 600	636	78, 307, 200	4, 704, 456
Whitebait	106, 700	6, 909		
Whitefish	24, 100	1, 356	43, 900	2, 137
Yellowtail	246, 200	10, 505	6, 566, 100	242, 720
Other fish	283, 100	6, 081	1, 800	111
Total	1, 170, 162, 700	9, 906, 293	115, 076, 800	6, 483, 426
SHELLFISH				
Crabs	3, 877, 500	249, 835		
Sea crawfish or spiny lobster	308, 400	60, 916	889, 800	117, 718
Shrimp	1, 847, 400	36, 841		
Abalone	424, 300	91, 979		
Clams:				
Hard	12, 400	2, 705		
Pismo	53, 600	11, 391		
Soft	27, 900	5, 835		
Octopus	32, 600	2, 103		
Oysters, market:				
Eastern	48, 200	17, 677		
Pacific	161, 000	30, 688		
Western or native	3, 900	1, 288		
Squid	1, 599, 100	35, 832	200	11
Total	8, 396, 300	547, 090	889, 800	117, 729
Grand total	1, 178, 559, 000	10, 453, 383	115, 966, 800	6, 601, 155

Fisheries of the northern district of California, 1938

OPERATING UNITS: BY GEAR

Item	Gill nets	Lines		Dip nets	Traps, crab	Rakes and tongs, oyster	Shovels	Total, exclusive of duplication
		Set and hand	Troll					
Fishermen:	Number	Number	Number	Number	Number	Number	Number	Number
On vessels.....	21	21	40	4	4	4	4	40
On boats and shore.....	10	78	210	29	56	3	10	265
Total.....	10	99	250	29	60	3	10	305
Vessels, motor.....		9	21		2			21
Net tonnage.....		73	185		19			185
Boats:								
Motor.....	9	64	201		52		9	211
Other.....						3		3
Apparatus:								
Number.....	12	316	1,299	29	963	3	10	
Square yards.....	9,600							
Hooks.....		24,159	5,436					

CATCH: BY GEAR

Species	Gill nets		Lines				Paranzella nets and otter trawls	
			Set and hand		Troll			
FISH	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Flounders:								
California halibut.....			1,700	\$60			3,100	\$248
Sole.....							3,881,600	228,780
Other.....	2,000	\$81					503,900	22,456
Hake.....							1,700	17
Halibut.....			208,800	14,378	7,300	\$503	189,400	13,042
Herring.....	5,100	39						
Lingcod.....			157,300	6,406	38,100	1,552	189,500	7,717
Perch.....	8,500	277						
Rockfishes.....			143,100	5,627	11,200	440	394,100	15,254
Sablefish.....			211,600	10,832			5,800	297
Salmon.....					1,853,700	158,274		
Sharks, including grayfish.....			17,300	831	1,200	37	121,900	1,224
Skates.....							60,000	601
Smelt.....	4,800	172					2,200	32
Tomcod.....								
Tuna, albacore.....					22,300	1,539		
Other fish.....							85,400	1,704
Total.....	20,400	569	739,800	38,134	1,933,800	162,345	5,438,600	291,372
SHELLFISH								
Crabs.....							85,500	4,850
Octopus.....			800	46			100	6
Total.....			800	46			85,600	4,856
Grand total.....	20,400	569	740,600	38,180	1,933,800	162,345	5,524,200	296,228

Species	Dip nets		Traps		Rakes and tongs		Shovels	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
FISH								
Perch.....	400	\$13						
Smelt.....	8,400	301						
Whitebait.....	96,100	6,076						
Total.....	104,900	6,390						
SHELLFISH								
Crabs.....			449,000	\$25,472				
Clams:								
Hard.....							5,000	\$787
Soft.....							200	53
Octopus.....			1,000	58				
Oysters, market, eastern.....					5,100	\$1,702		
Total.....			450,000	25,530	5,100	1,702	5,200	840
Grand total.....	104,900	6,390	450,000	25,530	5,100	1,702	5,200	840

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

Fisheries of the San Francisco district of California, 1938

OPERATING UNITS: BY GEAR

Item	Purse seines		Lampara and ring nets		Haul seines	Gill nets	
	Pilchard or sardine ¹	Tuna	Mackerel	Pilchard or sardine		Drift, salmon	Drift, sea bass
	Number	Number	Number	Number	Number	Number	Number
Fishermen:							
On vessels.....	946	45	12	110			
On boats and shore.....				14	11	272	10
Total.....	946	45	12	124	11	272	10
Vessels, motor.....	87	4	1	10			
Net tonnage.....	4,769	269	12	102			
Boats:							
Motor.....				2	3	142	6
Other.....					1	2	
Accessory boats.....	87	4	1	12			
Apparatus:							
Number.....	87	4	1	12	3	144	6
Length, yards.....	34,245	1,080	550	3,451	400		
Square yards.....						465,332	12,800

Item	Gill nets—Cont.		Lines		Fyke nets	Dip nets	Bag nets, shrimp
	Drift, shad	Other	Set and hand	Troll			
	Number	Number	Number	Number	Number	Number	Number
Fishermen:							
On vessels.....		2	14	40			36
On boats and shore.....	271	54	178	174	68	4	5
Total.....	271	56	192	214	68	4	41
Vessels:							
Steam.....				1			
Net tonnage.....				32			
Motor.....		1	4	13			8
Net tonnage.....		6	41	182			48
Total vessels.....		1	4	14			8
Total net tonnage.....		6	41	214			48
Boats:							
Motor.....	136	31	119	164	43	2	1
Other.....	1	1	7		9		
Accessory boats.....							4
Apparatus:							
Number.....	137	55	1,600	992	1,660	4	6
Length, yards.....							6,499
Square yards.....	389,113	86,075					
Hooks.....			140,596	2,855			

Item	Paranzella nets	Beam trawls	Otter trawls	Traps, crab	Rakes and tongs, oyster	Shovels	Total, exclusive of duplication
							Number
Fishermen:							
On vessels.....	95		15				1,197
On boats and shore.....		13		264	54	78	838
Total.....	95	13	15	264	54	78	2,035
Vessels:							
Steam.....	1						1
Net tonnage.....	32						32
Motor.....	17		3				124
Net tonnage.....	235		60				5,201
Total vessels.....	18		3				125
Total net tonnage.....	267		60				5,233
Boats:							
Motor.....		13		252	19	3	524
Other.....					26		41
Accessory boats.....							101
Apparatus:							
Number.....	9	13	3	4,950	54	78	
Yards at mouth.....	150	87	35				

¹ Includes 17 motor vessels, having a total capacity of 1,105 net tons, and a crew of 188 men, which also operated pilchard or sardine purse seines in Washington and Oregon waters, and contributed to the catch in those States. Seven of the vessels operated in Oregon, 6 in Washington, and 4 in both States.

Fisheries of the San Francisco district of California, 1938—Continued

CATCH: BY GEAR

Species	Purse seines		Lampara and ring nets		Haul seines		Gill nets	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
FISH								
Anchovies.....	30,000	\$450	219,800	\$3,297	2,000	\$29	7,600	\$164
Carp.....					5,400	80		
Flounders, "California halibut".....							100	12
Hardhead.....					2,500	200		
Herring.....			1,700	17	302,200	1,511	191,700	1,117
Kingfish.....			5,400	216				
Mackerel.....			1,000	30				
Perch.....					37,600	1,433	31,700	810
Pilchard or sardines.....	433,395,700	2,423,199	13,227,100	77,760			8,800	177
Salmon.....							1,668,400	97,357
Sea bass, white.....	100	6	200	14	800	72	10,000	905
Shad.....							1,338,700	50,646
Sharks, including grayfish.....	1,900	30	4,900	90			400	4
Smelt.....			8,300	431	11,800	605	208,600	10,764
Spittail.....					2,200	22		
Squawfish.....							300	11
Whitebait.....			100	6				
Total.....	433,427,700	2,423,685	13,468,500	81,861	364,500	3,952	3,466,300	181,967

Species	Lines				Fyke nets		Paranzella nets and otter trawls	
	Set and hand		Troll		Pounds	Value	Pounds	Value
FISH								
Carp.....	17,100	\$2,220			24,000	\$518		
Catfish.....					295,100	38,310		
Flounders:								
"California halibut".....	1,500	187					13,000	\$1,637
"sole".....	1,900	96					3,190,800	190,294
Other.....	1,200	48					682,700	30,679
Hake.....							18,000	180
Halibut.....	300	29						
Hardhead.....					10,400	1,201		
Kingfish.....							800	33
"Kingcod".....	128,600	4,788	1,000	\$35			44,300	1,649
Rockfishes.....	308,800	16,866	400	24			251,200	13,068
Sablefish.....	7,400	173					1,100	26
Salmon.....			109,900	9,073				
Sharks, including grayfish.....	3,312,900	59,405					998,700	9,988
Skates.....							329,400	3,294
Spittail.....					8,900	376		
Squawfish.....					700	26		
Suckers.....					500	17		
Tomcod.....							900	17
Tuna, albacore.....			7,000	407				
Other fish.....	700	14					74,900	1,498
Total.....	3,780,400	83,626	118,300	9,539	339,600	40,448	5,605,900	252,303
SHELLFISH								
Crabs.....							90,200	5,992
Octopus.....	6,200	337						
Total.....	6,200	337					90,200	5,992
Grand total.....	3,786,600	84,163	118,300	9,539	339,600	40,448	5,696,000	258,295

Species	Beam trawls		Dip nets		Bag nets	
	Pounds	Value	Pounds	Value	Pounds	Value
FISH						
Flounders, other than "sole".....	2,300	\$74				
Smelt.....			7,300	\$389		
Whitebait.....			8,000	586		
Total.....	2,300	74	15,300	975		
SHELLFISH						
Shrimp.....	392,500	7,850			1,451,600	\$28,320
Grand total.....	394,800	7,924	15,300	975	1,451,600	28,320

Fisheries of the San Francisco district of California, 1938—Continued

CATCH: BY GEAR—Continued

Species	Traps		Rakes and tongs		Shovels	
	Pounds	Value	Pounds	Value	Pounds	Value
SHELLFISH						
Crabs.....	3,080,900	\$204,786				
Clams:						
Hard.....					1,600	\$381
Soft.....					27,700	5,782
Oysters, market:						
Eastern.....			43,100	\$15,975		
Pacific.....			156,800	29,400		
Western or native.....			3,900	1,288		
Total.....	3,080,900	204,786	203,800	46,663	29,300	6,163

Fisheries of the Monterey district of California, 1938

OPERATING UNITS: BY GEAR

Item	Purse seines			Lampara and ring nets		Gill nets			
	Mackerel	Pilchard or sardine ¹	Tuna	Pilchard or sardine	Other	Set, "California halibut"	Set, crab	Drift, sea bass	Other
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	23	500	113	70	36	2	2	2	2
On boats and shore.....				82	70	30	48	31	33
Total.....	23	500	113	152	106	30	50	33	35
Vessels, motor:									
Net tonnage.....	2	44	10	6	5		1	1	1
Total.....	138	2,543	609	42	32		7	8	7
Boats:									
Motor.....				7	10	16	31	18	16
Other.....						2	1		6
Accessory boats.....	2	44	10	13					
Apparatus:									
Number.....	2	44	10	13	15	18	33	19	32
Length, yards.....	850	16,458	6,075	3,628	3,895				
Square yards.....						55,392	55,994	35,720	37,110

Item	Lines		Otter trawls	Traps		Rakes and tongs, oyster	Shovels	Aba-lone outfits	Total, exclusive of duplication
	Set and hand	Troll		Crab	Octopus				
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	6	27	24					50	627
On boats and shore.....	207	246	15	7	7	4	30	16	423
Total.....	213	273	39	7	7	4	30	66	1,050
Vessels, motor:									
Net tonnage.....	3	14	5					10	86
Total.....	29	133	38					115	2,740
Boats:									
Motor.....	152	190	4	5	5	1	5	3	214
Other.....	6						1		9
Accessory boats.....								13	68
Apparatus:									
Number.....	764	1,362	9	68	94	4	30	13	
Yards at mouth.....			105						
Hooks.....	58,564	3,682							

¹ Includes 5 motor vessels having a total capacity of 347 net tons, and a crew of 61 men which also operated pilchard or sardine purse seines in Washington and Oregon waters and contributed to the catch in those States. Four of the vessels operated in Oregon and 1 in Washington.

Fisheries of the Monterey district of California, 1938—Continued

CATCH: BY GEAR

Species	Purse seines		Lampara and ring nets		Gill nets	
	Pounds	Value	Pounds	Value	Pounds	Value
FISH			34,100	\$719		
Anchovies.....					1,400	\$55
Carp.....					100	7
Catfish.....						
Flounders:						
"California halibut".....	200	\$15	700	60	22,100	1,839
"Sole".....					10,000	475
Other.....					4,600	162
Herring.....			400	9	400	10
Horse mackerel.....			95,800	7,466	800	66
Kingfish.....			38,200	1,437	67,200	2,528
"Lingcod".....					3,100	168
Mackerel.....	149,700	3,742	802,400	20,080	2,000	55
Perch.....			2,700	139	11,100	508
Pilchard or sardines.....	296,484,000	1,630,062	14,899,500	124,593	2,200	44
Rockfishes.....					6,500	318
Sablefish.....					200	4
Seabass, white.....	2,900	300	100	13	19,800	2,028
Sharks, including grayfish.....	65,900	1,213	47,300	1,020	830,200	15,838
Skates.....					11,400	57
Smelt.....	300	12	30,600	1,375	58,300	2,629
Whitebait.....			2,200	213	300	28
Total.....	296,703,000	1,635,944	15,954,000	157,104	1,051,700	26,819
SHELLFISH						
Crabs.....					166,100	8,517
Octopus.....					100	5
Squid.....			1,471,800	31,511	200	10
Total.....			1,471,800	31,511	166,400	8,532
Grand total.....	296,703,000	1,635,944	17,425,800	188,615	1,218,100	35,351

Species	Lines				Paranetella nets, and otter trawls	
	Set and hand		Troll			
FISH	Pounds	Value	Pounds	Value	Pounds	Value
Flounders:						
"California halibut".....	3,900	\$327	100	\$5	12,600	\$1,053
"Sole".....	9,500	455			433,300	17,929
Other.....	10,700	599			64,100	2,664
Hake.....					16,400	164
Horse mackerel.....	2,000	150				
Kingfish.....	34,900	1,312			6,500	239
"Lingcod".....	76,100	4,096	500	27	5,600	297
Mackerel.....	528,100	14,452				
Perch.....					1,900	96
Rockfishes.....	1,829,000	74,033	400	20	16,700	833
Sablefish.....	37,100	907			1,100	28
Salmon.....			199,500	20,861		
Sea bass, white.....	1,000	103			100	6
Sharks, including grayfish.....	728,500	13,781	29,600	355	68,300	1,123
Skates.....	3,300	27			77,900	406
Smelt.....	3,600	164				
Tuna, albacore.....			2,691,400	142,068		
Other fish.....	4,200	160			4,800	184
Total.....	3,271,900	110,536	2,821,500	163,336	699,300	25,022
SHELLFISH						
Crabs.....					1,200	60
Octopus.....	4,800	329			260	12
Total.....	4,800	329			1,400	72
Grand total.....	3,276,700	110,865	2,821,500	163,336	700,700	25,094

Fisheries of the Monterey district of California, 1938—Continued

CATCH: BY GEAR—Continued

Species	Traps		Rakes and tongs		Shovels		Abalone outfits	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
SHELLFISH								
Crabs.....	700	\$35						
Shrimp.....	3,300	671						
Abalone.....							240,800	\$56,586
Clams:								
Hard.....					200	\$40		
Pismo.....					5,000	1,221		
Octopus.....	19,300	1,301						
Oysters, market, Pacific.....			1,100	\$160				
Total.....	23,300	2,007	1,100	160	5,200	1,261	240,800	56,586

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

Fisheries of the San Pedro district of California, 1938

OPERATING UNITS: BY GEAR

Item	Purse seines			Lampara and ring nets			
	Mack- erel	Pilchard or sardine ¹	Tuna	Mack- erel	Pilchard or sardine	Tuna	Other
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	166	1,029	867	632	771	219	7
On boats and shore.....							82
Total.....	166	1,029	867	632	771	219	89
Vessels, motor:							
Net tonnage.....	16	94	79	51	64	17	3
Boats, motor.....	474	4,785	4,203	1,723	2,019	492	17
Accessory boats.....	16	94	79	51	64	17	22
Apparatus:							
Number.....	16	94	79	51	64	17	25
Length, yards.....	7,129	37,618	47,480	29,138	33,323	9,775	6,671

Item	Gill nets			Trammel nets	Lines		Paran- zella nets
	Drift, bar- racuda	Set, sea bass	Other		Set and hand	Troll	
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	4	4	3	11	469	36	8
On boats and shore.....	42	50	31	53	779	571	12
Total.....	42	54	34	64	1,248	607	20
Vessels, motor:							
Net tonnage.....		2	2	4	97	17	2
Boats:		14	14	43	2,714	116	26
Motor.....	17	19	19	20	455	418	4
Other.....		1	1		16		
Accessory.....					137		
Apparatus:							
Number.....	17	22	26	24	2,837	2,792	3
Square yards.....	106,012	73,040	28,798	121,733			
Yards at mouth.....							50
Hooks.....					496,379	2,842	

¹ Includes 10 motor vessels, having a total capacity of 621 net tons, and a crew of 111 men, which also operated pilchard or sardine purse seines in Washington and Oregon waters, and contributed to the catch in those States. All of the vessels operated in Washington, and 4 also operated in Oregon.

Fisheries of the San Pedro district of California, 1938—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Traps, sea craw- fish	Har- poons, sword- fish	Rakes and tongs	Shovels	Abalone ouffits	Total, exclusive of dupli- cation
	Number	Number	Number	Number	Number	Number
Fishermen:						
On vessels.....	6	19				2,290
On boats and shore.....	155	95	4	66	11	993
Total.....	161	114	4	66	11	3,283
Vessels, motor.....	3	7				263
Net tonnage.....	32	54				9,724
Boats:						
Motor.....	91	40	1	6	4	588
Other.....	17		2		1	27
Accessory boats.....						294
Apparatus, number.....	4,498	47	4	66	5	

CATCH OFF CALIFORNIA: BY GEAR

Species	Purse seines		Lampara and ring nets		Gill nets		Trammel nets	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
FISH								
Anchovies.....			449,300	\$4,811				
Barracuda.....	77,100	\$5,027	107,300	6,436	240,200	\$14,628		
Carp.....					800	30		
Flounders:								
"California halibut".....			500	48	400	33	285,400	\$38,038
"Sole".....							2,300	116
Other.....							300	10
Flyingfish.....			100	5	62,800	2,332		
Herring.....					100	2		
Horse mackerel.....	2,782,600	25,941	1,169,700	10,911	1,200	29		
Kingfish.....			290,700	6,194	8,400	178	100	2
"Lingcod".....							200	8
Mackerel.....	13,682,300	143,309	38,796,000	406,278	29,600	580	100	2
Mullet.....					300	25		
Perch.....			47,400	3,018	12,900	659		
Pilchard or sardines.....	152,349,000	909,480	107,504,100	640,746	6,100	74		
Pompano.....			800	273				
Rock bass.....			3,400	251	7,300	389	2,400	138
Rockfishes.....			600	26	1,100	42		
Ruddersfishes.....			27,600	1,482				
Sculpin.....					300	19	800	63
Sea bass:								
Black.....	200	5	1,300	71	2,200	119	1,600	85
White.....	7,900	822	32,000	3,327	131,100	13,590	1,600	159
Sharks, including grayfish.....	2,700	87	1,000	39	194,600	4,744	139,300	3,781
Sheepshead.....							3,400	132
Skates.....							5,700	140
Smelt.....			159,500	7,249	54,700	2,281		
Swordfish.....	700	94						
Tuna and tunalike fishes:								
Albacore.....	9,000	655	5,400	394	300	21		
Bluefin.....	9,681,100	536,330	4,847,900	268,538	300	19		
Bonito.....	1,025,200	38,425	1,321,100	49,506	17,800	640	4,200	155
Skipjack or striped tuna.....			100	3				
Yellowfin.....	100	8	1,200	74			200	11
Whitefish.....							200	10
Yellowtail.....	2,600	129	31,300	1,587	3,100	159		
Other fish.....			91,500	1,038	1,200	85	4,800	336
Total.....	179,620,500	1,660,315	154,889,600	1,412,305	776,500	40,679	452,500	43,186
SHELLFISH								
Sea crawfish or spiny lobster.....							8,300	458
Squid.....	51,500	1,744	70,600	2,390			300	12
Total.....	51,500	1,744	70,600	2,390			8,600	470
Grand total.....	179,672,000	1,662,059	154,960,200	1,414,695	776,500	40,679	461,100	43,656

Fisheries of the San Pedro district of California, 1938—Continued

CATCH OFF CALIFORNIA: BY GEAR—Continued

Species	Lines				Paranzella nets		Traps	
	Set and hand		Troll		Pounds	Value	Pounds	Value
FISH	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Barracuda	137,000	\$8,239	338,200	\$20,189				
Flounders:								
"California halibut"	53,000	5,096	600	58	266,600	\$7,350		
"Sole"	1,900	101			204,500	6,132		
Other	6,200	1,286						
Hake	300	7						
Horse mackereel	500	10						
Kingfish	40,200	858			100	2		
"Lingcod"	1,700	95						
Mackerel	21,409,200	225,007	300	6				
Perch	700	47					200	\$14
Rock bass	81,500	5,714	400	26			37,100	2,554
Rockfishes	434,300	19,320			2,200	87	200	11
Sablefish	151,500	7,133						
Salmon			200	18				
Sculpin	89,000	6,844			200	7	3,800	288
Sea bass:								
Black	25,000	1,376			700	36		
White	11,300	1,173	2,400	254				
Sharks, including grayfish	787,500	20,400	1,900	61	94,500	2,017		
Sheepshead	28,000	1,096					26,900	1,057
Skates	4,800	118			35,000	357		
Smelt	5,800	255			200	9		
Tuna and tunalike fishes:								
Albacore	3,000,500	218,107	1,145,700	80,334				
Bluefin	10,000	555	2,400	133				
Bonito	108,900	4,079	520,200	19,485				
Yellowfin	1,900	114						
Whitefish	19,800	1,132					3,200	172
Yellowtail	12,200	620	6,400	322				
Other fish	15,000	1,021	200	17	300	21		
Total	26,527,700	529,799	2,016,900	120,903	604,300	16,018	71,400	4,096
SHELLFISH								
Crabs							3,900	123
Sea crawfish or spiny lobster							244,900	50,101
Octopus	100	9						
Total	100	9					248,800	50,224
Grand total	26,527,800	529,808	2,016,900	120,903	604,300	16,018	320,200	54,320

Species	Harpoons		Rakes and tongs		Shovels		Abalone outfits	
FISH	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Swordfish	266,000	\$33,367						
SHELLFISH								
Abalone							183,500	\$35,393
Clams:								
Hard					5,600	\$1,497		
Pismo					48,600	10,170		
Oysters, market, Pacific			3,100	\$1,128				
Total			3,100	1,128	54,200	11,667	183,500	35,393
Grand total	266,000	33,367	3,100	1,128	54,200	11,667	183,500	35,393

Fisheries of the San Pedro district of California, 1938—Continued

CATCH OFF LATIN AMERICA: BY GEAR

Species	Purse seines		Gill nets		Trammel nets		Lines, set and hand		Harpoons	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Barracuda	691,800	\$52,369					82,700	\$6,280		
Cabrilla							84,000	4,576		
Flounders, "California halibut"	100	9			7,800	\$835	600	65		
Groupers							21,500	1,374		
Mackerel							300	5		
Rock bass							7,300	435		
Rockfishes							8,600	415		
Sea bass:										
Black	800	52	900	\$54			216,100	13,254		
White	3,100	254	20,800	1,695			23,700	1,926		
Sharks, including grayfish							1,400	52		
Sheepshead							800	29		
Spanish mackerel							7,000	552		
Swordfish									38,400	\$4,022
Tuna and tunalike fishes:										
Bluefin	526,500	27,961					900	48		
Bonito	2,581,500	93,967					70,400	2,591		
Skipjack or striped tuna	1,394,800	69,740					6,388,400	319,423		
Yellowfin	3,917,200	235,032					15,596,200	937,015		
Whitefish							2,600	142		
Yellowtail	1,585,000	56,498	600	24			703,300	25,066		
Other fish							1,500	97		
Total	10,700,800	535,877	22,300	1,773	7,800	835	23,217,300	1,313,324	38,400	4,022

Fisheries of the San Diego district of California, 1938

OPERATING UNITS: BY GEAR

Item	Lampara and ring nets				Gill nets		
	Mackerel	Pilchard or sardine	Tuna	Other	Drift, barracuda	Set, sea bass	Other
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels	148	190	11			4	
On boats and shore	13	13	11	5	22	26	11
Total	161	203	22	5	22	30	11
Vessels, motor:							
Net tonnage	13	17	1			1	
Boats, motor	129	183	12			19	
Accessory boats	1	1	1	1	7	9	6
Total	13	17	1	1	7	9	6
Apparatus:							
Number	14	18	2	1	7	10	6
Length, yards	4,970	4,680	640	200			
Square yards					29,626	41,703	8,318

Item	Trammel nets	Lines		Traps, sea crawfish	Harpoons, swordfish	Total, exclusive of duplication
		Set and hand	Troll			
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels	5	1,000	9	2	33	1,209
On boats and shore	28	158	139	26	43	262
Total	33	1,248	148	28	76	1,471
Vessels, motor:						
Net tonnage	1	115	8	1	9	121
Boats:						
Motor	11	7,650	24	9	76	7,712
Other	9	66	90	21	16	120
Accessory boats				1		1
Total	10	1,387	608	963	25	133
Apparatus:						
Number	98,613	31,257	608			
Square yards						
Hooks						

Fisheries of the San Diego district of California, 1938—Continued

CATCH OFF CALIFORNIA: BY GEAR

Species	Purse seines		Lampara and ring nets		Gill nets		Trammel nets	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
FISH								
Barracuda.....			61,200	\$2,546	150,900	\$6,270	200	\$7
Flounders, "California halibut".....			600	51			172,400	14,367
Herring.....					3,300	54		
Horse mackerel.....			80,800	1,068	500	10		
Kingfish.....					400	8		
Mackerel.....			3,901,900	40,405	22,600	450		
Mullet.....					3,600	289		
Perch.....			700	14				
Pilchard or sardines.....			5,512,900	25,537				
Pompano.....			600	83				
Rock bass.....			2,100	91	100	6		
Rockfishes.....							300	14
Sea bass:								
Black.....					100	7	800	35
White.....			16,500	1,555	19,400	1,820	1,500	138
Sharks, including grayfish.....			600	13	3,000	61	26,500	535
Sheepshead.....							500	17
Skates.....							500	5
Smelt.....			1,000	45	3,800	173		
Tuna and tunalike fishes:								
Bluefin.....	156,100	\$8,818	1,451,500	82,011	100	7		
Bonito.....	37,500	1,366	823,600	29,967	4,200	153	3,800	139
Yellowfin.....			500	28				
Whitefish.....							500	22
Yellowtail.....			102,000	4,112	100	4	400	15
Total.....	193,600	10,184	11,936,400	187,526	211,900	9,292	207,400	15,294
SHELLFISH								
Sea crawfish or spiny lobster.....							800	145
Squid.....			4,700	165				
Total.....			4,700	165			800	145
Grand total.....	193,600	10,184	11,961,100	187,691	211,900	9,292	208,200	15,439

Species	Lines				Traps		Harpoons	
	Set and hand		Troll		Pounds	Value	Pounds	Value
FISH								
Barracuda.....	Pounds	Value	Pounds	Value				
Flounders:								
"California halibut".....	1,800	150						
"Sole".....	100	4						
Kingfish.....	300	7						
Mackerel.....	431,600	4,465						
Rock bass.....	97,800	4,212			23,500	\$1,013		
Rockfishes.....	74,200	3,518						
Sculpin.....	61,200	2,185						
Sea bass:								
Black.....	2,900	125						
White.....	13,400	1,256	300	25				
Sharks, including grayfish.....	21,100	424						
Sheepshead.....	1,500	52			800	26		
Skates.....	200	3						
Swordfish.....							53,900	\$6,831
Tuna and tunalike fishes:								
Albacore.....	781,700	52,205	131,400	13,137				
Bluefin.....	362,800	20,498						
Bonito.....	239,700	8,727	491,500	17,886				
Skipjack or striped tuna.....	2,700	136						
Yellowfin.....	5,500	327	1,200	74				
Whitefish.....	400	20						
Yellowtail.....	82,800	3,344	5,300	213				
Other fish.....	100	3						
Total.....	2,316,800	107,272	645,400	31,986	24,300	1,039	53,900	6,831
SHELLFISH								
Sea crawfish or spiny lobster.....					54,400	10,212		
Grand total.....	2,316,800	107,272	645,400	31,986	78,700	11,251	53,900	6,831

NOTE.—The catch by purse seines was made by fishermen from the San Pedro district.

Fisheries of the San Diego district of California, 1938—Continued

CATCH OFF LATIN AMERICA: BY GEAR

Species	Purse seines		Lampara and ring nets		Gill nets		Trawl nets	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
FISH								
Barracuda.....					43,800	\$2,698	243,200	\$15,771
Flounders, "California halibut".....								
Pilchard or sardines.....			100	\$1				
Rock bass.....			900	48	600	36		
Rock fishes.....					400	18	700	31
Sea bass:								
Black.....					1,400	78	1,300	73
White.....			2,900	216	150,700	11,191	400	28
Sharks, including grayfish.....					1,000	18		
Sheepshead.....							200	7
Skates.....							100	1
Smelt.....			600	35	300	22		
Tuna and tunalike fishes:								
Bluefin.....	103,500	\$5,694	481,500	26,674				
Bonito.....			48,700	1,793			1,600	62
Skipjack or striped tuna.....	47,400	2,370						
Yellowfin.....	94,000	5,642						
Whitefish.....							500	23
Yellowtail.....	24,600	922	17,000	636	900	38		
Other fish.....							100	4
Total.....	289,500	14,628	551,700	29,403	199,100	14,099	248,000	16,000
SHELLFISH								
Squid.....			200	11				
Grand total.....	289,500	14,628	551,900	29,414	199,100	14,099	248,000	16,000

Species	Lines				Traps		Harpoons	
	Set and hand		Troll		Pounds	Value	Pounds	Value
	Pounds	Value	Pound	Value				
FISH								
Barracuda.....	340,200	\$20,957	110,200	\$6,789				
Cabrilla.....	61,100	2,762						
Flounders, "California halibut".....	4,100	267						
Groupers.....	46,500	2,125						
Mackerel.....	1,000	19						
Rock bass.....	21,700	1,189						
Rock fishes.....	159,100	7,376						
Sculpin.....	100	5						
Sea bass:								
Black.....	152,200	8,564						
White.....	154,200	11,455	800	62				
Sharks, including grayfish.....	9,700	172						
Sheepshead.....	9,900	372						
Spanish mackerel.....	5,300	164					363,500	\$36,488
Swordfish.....								
Tuna and tunalike fishes:								
Albacore.....	21,100	2,069	8,800	883				
Bluefin.....	103,400	5,765						
Bonito.....	444,300	16,343	9,000	331				
Skipjack or striped tuna.....	14,820,200	741,068						
Yellowfin.....	58,099,800	3,526,767						
Whitefish.....	40,800	1,922						
Yellowtail.....	4,230,500	159,374	4,200	167				
Other fish.....	200	10						
Total.....	79,325,400	4,508,745	133,000	8,232			363,500	36,488
SHELLFISH								
Sea crawfish or spiny lobster.....					859,600	\$117,718		
Grand total.....	79,325,400	4,508,745	133,000	8,232	859,600	117,718	363,500	36,488

NOTE.—The catch by purse seines was made by fishermen from the San Pedro district.

HALIBUT FISHERY OF THE PACIFIC COAST ¹²

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 1938 the total catch of halibut by vessels of both nationalities amounted to 48,549,000 pounds, valued at \$3,487,000. This is a decrease of less than 1 percent in volume and 9 percent in value as compared with the catch and value in 1937. Of the total catch in 1938, 75 percent was taken by United States craft and 25 percent by Canadian craft. Considered according to ports of landing, 43 percent was landed at Seattle, Wash.; 40 percent at Canadian ports; and 17 percent at ports in Alaska.

Halibut fishery of the Pacific coast, 1938

UNITED STATES OPERATING UNITS: BY FLEET CLASSIFICATION

Item	Washington fleet	Alaska fleet	Total
Regular halibut vessels:			
Number.....	135	110	245
Net tonnage.....	4,009	1,870	5,879
Crew.....	1,049	514	1,563
Skates of lines.....	4,084	2,212	6,296
Vessels in other fisheries but landing one or more fares of halibut:			
Number.....	7	28	35
Net tonnage.....	227	296	493
Crew.....	53	98	151
Skates of lines.....	199	400	599
Regular halibut boats:			
Number.....		28	28
Crew.....		63	63
Skates of lines.....		298	298
Boats in other fisheries but landing one or more fares of halibut:			
Number.....		64	64
Crew.....		128	128
Skates of lines.....		512	512

CATCH OF ALL SPECIES: BY UNITED STATES VESSELS AND BOATS

Fleet classification	Landed in—						Total	
	Seattle, Wash.		British Columbia		Alaska			
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
WASHINGTON FLEET								
Regular vessels:								
Halibut.....	19,703,208	\$1,641,989	2,254,633	\$160,177	338,832	\$20,867	22,296,673	\$1,823,063
Sablefish.....	2,608,475	109,273	11,014	326	877	20	2,620,366	109,619
"Lingcod".....	1,228,062	43,975					1,228,062	43,975
Rockfishes.....	378,878	20,029					378,878	20,029
Total.....	23,918,623	1,815,266	2,265,647	160,503	339,709	20,917	28,523,979	1,996,686
Other vessels and boats:								
Halibut.....	390,847	28,503	68,729	4,406	31,723	2,053	491,299	34,962
Sablefish.....	14,342	573					14,342	573
"Lingcod".....	18,388	584					18,388	584
Rockfishes.....	708	30					708	30
Total.....	424,285	29,690	68,729	4,406	31,723	2,053	524,737	36,149

¹² These statistics are compiled from data collected by the International Fisheries Commission for Washington and British Columbia and by Bureau agents for Alaska. The weights shown represent the poundage of fish landed after evisceration and removal of heads.

Halibut fishery of the Pacific coast, 1938—Continued

CATCH OF ALL SPECIES: BY UNITED STATES VESSELS AND BOATS—Continued

Fleet classification	Landed in—						Total	
	Seattle, Wash.		British Columbia		Alaska			
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
ALASKA FLEET								
Regular vessels:								
Halibut.....	633, 599	\$64, 882	4, 889, 314	\$351, 442	5, 860, 009	\$333, 750	11, 083, 222	\$740, 074
Sablefish.....	111, 210	4, 414	526, 539	14, 902	819, 604	20, 147	1, 457, 353	39, 463
" Lingcod".....	68, 816	3, 188	-----	-----	7, 655	191	76, 471	3, 379
Rockfishes.....	54, 523	2, 840	-----	-----	8, 573	196	63, 096	3, 036
Total.....	868, 448	65, 324	5, 415, 853	366, 344	6, 395, 841	354, 284	12, 680, 142	785, 952
Other vessels and boats:								
Halibut.....	16, 201	1, 146	116, 589	8, 309	2, 340, 343	140, 772	2, 473, 133	150, 227
Sablefish.....	-----	-----	-----	-----	98, 708	2, 421	98, 708	2, 421
" Lingcod".....	508	15	-----	-----	33, 123	828	33, 631	843
Rockfishes.....	-----	-----	-----	-----	16, 229	365	16, 229	365
Total.....	16, 709	1, 161	116, 589	8, 309	2, 488, 403	144, 386	2, 621, 701	153, 856
COMBINED FLEETS								
Regular vessels:								
Halibut.....	20, 337, 107	1, 696, 871	7, 143, 947	511, 619	6, 898, 841	354, 647	33, 379, 895	2, 563, 137
Sablefish.....	2, 719, 685	113, 687	537, 553	15, 228	820, 481	20, 167	4, 077, 719	149, 082
" Lingcod".....	1, 296, 878	47, 163	-----	-----	7, 655	191	1, 304, 533	47, 354
Rockfishes.....	433, 401	22, 899	-----	-----	8, 573	196	441, 974	23, 065
Total.....	24, 787, 071	1, 880, 590	7, 681, 500	526, 847	6, 735, 350	375, 201	39, 204, 121	2, 782, 638
Other vessels and boats:								
Halibut.....	407, 048	29, 649	185, 318	12, 715	2, 372, 066	142, 825	2, 964, 432	185, 189
Sablefish.....	14, 342	573	-----	-----	98, 708	2, 421	113, 050	2, 994
" Lingcod".....	18, 896	696	-----	-----	33, 123	828	52, 019	1, 427
Rockfishes.....	708	30	-----	-----	16, 229	365	16, 937	395
Total.....	440, 994	30, 851	185, 318	12, 715	2, 520, 126	146, 439	3, 146, 438	190, 005
All vessels and boats:								
Halibut.....	20, 744, 155	1, 726, 520	7, 329, 265	524, 334	8, 270, 907	497, 472	36, 344, 327	2, 748, 326
Sablefish.....	2, 734, 027	114, 260	537, 553	15, 228	919, 189	22, 588	4, 190, 769	152, 076
" Lingcod".....	1, 315, 774	47, 762	-----	-----	40, 778	1, 019	1, 356, 552	48, 781
Rockfishes.....	434, 100	22, 899	-----	-----	24, 802	561	458, 911	28, 460
Grand total.....	25, 228, 065	1, 911, 441	7, 866, 818	539, 562	9, 255, 676	521, 640	42, 860, 559	2, 972, 643

Halibut fishery of the Pacific coast, 1938—Continued

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	
	Seattle, Wash.		British Columbia		Alaska			
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
WASHINGTON FLEET								
Regular halibut vessels.....	19,703	\$1,642	2,254	\$160	339	\$21	22,296	\$1,823
Other vessels and boats.....	391	28	69	4	32	2	492	34
Total.....	20,094	1,670	2,323	164	371	23	22,788	1,857
ALASKA FLEET								
Regular halibut vessels.....	634	55	4,889	352	5,560	334	11,083	741
Other vessels and boats.....	16	1	117	8	2,340	141	2,473	150
Total.....	650	56	5,006	360	7,900	475	13,556	891
COMBINED FLEETS								
Regular halibut vessels.....	20,337	1,696	7,144	511	5,899	355	33,380	2,562
Other vessels and boats.....	407	30	185	13	2,372	143	2,964	186
Total.....	20,744	1,726	7,329	524	8,271	498	36,344	2,748
British Columbia fleet.....	166	13	12,013	724	26	2	12,205	739
Grand total.....	20,910	1,739	19,342	1,248	8,297	500	48,549	3,487

NOTE.—In addition to the above, there were 1,091,261 pounds of halibut, sablefish, "lingcod" and rockfish livers valued at \$514,169, landed by the combined fleets at Pacific coast ports during 1938. Halibut vessels in the combined fleets also landed 1,236,124 pounds of halibut and sablefish viscera valued at \$123,613 during the same period.

The tabulation does not include landings at ports south of Seattle, Wash., which are normally less than 4 percent of the annual Pacific coast catch.

VESSEL FISHERIES AT SEATTLE, WASH.

A total of 52,086,890 pounds of fishery products, valued at \$3,329,-227, were handled by Seattle wholesale dealers during 1938, exclusive of quantities received by transporting vessels or by rail from Alaska or Canada. This represents a decrease of one-half of 1 percent in volume and 9 percent in value as compared with the quantity and value of the products handled during the preceding year. Of the total quantity handled, 25,228,065 pounds, valued at \$1,911,441, were landed by halibut vessels—a decrease of less than one-half of 1 percent in volume and 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 26,858,825 pounds, valued at \$1,417,786, which is a decrease of 1 percent in volume and 8 percent in value.

Fishery products landed by United States vessels at Seattle, Wash., 1938¹

BY FISHING GROUNDS

Fishing grounds	Trips	Halibut				Sablefish		"Lingcod"		Rockfishes		Total	
		No. 1		No. 2		Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
		Number	Pounds	Value	Pounds									Value
West of Cape Spencer.....	416	9,085,493	\$808,820	5,540,967	\$468,581	27,581	\$1,096	3,329	\$98	5,959	\$181	14,663,329	\$1,276,776
South of Cape Spencer.....	754	2,494,147	213,961	3,623,548	237,158	2,706,446	113,164	1,312,445	47,664	428,150	22,718	10,564,736	634,665
Total.....	1,170	11,579,640	1,022,781	9,164,515	703,739	2,734,027	114,260	1,315,774	47,762	434,109	22,899	25,228,065	1,911,441

BY MONTHS

Months	Trips	Halibut				Sablefish		"Lingcod"		Rockfishes		Total	
		No. 1		No. 2		Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
		Number	Pounds	Value	Pounds									Value
January.....	39					20,217	\$716	150,042	\$9,247	62,492	\$4,070	232,751	\$14,033
February.....	46					51,768	2,007	276,546	12,103	90,440	4,476	418,752	18,586
March.....	33					57,662	2,443	257,310	5,944	107,317	4,418	422,289	12,806
April.....	147	2,047,707	\$158,019	1,133,863	\$74,346	6,001	182	98,360	3,442	5,745	209	3,291,676	236,198
May.....	136	1,605,575	132,696	1,277,256	79,482	6,288	339	106,604	3,224	9,155	279	3,004,878	216,020
June.....	172	1,876,066	145,244	1,792,187	116,271	147,101	7,031	125,322	2,970	11,901	345	3,952,577	271,861
July.....	160	1,823,944	149,639	1,673,876	124,565	180,196	7,238	45,564	1,365	11,624	387	3,735,204	283,094
August.....	118	1,487,250	139,633	1,121,923	94,700	437,266	18,096	54,658	1,529	33,994	1,354	3,135,091	255,312
September.....	133	1,454,355	162,141	1,016,616	96,152	801,632	33,114	66,765	2,080	18,093	639	3,356,461	284,126
October.....	131	890,865	101,899	774,005	80,394	775,858	32,620	97,825	3,889	30,144	4,124	2,568,697	222,926
November.....	63	393,878	43,610	375,789	37,829	250,040	10,474	36,778	1,969	53,204	2,568	1,109,689	96,480
Total.....	1,170	11,579,640	1,022,781	9,164,515	703,739	2,734,027	114,260	1,315,774	47,762	434,109	22,899	25,228,065	1,911,441

¹ Halibut fleet.

NOTE.—There were no landings by the fleet in December due to a fishermen's strike.

The statistics in this table are compiled from reports collected by the Bureau of Fisheries and the International Fisheries Commission.

Fishery products received by Seattle wholesale dealers, 1938; by months 1

Species	January		February		March		April		May		June	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Cod.....	132,284	\$3,694	65,995	\$2,612	67,517	\$1,802	51,245	\$1,291	3,687	\$45	6,640	\$87
Flounders:												
" Sole".....	229,131	9,165	210,978	8,461	154,095	6,327	256,756	9,462	491,345	13,420	335,332	8,561
Other.....	218,020	5,451	110,622	2,803	54,106	1,402	20,221	541	795	12	1,509	20
Halibut.....												
Herring.....	24,600	294	259,711	4,470	393,653	4,056	32,142	2,840	42,272	2,540	87,132	4,332
" Lingcod".....	26,188	903	43,969	1,922	43,792	1,486	46,200	347				
Perch.....	12,370	434	13,482	501	15,802	513	148,670	3,214	148,263	1,951	227,234	2,338
Rockfishes.....	14,417	447	17,588	484	14,651	280	25,859	758	10,851	268	2,941	74
Sablefish.....							40,265	750	15,465	276	23,214	707
Salmon:											5,665	133
Chinook or king.....			15,806	2,067	126,339	17,790	316,131	40,438	316,444	37,666	416,752	46,231
Silver or coho.....							127	12	34,789	2,365	68,450	5,803
Smelt.....	8,068	663	5,603	391	350	21	350	11	16,892	1,539	43,096	1,724
Crabs.....	108,588	7,064	157,118	8,426	168,205	9,189	167,185	6,250	172,523	6,347	107,965	5,026
Shrimp.....							3,968	638	1,486	266	796	144
Clams, hard, in shell (meats).....	42,047	3,670	33,308	2,984	46,669	4,764	50,333	4,910	2,864	296		
Scallops, bay (meats).....	1,580	397	1,803	396	1,903	485	1,844	464	1,569	392	1,425	356
Octopus.....	5,383	289	4,375	215	5,123	188	4,910	229	7,627	397	2,966	119
Total.....	822,776	32,461	945,350	36,331	1,094,205	48,193	1,166,096	72,155	1,266,872	67,779	1,331,139	75,706

Species	July		August		September		October		November		December		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Cod.....	1,352	\$18	2,252	\$24	5,048	\$56	14,677	\$194	20,631	\$428	60,798	\$1,676	432,226	\$11,927
Flounders:														
" Sole".....	496,861	12,437	543,112	13,574	616,938	12,923	155,748	4,136	81,319	2,514	116,077	4,568	3,588,692	106,538
Other.....	140	2	178	2	366	3	442	7	19,092	380	34,406	831	459,896	11,454
Halibut.....	95,825	5,675	28,892	1,807	1,049	105	755	65					288,067	17,364
Herring.....													727,429	9,230
" Lingcod".....	271,865	3,187	293,282	3,035	102,064	2,202	45,223	766	31,623	700	44,537	1,352	1,431,720	23,056
Perch.....	90	2	4,518	132	9,110	274	6,449	193	7,272	235	13,187	476	121,931	3,860
Rockfishes.....	6,962	207	4,555	103	5,288	109	8,250	306	4,812	172	19,325	764	174,782	4,555
Sablefish.....	21,889	453	35,847	822	11,236	238	6,506	136					81,142	1,782
Salmon:														
Blueback, red, or sockeye.....	192	19	184,855	13,129	12,898	954							197,945	14,102
Chinook or king.....	726,570	82,443	1,117,169	139,322	1,668,599	115,806	351,535	38,360	34,799	3,904	37	2	5,090,183	524,618
Chum or keta.....			2,508	130	9,202	231	3,966,473	99,162	1,718,097	59,892	200	4	5,696,480	159,419
Humpback or pink.....			169	5									169	5
Silver or coho.....	212,339	19,169	1,025,055	78,045	1,360,381	97,358	1,996,919	129,282	124,054	7,784	17,105	1,284	4,869,219	341,102

Smelt.....	48,160	1,795	88,674	3,166	39,745	1,790	32,632	1,958	22,293	1,759	14,929	1,194	320,794	16,011
Tuna, albacore.....			245,783	11,674	626,289	27,743	320,023	14,142					1,192,096	53,559
Crabs.....	152,400	6,998	107,004	4,960	67,384	3,370	157,844	6,354	194,234	7,982	191,782	7,182	1,752,912	79,068
Shrimp.....	563	48	116	21	250	20			1,813	196	7,485	1,028	16,377	2,361
Clams, hard, in shell (meats).....					38,025	3,418	42,650	3,822	39,200	3,512	36,675	3,290	331,671	30,666
Scallops, bay (meats).....	1,949	487	2,395	598	1,140	292	1,603	408	996	250	1,401	356	19,008	4,880
Octopus.....	2,672	134	3,163	155	3,364	166	5,848	206	5,067	219	9,661	477	60,159	2,858
Squid.....									1,390	110	3,948	261	5,338	371
Total.....	2,038,889	133,074	3,690,117	270,634	4,508,396	267,060	7,113,576	299,559	2,306,692	90,037	574,717	24,796	26,858,825	1,417,786

¹ This tabulation does not include fish received from Alaska or Canada or vessels in the halibut fleet.

² 81,444 dozen.

NOTE.—The yields of bivalve mollusks have been converted from weights in the shell to weight of meats on the following bases: Hard clams, 25 percent, and bay scallops, 17 percent.*

LAKE FISHERIES ¹³

In 1938 the yield of the fisheries of the Great Lakes, including those of the international lakes of northern Minnesota, in the United States and Canada amounted to 112,633,700 pounds, representing a decrease of 3 percent as compared with the catch in the preceding year.

Considering the fishery of United States craft only, the catch amounted to 81,524,500 pounds, valued at \$6,083,212, which is a decrease of 3 percent in volume but an increase of 1 percent in value as compared with the catch in the previous year. These fisheries gave employment to 6,976 fishermen, as compared with 6,418 in the previous year.

Lake fisheries of the United States and Canada, 1938

CATCH: BY LAKES

Species	Lake Ontario			Lake Erie		
	United States	Canada	Total	United States	Canada	Total
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Blue pike.....	58,500	59,500	118,000	8,659,400	7,157,700	15,817,100
Bowfin.....	1,700	(¹)	1,700	5,800	(¹)	2,800
Burbot.....	19,000	(¹)	19,000	262,600	(¹)	262,600
Carp.....	134,700	144,200	278,900	2,269,500	373,900	2,583,400
Catfish and bullheads.....	52,200	191,200	243,400	463,800	78,300	542,100
Cisco.....	36,100	(¹)	36,100	809,700	1,374,500	2,184,200
Eels, common.....	44,300	42,300	86,600			
Garfish.....				5,900	(¹)	5,900
Goldfish.....				214,700	(¹)	214,700
Lake herring.....	6,200	1,230,600	1,236,800			
Lake trout.....	16,900	275,800	292,700	100	(¹)	100
Mooneye.....				11,300	(¹)	11,300
Pike or pickerel (jacks).....	10,900	104,600	115,500	3,200	20,200	23,400
Rock bass.....	4,400	(¹)	4,400	3,400	(¹)	3,400
Sauger.....				814,400	(¹)	814,400
Sheepshead.....				3,392,300	(¹)	3,392,300
Sturgeon.....	10,500	5,300	15,800	20,300	16,500	36,800
Sucker "mullet".....	128,600	(¹)	128,600	756,000	(¹)	756,000
Sunfish.....	44,100	(¹)	44,100			
White bass.....	5,000	(¹)	5,000	727,300	(¹)	727,300
Whitefish, common.....	55,800	602,300	658,100	910,900	1,001,800	1,912,700
Yellow perch.....	58,400	169,400	227,800	5,186,900	2,595,500	7,782,400
Yellow pike.....	2,200	15,000	17,200	3,134,600	509,500	3,644,100
Miscellaneous.....		245,800	245,800		1,373,100	1,373,100
Total.....	689,500	3,086,000	3,775,500	27,619,100	14,501,000	42,120,100

¹ Where there has been a Canadian catch of these species it is included under "Miscellaneous."

¹³ The statistics of the catch presented herewith were obtained principally from records of the various State fishery agencies. 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 November 1 and December 1 to April 1, and for Rainy and Namakan Lakes from May 15 to November 1 and December 1 to April 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 January 1 and April 1 is estimated at less than 3 percent of the total catch.

Lake fisheries of the United States and Canada, 1938—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			14,200	14,200
Bowfin.....	1,100	(1)	1,100				
Burbot.....	12,000	(1)	12,000	34,300	8,500	(1)	8,500
Carp.....	631,100	49,100	680,200	1,873,000	300	600	900
Catfish and bullheads.....	165,700	10,600	176,300	67,600			
Chubs.....	192,100	452,000	644,100	5,404,100	256,300	61,900	318,200
Lake herring.....	5,428,800	235,700	5,664,500	4,477,300	10,593,700	1,855,500	12,449,200
Lake trout.....	1,270,100	3,800,300	5,070,400	4,905,600	3,166,900	1,667,800	4,834,700
Pike or pickerel (jacks).....	25,500	128,700	154,200	18,400	5,100	8,200	13,300
Rock bass.....	27,900	(1)	27,900	2,600			
Sauger.....	2,100	(1)	2,100	400			
Sheepshead.....	19,800	(1)	19,800	4,600			
Smelt.....	100	(1)	100	1,841,400	4,300	(1)	4,300
Steelhead trout.....				1,200			
Sturgeon.....		12,500	12,500			2,600	2,600
Sucker "mullet".....	1,788,200	(1)	1,788,200	1,858,100	288,700	(1)	288,700
White bass.....				3,400			
Whitefish:							
Common.....	558,000	1,587,100	2,145,100	1,258,900	455,400	311,700	767,100
Menominee.....	64,200	(1)	64,200	75,700	23,500	(1)	23,500
Yellow perch.....	500,400	151,800	652,200	2,203,600	7,900	700	8,600
Yellow pike.....	1,358,100	358,500	1,714,600	49,600	45,400	75,600	120,900
Crawfish.....				6,000			
Mussel shells.....	5,500	(1)	5,500	293,500			
Miscellaneous.....		469,000	469,000			58,500	58,500
Total.....	12,038,700	7,257,300	19,296,000	24,379,300	14,856,000	4,057,200	18,913,200

Species	Namakan Lake			Rainy Lake		
	United States	Canada	Total	United States	Canada	Total
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Blue pike.....					700	700
Burbot.....				1,700	(1)	1,700
Chubs.....					14,700	14,700
Lake herring.....				14,000	(1)	14,000
Pike or pickerel (jacks).....	2,500	3,800	6,300	27,600	101,100	128,700
Sturgeon.....		500	500	100	700	800
Sucker "mullet".....				2,000	(1)	2,000
Whitefish, common.....	30,500	9,300	39,800	29,300	66,100	95,400
Yellow perch.....				6,000	10,700	16,700
Yellow pike.....	9,500	5,900	15,400	38,900	182,800	221,700
Miscellaneous.....					90,000	90,000
Total.....	42,500	19,500	62,000	119,600	467,700	587,300

1 Where there has been a Canadian catch of these species it is included under "Miscellaneous."

Lake fisheries of the United States and Canada, 1938—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
Blue pike.....				8,717,900	7,234,100	15,952,000
Bowfin.....				5,600	(1)	5,600
Burbot.....	19,800	(1)	19,800	357,900	(1)	357,900
Carp.....	11,000	1,300	12,300	4,859,600	599,100	5,428,700
Catfish and bullheads.....	41,300	8,400	49,700	790,600	288,500	1,079,100
Chubs.....				5,852,500	528,600	6,381,100
Cisco.....				845,800	1,374,500	2,220,300
Crappie.....	400	(1)	400	400	(1)	400
Eels, common.....				44,300	42,300	86,600
Garfish.....				5,900	(1)	5,900
Goldfish.....				214,700	(1)	214,700
Lake herring.....	2,900	(1)	2,900	20,522,900	3,321,800	23,844,700
Lake trout.....		6,300	6,300	9,359,600	5,750,200	15,109,800
Mooneye.....				11,300	(1)	11,300
Pike or pickerel (jacks).....	137,900	425,200	563,100	231,100	791,800	1,022,900
Rock bass.....				38,300	(1)	38,300
Sauger.....	87,900	43,900	131,800	934,800	43,900	978,700
Sheepshead.....				3,416,700	(1)	3,416,700
Smelt.....				1,845,800	(1)	1,845,800
Steelhead trout.....				1,200	(1)	1,200
Sturgeon.....				30,900	38,100	69,000
Sucker "mullet".....	180,300	300	180,600	5,001,900	300	5,002,200
Sunfish.....				44,100	(1)	44,100
Tullibee.....	878,400	112,200	990,600	878,400	112,200	990,600
White bass.....				735,700	(1)	735,700
Whitefish:						
Common.....	3,700	192,400	196,100	3,302,500	3,770,700	7,078,200
Menominee.....				153,400	(1)	153,400
Yellow perch.....	53,600	25,800	79,400	8,016,800	2,953,900	10,970,700
Yellow pike.....	362,600	651,500	1,014,100	4,998,900	1,798,700	6,797,600
Crawfish.....				6,000	(1)	6,000
Mussel shells.....				299,000	(1)	299,000
Miscellaneous.....		253,200	253,200		2,490,500	2,490,500
Total.....	1,779,800	1,720,500	3,500,300	81,524,500	31,109,200	112,633,700

* Where there has been a Canadian catch of these species it is included under "Miscellaneous."

Lake fisheries of the United States, 1938

OPERATING UNITS: BY LAKES

Item	Lake Ontario	Lake Erie	Lake Huron	Lake Michigan	Lake Superior	Lake of the Woods, Rainy Lake, and Namanagan Lake	Total
	Number	Number	Number	Number	Number	Number	
Fishermen:							
On vessels.....	11	264	121	1,031	189		1,616
On boats and shore:							
Regular.....	36	787	699	918	853	120	3,413
Casual.....	120	420	134	953	318	2	1,947
Total.....	167	1,471	954	2,902	1,360	122	6,976
Vessels:							
Steam.....		13	5	22	4		44
Net tonnage.....		305	81	499	134		1,019
Motor.....	3	39	28	296	59		425
Net tonnage.....	33	433	448	3,499	590		5,003
Total vessels.....	3	52	33	318	63		469
Total net tonnage.....	33	738	529	3,998	724		6,022
Boats:							
Motor.....	44	304	260	447	512	95	1,662
Other.....	72	383	283	545	379	27	1,659

Lake fisheries of the United States, 1938—Continued

OPERATING UNITS: BY LAKES—Continued

Item	Lake Ontario	Lake Erie	Lake Huron	Lake Michigan	Lake Superior	Lake of the Woods, Rainy Lake, and Namanan Lake	Total
Apparatus:	Number	Number	Number	Number	Number	Number	Number
Haul seines.....	7	173	69	59	17		325
Length, yards.....	583	74,416	33,606	27,233	3,404		139,241
Gill nets:							
"Shoal," 2¼ to 3¾ inches.....	1,337	21,740	2,870	64,588	11,939		102,474
Square yards.....	218,070	3,435,000	574,000	12,869,300	3,147,600		20,233,970
"Shoal," 4 to 6 inches.....	483	11,286	5,975	43,972	12,669	266	74,651
Square yards.....	90,330	2,246,850	1,337,500	9,584,000	3,702,010	84,384	17,045,074
"Shoal," 10 to 14 inches.....	34	8					42
Square yards.....	10,200	2,400					12,600
Bar nets.....		110					110
Square yards.....		16,500					16,500
Trammel nets.....				6			6
Square yards.....				600			600
Lines:							
Troll.....					75		75
Hooks.....					525		525
Trot.....	83	116	636	7,907	5,202		13,944
Hooks.....	16,600	23,200	189,900	2,403,450	1,049,375		3,684,725
Pound nets.....		45	449	1,093		69	1,888
Trap nets.....	140	6,105	3,066				9,311
Fyke nets.....	145	794	276	1,584	83	93	2,905
Crawfishpots.....				740			740
Crowfoot bars.....				62			62
Picks.....				19			19

OPERATING UNITS: BY STATES AND LAKES

Item	New York			Pennsylvania	Ohio
	Lake Ontario	Lake Erie	Total	Lake Erie	Lake Erie
Fishermen:	Number	Number	Number	Number	Number
On vessels.....	11	49	60	133	82
On boats and shore:					
Regular.....	36	47	83	35	616
Casual.....	120	94	214	15	235
Total.....	167	190	357	183	953
Vessels:					
Steam.....		1	1	9	3
Net tonnage.....		24	24	185	96
Motor.....	3	9	12	16	14
Net tonnage.....	33	68	101	189	176
Total vessels.....	3	10	13	25	17
Total net tonnage.....	33	92	125	374	272
Boats:					
Motor.....	44	26	70	16	242
Other.....	72	44	116	1	291
Apparatus:					
Haul seines.....	7	6	13		183
Length, yards.....	583	516	1,099		64,300
Gill nets:					
"Shoal," 2¼ to 3¾ inches.....	1,337	6,300	7,637	9,060	6,175
Square yards.....	218,070	1,160,000	1,378,070	1,395,000	839,000
"Shoal," 4 to 6 inches.....	483	3,218	3,701	6,150	1,763
Square yards.....	90,330	643,600	733,930	1,230,000	342,250
"Shoal," 10 to 14 inches.....	34	8	42		
Square yards.....	10,200	2,400	12,600		
Bar nets.....					110
Square yards.....					16,500
Lines:					
Trot.....	83	96	179		
Hooks.....	16,600	19,200	35,800		
Pound nets.....				45	
Trap nets.....	140	16	156		5,900
Fyke nets.....	145		145		509

Lake fisheries of the United States, 1938—Continued

OPERATING UNITS: BY STATES AND LAKES—Continued

Item	Michigan					Indiana
	Lake Erie	Lake Huron	Lake Michigan	Lake Superior	Total	Lake Michigan
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....		121	370	107	598	29
On boats and shore:						
Regular.....	89	699	403	325	1,516	16
Casual.....	56	134	275	162	627	12
Total.....	145	954	1,048	594	2,741	57
Vessels:						
Steam.....		5	8	4	17	1
Net tonnage.....		81	111	134	326	22
Motor.....		28	96	25	149	8
Net tonnage.....		448	1,090	323	1,861	87
Total vessels.....		33	104	29	166	9
Total net tonnage.....		529	1,201	457	2,187	109
Boats:						
Motor.....	20	280	207	222	709	6
Other.....	47	253	169	90	559	5
Apparatus:						
Haul seines.....	34	69	1	15	119	1
Length, yards.....	9,600	33,605	65	2,904	46,174	300
Gill nets:						
"Shoal," 2¼ to 3¾ inches.....	205	2,870	17,682	4,850	25,607	1,575
Square yards.....	41,000	574,000	3,469,900	863,000	4,947,900	315,000
"Shoal," 4 to 6 inches.....	155	5,975	21,189	7,365	34,684	925
Square yards.....	31,000	1,337,500	4,604,900	2,129,500	8,102,900	185,000
Lines:						
Troll.....				75	75	
Hooks.....				525	525	
Trot.....	20	636	510	3,247	4,413	
Hooks.....	6,000	189,900	155,400	729,100	1,080,400	
Pound nets.....		449	744	136	1,329	4
Trap nets.....	189	3,066			3,255	
Fyke nets.....	285	276	100	6	667	
Crowfoot bars.....			47		47	
Picks.....			19		19	

Lake fisheries of the United States, 1938—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
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....	69	563	76	639	6		6
On boats and shore:							
Regular.....	2	497	141	638	387	120	507
Casual.....	3	663	65	728	91	2	93
Total.....	74	1,723	282	2,005	484	122	606
Vessels:							
Steam.....		13		13			
Net tonnage.....		396		366			
Motor.....	21	171	32	203	2		2
Net tonnage.....	300	2,022	255	2,277	12		12
Total vessels.....	21	184	32	216	2		2
Total net tonnage.....	300	2,388	255	2,643	12		12
Boats:							
Motor.....	2	232	70	302	220	95	315
Other.....	1	370	81	451	208	27	235
Apparatus:							
Haul seines.....		57	2	59			
Length, yards.....		26,868	500	27,368			
Gill nets:							
"Shoal," 2¼ to 3¾ inches.....	2,825	42,506	2,993	45,499	4,096		4,096
Square yards.....	565,000	8,509,400	769,300	9,278,700	1,515,300		1,515,300
"Shoal," 4 to 6 inches.....	1,675	20,183	3,195	23,378	2,109	266	2,375
Square yards.....	325,000	4,469,100	968,500	5,437,600	604,010	84,384	688,394
Trammel nets.....		6		6			
Square yards.....		600		600			
Lines:							
Trot.....		7,397	1,095	8,492	880		880
Hooks.....		2,248,050	278,800	2,526,850	41,675		41,675
Pound nets.....		345	96	441		69	69
Fyke nets.....		1,464	27	1,491		93	93
Crawfish pots.....		740		740			
Crowfoot bars.....		15		15			

OPERATING UNITS OF LAKE ONTARIO: BY GEAR¹

Item	Haul seines	Gill nets			Trot lines	Trap nets	Fyke nets	Total, exclusive of duplication
		"Shoal" 2¼ to 3¾ inches	"Shoal" 4 to 6 inches	"Shoal" 10 to 14 inches				
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....		11	4					11
On boats and shore:								
Regular.....		30	16	6	3	16	5	36
Casual.....	19	19	9	7	50	28	14	120
Total.....	19	60	20	13	53	44	19	167
Vessels, motor.....		3	1					3
Net tonnage.....		33	7					33
Boats:								
Motor.....	4	21	13	5	10	18	6	44
Other.....	5	9	3	6	39	9	10	72
Apparatus:								
Number.....	7	1,337	483	34	83	140	145	
Length, yards.....	583							
Square yards.....		218,070	90,330	10,200				
Hooks.....					16,600			

¹ Includes Niagara River below the Falls, and the St. Lawrence River.

Lake fisheries of the United States, 1938—Continued

OPERATING UNITS OF LAKE ERIE: BY GEAR¹

Item	Haul seines	Gill nets			Bar nets	Trot lines	Pound nets	Trap nets	Fyke nets	Total, exclusive of duplication
		"Shoal" 2¼ to 3¾ inches	"Shoal" 4 to 6 inches	"Shoal" 10 to 14 inches						
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....		284	241							284
On boats and shore:										
Regular.....	146	79	47	1	12	6	20	524	94	787
Casual.....	222	65	30	1	7	43	7	76	45	420
Total	368	408	318	2	19	49	27	600	139	1,471
Vessels:										
Steam.....		13	12							13
Net tonnage.....		305	273							305
Motor.....		39	35							39
Net tonnage.....		433	363							433
Total vessels		52	47							52
Total net tonnage		738	636							738
Boats:										
Motor.....	42	42	30	1	5	5	10	203	84	304
Other.....	187	12	3		7	42		146	68	383
Apparatus:										
Number.....	173	21,740	11,286	8	110	116	45	6,105	794	
Length, yards.....	74,416									
Square yards.....		3,435,000	2,246,850	2,400	16,500					
Hooks.....						25,200				

¹ Includes Niagara River above the falls.

OPERATING UNITS OF LAKE HURON: BY GEAR

Item	Haul seines	Gill nets		Trot lines	Pound nets	Trap nets	Fyke nets	Total, exclusive of duplication
		"Shoal" 2¼ to 3¾ inches	"Shoal" 4 to 6 inches					
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....		48	66	53	8	27		121
On boats and shore:								
Regular.....	90	99	126	28	200	523	47	699
Casual.....	48	35	36	8	16	42	9	134
Total	138	182	228	89	224	592	56	954
Vessels:								
Steam.....		3	4	2				5
Net tonnage.....		53	65	41				31
Motor.....		8	15	11	2	8		28
Net tonnage.....		146	231	232	18	89		448
Total vessels		11	19	13	2	8		33
Total net tonnage		199	286	273	18	89		529
Boats:								
Motor.....	34	50	53	10	78	180	18	290
Other.....	29	36	33	8	64	120	31	253
Apparatus:								
Number.....	69	2,870	5,975	636	449	3,066	276	
Length, yards.....	33,605							
Square yards.....		574,000	1,337,500					
Hooks.....				189,900				

Lake fisheries of the United States, 1938—Continued

OPERATING UNITS OF LAKE MICHIGAN: BY GEAR

Item	Haul seines	Gill nets		Tram- mel nets	Trot lines	Pound nets
		"Shoal" 2¼ to 3¼ inches	"Shoal" 4 to 6 inches			
	Number	Number	Number	Number	Number	Number
Fishermen:						
On vessels.....		842	734		176	78
On boats and shore:						
Regular.....	61	560	395	4	74	326
Casual.....	105	507	313	5	93	138
Total.....	166	1,009	1,432	9	283	540
Vessels:						
Steam.....		17	10		6	2
Net tonnage.....		349	227		167	28
Motor.....		246	206		46	26
Net tonnage.....		2,855	2,528		664	195
Total vessels.....		263	216		52	28
Total net tonnage.....		3,204	2,755		831	223
Boats:						
Motor.....	26	264	168	2	30	137
Other.....	57	257	122	6	44	137
Apparatus:						
Number.....	59	64,588	43,972	6	7,907	1,003
Length, yards.....	27,283					
Square yards.....		12,559,300	9,584,000	600		
Hooks.....					2,403,450	

Item	Fyke nets	Crawfish pots	Crowfoot bars	Picks	By hand	Total, exclusive of dupli- cation
	Number	Number	Number	Number	Number	Number
Fishermen:						
On vessels.....	53					1,031
On boats and shore:						
Regular.....	193					918
Casual.....	60	5	55	19	11	953
Total.....	306	5	55	19	11	2,902
Vessels:						
Steam.....	1					22
Net tonnage.....	13					499
Motor.....	20					296
Net tonnage.....	161					3,499
Total vessels.....	21					318
Total net tonnage.....	174					3,998
Boats:						
Motor.....	78	2	45	10		447
Other.....	109	5	17	6	11	545
Apparatus, number.....	1,564	740	62	19		

Lake fisheries of the United States, 1938—Continued

OPERATING UNITS OF LAKE SUPERIOR: BY GEAR

Item	Haul seines	Gill nets		Lines		Pound nets	Fyke nets	Total, exclusive of duplication
		"Shoal" 2¼ to 3¾ inches	"Shoal" 4 to 6 inches	Troll	Trot			
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
On vessels.....		107	120		110	21	8	189
On boats and shore:								
Regular.....	26	685	437	18	308	97	2	853
Casual.....	20	224	182	14	78	28	6	318
Total.....	46	1,016	739	32	496	146	16	1,360
Vessels:								
Steam.....		1	4		3	1		4
Net tonnage.....		24	134		108	24		134
Motor.....		87	34		28	7	4	59
Net tonnage.....		334	331		306	59	22	590
Total vessels.....		38	38		31	8	4	63
Total net tonnage.....		358	465		414	83	22	724
Boats:								
Motor.....	10	396	291	10	189	44	2	512
Other.....	10	312	185		58	33	3	379
Apparatus:								
Number.....	17	11,939	12,669	75	5,202	232	33	
Length, yards.....	3,404							
Square yards.....		3,147,600	3,702,010					
Hooks.....				526	1,049,575			

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, ex- clusive of duplication
Fishermen, on boats and shore:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Regular.....	90	34	29	120
Casual.....	2			2
Total.....	92	34	29	122
Boats:				
Motor.....	74	21	23	95
Other.....	14	7	11	27
Apparatus:				
Number.....	266	69	93	
Square yards.....	84,384			

CATCH: BY GEAR

Species	New York							
	Haul seines		Gill nets		Trot lines		Trap nets	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Blue pike.....			1,117,300	\$78,211			4,900	\$343
Bowfin.....			100	2			1,600	32
Burbot.....			13,000	130			6,100	61
Carp.....	158,200	\$9,492	1,400	84			12,200	732
Catfish and bullheads.....	700	49	700	49	200	\$14	35,700	2,499
Cisco.....			427,700	51,324			3,700	444
Eels, common.....							39,800	2,388
Garfish.....	5,900	59						
Lake herring.....			6,200	620				
Lake trout.....	8,600	1,760	6,300	1,260			2,100	420
Pike or pickerel (jacks).....			300	30			8,200	820
Rock bass.....							4,400	264
Sauger.....			200	14				
Sheepshead.....							100	2
Sturgeon.....	500	175	3,300	1,155	14,500	5,075	500	175
Sucker "mullet".....	17,100	513	105,200	3,156	600	18	22,600	678
Sunfish.....							40,200	2,412
White bass.....				36			5,000	300
Whitefish, common.....			112,900	27,135			34,000	6,800
Yellow perch.....	200	14	86,100	6,027	100	7	16,800	1,176
Yellow pike.....			2,900	290			5,400	540
Total.....	191,100	12,062	1,884,200	169,523	15,400	5,114	243,300	20,086

Lake fisheries of the United States, 1938—Continued

CATCH: BY GEAR—Continued

Species	New York—Continued				Pennsylvania	
	Fyke nets		Total		Gill nets	
	Pounds	Value	Pounds	Value	Pounds	Value
Blue pike			1,122,200	\$78,554	1,260,800	\$88,256
Bowfin			1,700	34		
Burbot			19,100	191	18,800	188
Carp	1,300	\$78	173,100	10,388		
Catfish and bullheads	15,500	1,085	52,800	3,696		
Cisco	1,300	156	432,700	51,924	370,100	44,412
Eels, common	4,500	270	44,300	2,658		
Garfish			5,900	59		
Lake herring			6,200	620		
Lake trout			16,900	3,440	100	20
Pike or pickerel (jacks)	2,400	240	10,900	1,000		
Rock bass			4,400	264		
Sauger			200	14		
Sheepshead			100	2	4,600	92
Sturgeon			18,800	6,580		
Sucker "mullet"	8,400	252	153,900	4,617	6,600	132
Sunfish	3,900	234	44,100	2,646		
White bass			5,600	338	7,500	300
Whitefish, common			146,900	33,935	466,300	93,260
Yellow perch	4,800	336	108,000	7,560	126,700	7,602
Yellow pike			8,300	830	100	10
Total	42,100	2,651	2,376,100	209,436	2,261,600	234,272

Species	Pennsylvania—Continued				Ohio			
	Pound nets		Total		Haul seines		Gill nets	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Blue pike	181,100	\$12,677	1,441,900	\$100,933	200	\$12	919,700	\$55,182
Burbot	9,300	93	28,100	281			14,100	282
Carp	4,000	80	4,000	80	1,094,100	32,823	7,500	225
Catfish and bullheads	1,800	108	1,800	108	154,700	12,376	300	24
Cisco	1,800	216	371,900	44,628			39,700	5,955
Goldfish					199,500	7,980		
Lake trout			100	20				
Mooneye					6,000	240		
Sauger					21,300	2,130	204,300	20,430
Sheepshead	15,700	314	20,300	406	675,600	20,268	9,200	275
Sturgeon	300	81	300	81			8,800	2,640
Sucker "mullet"	8,600	172	15,200	304	23,500	940	12,300	492
White bass	28,100	1,124	35,600	1,424	98,600	5,916	16,400	984
Whitefish, common	59,900	11,980	528,200	105,240			84,300	16,860
Yellow perch	73,200	4,392	199,900	11,994	2,100	168	1,085,400	86,832
Yellow pike	28,100	2,810	28,200	2,820	18,800	1,880	24,100	2,410
Total	411,900	34,047	2,673,500	268,319	2,294,400	84,733	2,426,100	192,592

Species	Ohio—Continued							
	Bar nets		Trap nets		Fyke nets		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Blue pike	200	\$12	5,215,900	\$358,482	17,800	\$1,068	6,153,800	\$414,756
Burbot			219,400	4,388	600	12	234,100	4,682
Carp	161,200	4,836	149,500	4,485	45,200	1,356	1,457,500	43,725
Catfish and bullheads	400	32	226,000	18,080	28,000	2,270	409,400	32,782
Cisco			1,600	225			41,200	6,180
Goldfish	2,100	84	5,000	200	4,100	164	210,700	8,428
Mooneye			5,300	212			11,300	452
Sauger			564,800	56,480	11,700	1,170	802,100	80,210
Sheepshead	1,800	54	2,421,400	72,642	130,900	3,927	3,288,900	97,167
Sturgeon			2,000	870			11,700	3,510
Sucker "mullet"	100	4	607,400	24,296	30,400	1,216	673,700	26,948
White bass			443,000	26,580	110,400	6,624	668,400	40,104
Whitefish, common			207,100	41,420	500	100	291,900	58,380
Yellow perch	100	8	3,814,400	305,152	10,000	800	4,912,000	392,960
Yellow pike	200	20	2,786,900	278,690	93,400	9,340	2,923,400	292,340
Total	166,100	5,050	16,670,500	1,192,202	483,000	28,047	22,040,100	1,502,624

Lake fisheries of the United States, 1938—Continued

CATCH: BY GEAR—Continued

Species	Michigan							
	Haul seines		Gill nets		Lines			
	Pounds	Value	Pounds	Value	Troll		Trot	
Pounds					Value	Pounds	Value	
Bowfin.....	700	\$14					100	\$2
Burbot.....			6,400	\$64			14,600	146
Carp.....	835,800	25,074	19,100	673			1,700	51
Catfish and bullheads.....	46,700	3,269					12,600	702
Chubs.....			1,678,500	201,420				
Goldfish.....	3,600	144						
Lake herring.....	63,300	1,896	3,859,600	117,434				
Lake trout.....			4,055,300	608,295	46,400	\$6,960	1,642,400	231,160
Pike or pickerel (jacks).....	2,100	210	2,600	260				
Rock bass.....	5,800	348	400	24				
Sauger.....	100	10	700	70				
Sheepshead.....	18,300	366	100	2			3,300	66
Smelt.....			267,400	8,022				
Sucker "mullet".....	87,600	2,625	351,800	10,554				
White bass.....	600	36						
Whitefish:								
Common.....			898,200	179,640				
Menominee.....			91,200	9,120				
Yellow perch.....	16,800	1,344	642,200	51,456			2,300	184
Yellow pike.....	106,400	10,640	56,600	5,660			400	40
Total.....	1,187,600	45,976	11,931,100	1,192,694	46,400	6,960	1,677,400	232,351

Species	Michigan—Continued							
	Pound nets		Trap nets		Fyke nets		Crowfoot bars	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Bowfin.....			700	\$14	2,400	\$48		
Burbot.....	800	\$8	200	2	600	6		
Carp.....	37,200	816	173,200	5,196	314,500	9,435		
Catfish and bullheads.....	2,500	176	103,600	7,262	54,700	3,836		
Goldfish.....					400	16		
Lake herring.....	4,179,700	125,391	2,065,000	61,650	2,500	75		
Lake trout.....	143,900	21,585	144,500	21,675	1,400	210		
Pike or pickerel (jacks).....	8,400	840	20,000	2,000	15,300	1,530		
Rock bass.....	1,700	102	11,500	690	14,500	870		
Sauger.....			3,800	360	40,200	4,020		
Sheepshead.....	7,100	142	24,700	494	103,700	2,074		
Smelt.....	405,900	12,177						
Sucker "mullet".....	1,095,300	32,859	1,557,200	46,726	251,000	7,530		
White bass.....					22,100	1,326		
Whitefish:								
Common.....	656,600	131,300	443,500	88,700	5,500	1,100		
Menominee.....	6,500	650	17,200	1,720				
Yellow perch.....	79,100	6,328	371,200	29,696	123,700	9,896		
Yellow pike.....	73,600	7,360	1,178,300	117,830	172,300	17,230		
Mussel shells ¹							125,000	\$3,160
Pearls and slugs ¹								50
Total.....	6,698,200	339,738	6,104,400	384,005	1,124,800	59,202	125,000	3,200

¹ From tributary streams.

Lake fisheries of the United States, 1938—Continued

CATCH: BY GEAR—Continued

Species	Michigan—Continued						Indiana	
	Picks		By hand		Total		Haul seines	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Bowfin.....					3,900	\$78		
Burbot.....					22,600	228		
Carp.....					1,281,500	41,245	4,000	\$100
Catfish and bullheads.....					220,100	15,234		
Chubs.....					1,678,500	201,420		
Goldfish.....					4,000	160		
Lake herring.....					10,160,000	306,446		
Lake trout.....					5,933,900	889,885		
Pike or pickerel (jacks).....					48,400	4,840		
Rock bass.....					33,900	2,034		
Sauger.....					44,600	4,460		
Sheepshead.....					157,200	3,144		
Smelt.....					673,300	20,199		
Sucker "mullet".....					3,842,800	100,294		
White bass.....					22,700	1,362		
Whitefish:								
Common.....					2,003,700	400,740		
Menominee.....					114,900	11,480		
Yellow perch.....					1,235,300	98,904		
Yellow pike.....					1,587,600	158,760		
Mussel shells ¹	30,000	\$750	13,500	\$278	168,500	4,178		
Pearls and slugs ¹		20		9		79		
Total.....	30,000	770	13,500	287	28,838,400	2,265,178	4,000	160

Species	Indiana—Continued						Illinois	
	Gill nets		Pound nets		Total		Gill nets	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Burbot.....	1,200	\$24			1,200	\$24	5,000	\$100
Carp.....					4,000	160		
Chubs.....	277,000	22,157			277,000	22,157	524,900	78,780
Lake herring.....	219,100	10,956	8,500	\$425	227,600	11,381	145,800	7,289
Lake trout.....	174,200	27,834			174,200	27,834	311,400	62,277
Steelhead trout.....	1,200	240			1,200	240		
Sucker "mullet".....	1,500	45	3,500	105	5,000	150		
Yellow perch.....	73,000	3,650			73,000	3,650	168,400	8,490
Total.....	747,200	64,906	12,000	530	763,200	65,596	1,155,500	156,816

Species	Wisconsin							
	Haul seines		Gill nets		Trammel nets		Trot lines	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Burbot.....	4,200	\$42	9,900	\$99			3,800	\$38
Carp.....	1,644,500	69,155	75,200	2,286	1,000	\$30	100	3
Catfish and bullheads.....			3,500	252			100	7
Chubs.....			3,284,400	385,226				
Lake herring.....			3,541,200	153,276				
Lake trout.....			1,562,400	295,060			566,800	106,055
Pike or pickerel (jacks).....			1,700	170			100	10
Sheepshead.....			100	2				
Smelt.....	4,700	141	1,041,900	81,257				
Sucker "mullet".....	30,500	906	340,500	10,395			300	9
White bass.....			200	12				
Whitefish:								
Common.....	200	40	91,900	17,412			100	22
Menominee.....			23,200	2,820				
Yellow perch.....	123,800	7,353	386,800	23,208			800	48
Yellow pike.....			8,900	890			100	10
Total.....	1,807,700	77,636	10,336,900	922,365	1,000	30	672,200	109,082

¹ From tributary streams.

Lake fisheries of the United States, 1938—Continued

CATCH: BY GEAR—Continued

Species	Wisconsin—Continued							
	Pound nets		Fyke nets		Crawfish pots		Crowfoot bars	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Burbot.....	4,800	\$48	3,600	\$36				
Carp.....	400	12	106,300	3,189				
Catfish and bullheads.....			61,500	4,305				
Chubs.....	60,500	7,248	13,400	1,608				
Lake herring.....	696,100	37,468	14,100	705				
Lake trout.....	330,100	62,040	1,000	185				
Pike or pickerel (jacks).....	400	40	1,200	110				
Sheepshead.....			100	2				
Smelt.....	88,500	2,655	37,400	1,122				
Sucker "mullet".....	77,400	2,322	161,900	4,857				
White bass.....			3,200	192				
Whitefish:								
Common.....	171,500	36,104	800	176				
Menominee.....	6,700	670						
Yellow perch.....	21,800	1,308	726,600	43,536				
Yellow pike.....	30,000	3,000	1,400	140				
Crawfish.....					6,000	\$450		
Mussel shells ¹							100,400	\$1,400
Total.....	1,488,200	152,915	1,132,500	60,163	6,000	450	100,400	1,400

Species	Wisconsin—Continued				Minnesota			
	By hand		Total		Gill nets		Trot lines	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Burbot.....			26,300	\$263	7,300	\$73		
Carp.....			1,828,500	74,675	400	8		
Catfish and bullheads.....			65,200	4,564	3,300	165		
Chubs.....			3,308,300	394,082	63,800	6,380		
Lake herring.....			4,251,400	191,449	5,729,000	117,460		
Lake trout.....			2,460,300	466,220	342,000	35,889	120,800	\$11,306
Pike or pickerel (jacks).....			3,400	330	82,200	6,640		
Sauger.....					68,600	5,134		
Sheepshead.....			200	4				
Smelt.....			1,172,500	35,175				
Sucker "mullet".....			619,600	18,488	86,200	1,792		
Tullibees.....					841,400	42,070		
White bass.....			3,400	204				
Whitefish:								
Common.....			264,500	53,754	53,800	5,532		
Menominee.....			34,900	3,490	3,600	190		
Yellow perch.....			1,259,600	75,453	46,200	2,312		
Yellow pike.....			40,400	4,040	203,300	19,465		
Crawfish.....			6,000	450				
Mussel shells ¹	30,100	\$425	130,500	1,825				
Total.....	30,100	425	15,475,000	1,824,466	7,531,100	243,110	120,800	11,306

Species	Minnesota—Continued					
	Pound nets		Fyke nets		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
Burbot.....	4,900	\$50	9,300	\$100	21,500	\$223
Carp.....	9,200	185	1,400	28	11,000	221
Catfish and bullheads.....	13,300	667	24,700	1,232	41,300	2,064
Chubs.....					63,800	6,380
Crappie.....	100	4	300	12	400	16
Lake herring.....	2,900	50			5,731,900	117,510
Lake trout.....					462,800	47,195
Pike or pickerel (jacks).....	61,900	4,948	24,300	1,143	168,400	12,731
Sauger.....	13,800	827	5,500	329	87,900	6,290
Sturgeon.....	100	25			100	25
Sucker "mullet".....	79,400	1,587	26,100	521	191,700	3,900
Tullibees.....	26,900	1,342	10,100	503	878,400	43,915
Whitefish:						
Common.....	15,100	1,500	400	37	69,300	7,069
Menominee.....					3,600	190
Yellow perch.....	7,500	375	5,900	297	59,600	2,984
Yellow pike.....	171,100	16,941	36,600	3,658	411,000	40,064
Total.....	406,200	28,501	144,600	7,860	8,202,700	290,777

¹ From tributary streams.

Lake fisheries of the United States, 1938—Continued

CATCH: BY LAKES

Species	Lake Ontario		Lake Erie			
	New York		New York		Pennsylvania	
	Pounds	Value	Pounds	Value	Pounds	Value
Blue pike.....	58,500	\$4,095	1,063,700	\$74,459	1,441,900	\$100,933
Bowfin.....	1,700	34				
Burbot.....	19,000	190	100	1	28,100	281
Carp.....	134,700	8,082	38,400	2,304	4,000	80
Catfish and bullheads.....	52,200	3,654	800	42	1,800	108
Cisco.....	36,100	4,332	396,600	47,592	371,900	44,628
Eels, common.....	44,300	2,658				
Garfish.....			5,900	59		
Lake herring.....	6,200	620				
Lake trout.....	16,900	3,440			100	20
Pike or pickerel (jacks).....	10,900	1,090				
Rock bass.....	4,400	264				
Sauger.....			200	14		
Sheepshead.....			100	2	20,300	406
Sturgeon.....	10,500	3,675	8,300	2,905	300	81
Sucker, "mullet".....	128,600	3,858	25,300	759	15,200	304
Sunfish.....	44,100	2,646				
White bass.....	5,000	300	600	36	35,600	1,424
Whitefish, common.....	55,800	11,160	91,100	22,775	526,200	105,240
Yellow perch.....	58,400	4,088	49,600	3,472	199,900	11,994
Yellow pike.....	2,200	220	6,100	610	28,200	2,820
Total.....	689,500	54,406	1,686,600	155,030	2,673,500	268,319

Species	Lake Erie—Continued					
	Ohio		Michigan		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
Blue pike.....	6,153,800	\$414,756			8,659,400	\$590,148
Bowfin.....			2,800	\$56	2,800	56
Burbot.....	234,100	4,682	300	3	262,600	4,967
Carp.....	1,457,500	43,725	709,600	21,288	2,209,500	67,397
Catfish and bullheads.....	409,400	32,782	62,000	3,640	463,800	36,572
Cisco.....	41,200	6,180			809,700	98,400
Garfish.....					5,900	59
Goldfish.....	210,700	8,428	4,000	160	214,700	8,688
Lake trout.....					100	20
Mooneye.....	11,300	452			11,300	452
Pike or pickerel (jacks).....			3,200	320	3,200	320
Rock bass.....			3,400	204	3,400	204
Sauger.....	802,100	80,210	42,100	4,210	844,400	84,434
Sheepshead.....	3,238,900	97,167	133,000	2,660	3,392,300	100,235
Sturgeon.....	11,700	3,510			20,300	6,496
Sucker, "mullet".....	673,700	26,948	41,800	1,284	756,000	29,275
White bass.....	668,400	40,104	22,700	1,362	727,300	42,626
Whitefish, common.....	291,900	58,380	1,700	840	610,900	186,735
Yellow perch.....	4,912,000	392,960	25,400	2,032	5,186,900	410,458
Yellow pike.....	2,923,400	292,340	176,900	17,690	3,134,600	313,460
Total.....	22,040,100	1,502,624	1,218,900	55,229	27,619,100	1,981,202

Lake fisheries of the United States, 1938—Continued

CATCH: BY LAKES—Continued

Species	Lake Huron		Lake Michigan			
	Michigan		Michigan		Indiana	
	Pounds	Value	Pounds	Value	Pounds	Value
Bowfin	1, 100	\$22				
Burbot	12, 000	120	7, 000	\$70	1, 200	\$24
Carp	631, 100	19, 033	40, 500	915	4, 000	160
Catfish and bullheads	165, 700	11, 419	2, 400	175		
Chubs	192, 100	23, 062	1, 439, 100	172, 692	277, 000	22, 157
Lake herring	5, 426, 800	164, 450	2, 337, 400	70, 182	227, 600	11, 381
Lake trout	1, 270, 100	190, 515	2, 479, 800	371, 670	174, 200	27, 834
Pike or pickerel (jacks)	25, 500	2, 550	18, 200	1, 820		
Rock bass	27, 900	1, 674	2, 600	156		
Sauger	2, 100	210	4, 400	40		
Sheepshead	19, 800	396	4, 400	88		
Smelt	100	3	668, 900	20, 067		
Steelhead trout					1, 200	240
Sucker "mullet"	1, 788, 200	53, 646	1, 300, 800	39, 024	5, 000	150
Whitefish:						
Common	558, 000	111, 600	1, 117, 100	223, 420		
Menominee	54, 200	5, 420	53, 800	5, 380		
Yellow perch	500, 400	40, 032	704, 100	50, 328	73, 000	3, 650
Yellow pike	1, 356, 100	135, 610	49, 600	4, 960		
Mussel shells ¹	5, 500	78	163, 000	4, 100		
Pearls and slugs ¹				79		
Total	12, 038, 700	759, 830	10, 389, 100	971, 466	763, 200	65, 596

Species	Lake Michigan—Continued					
	Illinois		Wisconsin		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
Burbot	5, 000	\$100	21, 100	\$211	24, 300	\$405
Carp			1, 829, 500	74, 675	1, 873, 000	75, 750
Catfish and bullheads			85, 700	4, 564	87, 500	4, 789
Chubs	524, 900	78, 730	3, 163, 100	379, 582	5, 404, 100	653, 141
Lake herring	145, 800	7, 289	1, 765, 500	92, 109	4, 477, 300	180, 961
Lake trout	111, 400	62, 277	1, 940, 200	388, 100	4, 905, 600	850, 181
Pike or pickerel (jacks)			200	20	18, 400	1, 840
Rock bass					2, 600	156
Sauger					400	40
Sheepshead			200	4	4, 600	92
Smelt			1, 172, 500	35, 175	1, 841, 400	55, 242
Steelhead trout					1, 200	240
Sucker "mullet"			552, 300	16, 459	1, 858, 100	55, 633
White bass			3, 400	204	3, 400	204
Whitefish:						
Common			141, 800	29, 196	1, 258, 900	262, 616
Menominee			21, 900	2, 190	75, 700	7, 570
Yellow perch	168, 400	8, 420	1, 258, 100	75, 363	2, 203, 600	143, 761
Yellow pike					49, 600	4, 960
Crawfish			6, 000	450	6, 000	450
Mussel shells ¹			130, 500	1, 825	293, 500	5, 925
Pearls and slugs ¹						79
Total	1, 155, 500	166, 816	12, 071, 500	1, 100, 107	24, 379, 300	2, 293, 985

Species	Lake Superior					
	Michigan		Wisconsin		Minnesota	
	Pounds	Value	Pounds	Value	Pounds	Value
Burbot	3, 300	\$33	5, 200	\$52		
Carp	800	9				
Chubs	47, 300	5, 676	145, 200	14, 520	63, 800	\$6, 380
Lake herring	2, 393, 800	71, 814	2, 484, 900	99, 340	5, 715, 000	117, 180
Lake trout	2, 184, 000	327, 400	520, 100	78, 120	462, 800	47, 195
Pike or pickerel (jacks)	1, 500	150	3, 200	310	400	44
Smelt	4, 300	129				
Sucker "mullet"	212, 000	6, 360	67, 900	2, 029	9, 400	258
Whitefish:						
Common	326, 900	65, 380	122, 700	24, 558	5, 900	754
Menominee	6, 900	690	13, 000	1, 300	3, 600	190
Yellow perch	6, 400	512	1, 500	90		
Yellow pike	5, 000	500	40, 400	4, 040		
Total	6, 191, 700	478, 653	3, 403, 500	224, 359	6, 260, 800	172, 001

¹ From tributary streams.

Lake fisheries of the United States, 1938—Continued

CATCH: BY LAKES—Continued

Species	Lake Superior—Continued		Lake of the Woods, Rainy Lake, and Namakan Lake		Total, all lakes	
	Total		Minnesota		Pounds	Value
	Pounds	Value	Pounds	Value		
Blue pike.....					8,717,900	\$594,248
Bowfin.....					5,600	112
Burbot.....	8,500	\$85	21,500	\$223	387,900	8,990
Carp.....	300	9	11,000	221	4,889,600	170,492
Catfish and bullheads.....			41,300	2,064	790,800	58,448
Chubs.....	256,300	26,576			5,852,500	702,769
Cisco.....					845,900	102,732
Crappie.....			400	16	400	16
Eels, common.....					44,300	2,658
Garfish.....					5,900	59
Goldfish.....					214,700	8,588
Lake herring.....	10,593,700	288,334	18,900	880	20,522,900	634,696
Lake trout.....	3,166,900	452,715			9,359,600	1,496,871
Mooneye.....					11,200	452
Pike or pickerel (jacks).....	5,100	504	168,000	12,687	281,100	18,991
Rock bass.....					38,300	2,298
Sauger.....			87,900	6,290	934,800	90,974
Sheepshead.....					3,416,700	100,723
Smelt.....	4,300	129			1,845,800	55,374
Steelhead trout.....					1,200	240
Sturgeon.....			100	26	30,900	10,196
Sucker "mullet".....	288,700	8,647	182,300	3,642	5,001,900	154,701
Sunfish.....					44,100	3,646
Tullibees.....			878,400	43,915	878,400	43,915
White bass.....					735,700	43,430
Whitefish:						
Common.....	455,400	90,692	63,500	6,315	3,802,500	659,118
Menominee.....	23,800	2,180			153,400	15,170
Yellow perch.....	7,900	602	59,800	2,684	8,016,800	601,925
Yellow pike.....	45,400	4,840	411,000	40,064	4,998,900	498,854
Crawfish.....					6,000	450
Mussel shells ¹					299,000	6,003
Pearls and slugs ¹						79
Total.....	14,856,000	875,013	1,941,900	118,776	81,524,500	6,063,212

¹ From tributary streams.

Industries related to the fisheries of the Lake States, 1938

OPERATING UNITS, SALARIES, AND WAGES

Item	New York	Pennsylvania	Ohio	Michigan	Indiana	Illinois	Wisconsin	Minnesota	Total
Transporting:									
Persons engaged, on vessels.....	Number	Number	Number	Number	Number	Number	Number	Number	Number
			21	9					30
Vessels:									
Steam.....			2						2
Net tonnage.....			63						63
Motor.....			12	3					15
Net tonnage.....			154	21					175
Total vessels.....			14	3					17
Total net tonnage.....			217	21					238
Wholesale and manufacturing:									
Establishments.....	17	6	48	45	3	46	36	13	214
Persons engaged:									
Proprietors.....	21	5	44	24	3	16	28	5	146
Salaried employees.....	33	8	76	76	2	211	49	31	486
Wage earners:									
Average for season.....	116	56	289	361	5	628	536	181	2,140
Average for year.....	79	39	208	193	5	500	187	57	1,268
Paid to salaried employees.....	\$42,832	\$15,825	\$168,475	\$146,364	\$1,920	\$568,974	\$196,830	\$40,956	\$1,182,175
Paid to wage earners.....	\$87,978	\$49,316	\$293,959	\$233,040	\$6,200	\$699,469	\$207,219	\$71,525	\$1,648,708
Total salaries and wages.....	\$130,807	\$65,141	\$462,434	\$379,404	\$8,120	\$1,268,443	\$404,049	\$112,480	\$2,830,878
Fishermen manufacturing.....			15	30		40	43	78	206

Industries related to the fisheries of the Lake States, 1938—Continued

PRODUCTS MANUFACTURED

Item	New York		Pennsylvania		Ohio		Indiana	
	Quantity (¹)	Value (¹)	Quantity (¹)	Value (¹)	Quantity (¹)	Value (¹)	Quantity (¹)	Value (¹)
By manufacturing establishments:								
Alewives, spiced...pounds.....								
Blue pike:								
Fresh filets.....do.....	401,042	\$82,828	231,920	\$43,663	1,106,219	\$239,866		
Frozen filets.....do.....	30,550	5,204	21,870	4,145	261,053	54,924		
Chub, cisco and tullibees, smoked.....pounds.....	(¹)	(¹)			(¹)	(¹)	55,000	\$13,200
Herring, lake, smoked.do.....	(¹)	(¹)						
Lake trout:								
Fresh filets.....do.....	2,509	697	(¹)	(¹)	(¹)	(¹)		
Smoked.....do.....							17,000	4,800
Sablefish, smoked.....do.....					(¹)	(¹)		
Salmon:								
Kippered.....do.....	(¹)	(¹)			(¹)	(¹)		
Smoked.....do.....	(¹)	(¹)			(¹)	(¹)		
Sauger:								
Fresh filets.....do.....	57,226	13,201	20,100	3,987	152,100	36,393		
Frozen filets.....do.....	35,132	6,973	(¹)	(¹)	61,000	14,100		
Sheepshead, smoked.....do.....					11,900	1,438		
White bass, fresh filets pounds.....	(¹)	(¹)	8,598	1,372	13,105	2,646		
Whitefish:								
Fresh filets.....do.....	(¹)	(¹)	(¹)	(¹)	(¹)	(¹)		
Smoked.....do.....	34,000	11,900			(¹)	(¹)	(¹)	(¹)
Yellow perch:								
Fresh filets.....do.....	35,613	7,218	25,052	4,686	367,396	83,000		
Frozen filets.....do.....					42,705	9,989		
Yellow pike:								
Fresh filets.....do.....	20,502	6,419	(¹)	(¹)	69,534	14,021		
Frozen filets.....do.....	(¹)	(¹)			10,950	2,975		
Unclassified products:								
Filets, fresh and frozen pounds.....	(¹)	(¹)	\$ 7,708	\$ 2,131	(¹)	(¹)		
Smoked.....do.....	274,000	72,900			149,500	39,312	(¹)	(¹)
Miscellaneous.....do.....		26,809				39,805		
Total.....		233,149	315,248	69,984		538,469	72,000	18,000
By fishermen:								
Catfish and bullheads, smoked.....pounds.....					10,000	2,000		
Carp, smoked.....do.....					5,000	500		
Herring, lake, smoked.....do.....					1,000	100		
Sheepshead, smoked.....do.....					25,000	2,500		
Whitefish, smoked.....do.....					2,000	600		
Yellow pike, smoked.....do.....					2,000	400		
Total.....					45,000	6,100		
Grand total.....		233,149	315,248	69,984		544,569	72,000	18,000

Item	Illinois		Michigan		Wisconsin		Minnesota	
	Quantity (¹)	Value (¹)	Quantity (¹)	Value (¹)	Quantity (¹)	Value (¹)	Quantity (¹)	Value (¹)
By manufacturing establishments:								
Alewives, spiced pounds.....	1,660,000	\$308,000			436,300	\$62,900		
Blue pike:								
Fresh filets.....do.....	433,514	92,802	(¹)	(¹)	(¹)	(¹)		
Frozen filets.....do.....	(¹)	(¹)						
Chub, cisco and tullibees, smoked.....pounds.....	1,670,000	470,760	295,700	\$72,300	619,911	154,682	45,000	\$9,300
Herring, lake:								
Fresh filets.....do.....	(¹)	(¹)	(¹)	(¹)	7,200	820		
Salted.....do.....			1,518,960	61,342	(¹)	(¹)	633,000	26,175
Smoked.....do.....	(¹)	(¹)	41,016	5,498	508,000	49,300	48,500	4,850
Lake trout:								
Fresh filets.....do.....	4,029	1,016	(¹)	(¹)	(¹)	(¹)		
Smoked.....do.....	87,785	23,435	108,659	36,631	207,000	54,252	(¹)	(¹)
Sablefish, smoked.....do.....	(¹)	(¹)	(¹)	(¹)	65,100	13,788		
Salmon:								
Kippered.....do.....	69,700	22,855					(¹)	(¹)
Smoked.....do.....	666,000	257,370	303,308	60,814	137,000	29,160		

See footnotes at end of table.

Industries related to the fisheries of the Lake States, 1938—Continued

PRODUCTS MANUFACTURED—Continued

Item	Illinois		Michigan		Wisconsin		Minnesota	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
By manufacturing establishments—Continued.								
Sauger:					163,000	\$30,460		
Fresh fillets.....do.....	696,738	\$147,216	(1)	(1)	(1)	(1)		
Frozen fillets.....do.....	473,170	105,575						
Whitefish:								
Fresh fillets.....do.....	9,835	2,795			(1)	(1)	(1)	(1)
Smoked.....do.....			46,589	\$10,061	(1)	(1)		
Yellow perch:								
Fresh fillets.....do.....	214,918	49,650	(1)	(1)	189,500	42,365		
Frozen fillets.....do.....	50,107	11,700			(1)	(1)		
Yellow pike:								
Fresh fillets.....do.....	190,823	41,738			64,000	14,140		
Frozen fillets.....do.....	10,458	2,328			56,000	8,800		
Unclassified products:								
Fillets, fresh and frozen pounds.....	4 34,127	6 6,609	6 215,250	8 38,706	6 69,300	6 16,940		
Smoked.....do.....	10 128,506	10 34,395	(1)	(1)	11 40,000	11 6,420	(1)	(1)
Miscellaneous.....do.....	14 211,447			18 7,790		16 68,566		17 334,730
Total.....do.....		1,789,751		293,742		552,593		76,055
By fishermen:								
Chub, cisco, and tullibees, smoked.....pounds.....	110,000	33,000	13,000	3,900	90,000	27,000		
Herring, lake:								
Salted.....do.....			160,000	4,500	20,000	800	125,000	5,000
Smoked.....do.....			2,000	200	20,000	2,000		
Lake trout, smoked.....do.....	45,000	15,750	12,500	3,750	5,000	1,500		
Sturgeon roe, salted.....do.....							25	20
Suckers, smoked.....do.....			1,000	100				
Whitefish, smoked.....do.....			2,500	850				
Total.....do.....	155,000	48,750	181,000	13,300	135,000	31,300	125,025	5,020
Grand total.....do.....		1,838,501		307,042		583,893		80,075

¹ The production of this item has been included under "Unclassified products."

² This item has been included under "Miscellaneous."

³ Includes fresh fillets of lake trout, whitefish, and yellow pike; and frozen fillets of sauger.

⁴ Includes fresh fillets of halibut, lake herring, red snapper, sheepshead, and suckers; and frozen fillets of blue pike, lake herring, lake trout, red snapper, and whitefish.

⁵ Includes fresh fillets of blue pike, lake herring, lake trout, and yellow perch; and frozen fillets of lake herring and sauger.

⁶ Includes fresh fillets of blue pike, lake trout, and whitefish; and frozen fillets of sauger and yellow perch.

⁷ Includes smoked chub, cisco, eels, lake herring, salmon and tullibees; and kippered salmon.

⁸ Includes smoked chub, cisco, tullibees, mooneye, sablefish, suckers, whitefish, and kippered salmon.

⁹ Included with miscellaneous products in Illinois.

¹⁰ Includes smoked buffalo fish, carp, eels, lake herring, sea herring, sablefish, sturgeon, and shad.

¹¹ Includes smoked carp and whitefish.

¹² Includes fresh fillets of white bass, whitefish and whiting; frozen fillets of lake trout and yellow pike; and spiced alewives and sea herring.

¹³ Includes fresh fillets of lake trout, red snapper, sole, and whitefish; frozen fillets of white bass; and spiced alewives and sea herring.

¹⁴ Includes spiced sea herring, canned hard clam oyster, and a small production of smoked whitefish produced in Indiana.

¹⁵ Includes smoked carp and sablefish, and spiced sea herring.

¹⁶ Includes spiced chubs, lake herring, and sea herring; salted lake herring; canned whitefish caviar; burbot liver oil; and mussel-shell poultry feed and lime.

¹⁷ Includes smoked lake trout, salmon, and whitefish; spiced alewives, and sea herring; and burbot liver oil.

NOTE.—The total value of the manufactured products for the Lake States was as follows: By manufacturing establishments, \$3,560,743; and by fishermen, \$104,470. Some of the above products may have been manufactured from products imported from another State or a foreign country; therefore, they cannot be correlated directly with the catch within the State. All but 10 of the persons engaged in the preparation of fishermen's manufactured products also have been included as fishermen. This should be considered when computing the total number of persons in the fishery industries exclusive of duplication.

RECEIPTS OF FISHERY PRODUCTS AT CHICAGO, ILL.

Receipts of fishery products in the wholesale marketing area of Chicago, Ill., as collected and compiled by the Division's Fishery Market News Service, totaled 48,418,745 pounds during 1939; the largest receipts aggregating 5,658,461 pounds, occurring in October, and the smallest amounting to 2,553,876 pounds in February. Michigan, with shipments of 6,219,304 pounds, was the most important State supplying the Chicago market. Following in order were Wisconsin, Louisiana, Massachusetts, and Ohio. Among the Canadian Provinces, British Columbia, with 5,511,824 pounds, supplied the most fish to the Chicago market; however, 1,895,735 pounds of this quantity were captured by United States fishermen and shipped through British Columbia ports in bond. Second in importance among the Canadian Provinces was Manitoba with shipments of 4,917,324 pounds.

Receipts of fresh and frozen fishery products at Chicago, Ill., 1939

BY SPECIES AND MONTHS

Species	January	February	March	April	May	June
FRESH-WATER FISH						
Blue pike.....	<i>Pounds</i> 2,240	<i>Pounds</i>	<i>Pounds</i> 13,480	<i>Pounds</i> 27,631	<i>Pounds</i> 284,133	<i>Pounds</i> 197,692
Bowfin.....	504		1,024	254	319	
Brook trout.....	260	70	487	380	793	1,485
Buffalofish.....	49,248	12,332	57,498	73,199	69,912	38,673
Bullheads.....	21,205	11,048	4,920	11,682	36,485	16,101
Burbot.....		407	149	229	54	7
Carp.....	109,280	98,806	192,425	174,355	210,296	130,088
Catfish.....	7,866	3,649	5,263	8,682	30,712	36,007
Chubs.....	88,940	50,330	46,755	59,755	83,022	87,834
Cisco.....				3,010		
Eels.....		150	5,099	125	3,552	324
Lake herring.....	188,327	89,166	287,302	222,760	224,491	225,881
Lake trout.....	246,575	131,686	224,573	268,535	557,287	443,818
Lake trout, frozen.....		1,257	36,119	3,666	1,345	
Menominee.....	305	228	625	5,293	8,172	2,231
Pickeral (jacks).....	17,821	6,309	19,195	35,011	20,044	17,111
Pickeral (jacks), frozen.....		4,370	6,928	774		
Rock bass.....				2,655	5,088	3,289
Sauger.....	744,817	378,763	465,429	160,959	28,350	20,703
Sauger, frozen.....	77,607	96,907	739,274	68,661		16,855
Sheepshead.....	73,165	27,640	70,567	30,055	211,295	119,941
Smelt.....	7,991	68,604	179,314	498,287	29,634	44,051
Smelt, frozen.....	22,380	4,000				
Suckers.....	52,568	46,299	35,983	111,284	81,342	108,966
Tullibee filets.....						270
Tullibee, frozen.....	5,810	39,899	182			
Whitefish.....	230,797	86,841	169,601	78,839	180,886	269,085
Whitefish, frozen.....	5,690	61,028	143,664	6,206	10,521	2,828
Yellow perch.....	213,318	92,699	157,337	199,922	241,056	101,751
Yellow perch, frozen.....	369	1,784	5,666	588		14,393
Yellow pike.....	230,089	86,692	101,712	272,928	211,078	112,029
Yellow pike, frozen.....	6,076	4,045	23,582	10,195		3,981
Unclassified.....	443	380	1,170	805	910	
Total.....	2,403,721	1,405,289	2,965,291	2,333,123	2,525,736	2,015,384

NOTE.—Includes all rail arrivals as reported by freight and express terminals, and truck receipts as reported by wholesale dealers, including smokers. Local cold-storage withdrawals and direct truck shipments to hotels, restaurants, chain stores, and other retailers are not included. Weights shown are for fishery products as received.

Receipts of fresh and frozen fishery products at Chicago, Ill., 1939—Continued

BY SPECIES AND MONTHS—Continued

Species	July	August	September	October	November	December	Total
FRESH-WATER FISH							
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Blue pike.....	54,094	122,740	44,895	94,703	195,012	63,872	1,100,472
Bowfin.....					180	150	2,431
Brook trout.....	70	100	783	858	484	110	5,915
Buffalofish.....	68,306	66,775	73,796	64,452	45,270	45,863	666,312
Bullheads.....	22,282	16,781	41,086	54,968	29,051	19,432	285,041
Burbot.....	60				383	328	1,617
Carp.....	91,060	117,293	161,961	132,240	129,299	110,254	1,657,827
Catfish.....	30,744	30,660	29,766	23,833	33,451	18,146	258,779
Chubs.....	130,392	138,629	119,677	124,233	127,804	122,248	1,179,619
Cisco.....		22,320		115	1,955	3,349	30,749
Crappie.....			786	2,029	2,139	3,160	8,114
Eels.....	3,014	6,032	8,788	54,051	33,199	10,492	124,826
Lake herring.....	186,531	82,279	59,492	253,176	289,856	212,187	2,291,448
Lake trout.....	426,751	425,045	453,204	695,193	965,118	847,697	5,065,482
Lake trout, frozen.....			30,200	13,700		73,875	160,162
Menominee.....	2,446	3,960	1,693	2,000	8,595	5,064	36,512
Pickeral (jacks).....	24,810	21,431	37,992	42,987	23,534	22,866	288,601
Pickeral (jacks), frozen.....					1,400		13,472
Rock bass.....	2,149	1,352	4,352	4,490	409	74	23,833
Sauger.....	3,860	1,936	64,923	229,081	26,579	85,242	2,210,342
Sauger, frozen.....	43,199	37,014	89,971	47,835	15,000	61,337	1,293,560
Sheepshead.....	49,609	21,617	28,216	58,336	27,084	31,606	749,031
Smelt.....	37,171	50,745	35,341	26,774		27,463	1,025,289
Smelt, frozen.....					1,880	684	28,944
Suckers.....	91,432	60,044	95,191	73,098	63,735	60,878	879,820
Sunfish.....	761	250	2,764	10,418	5,385	600	20,178
Tullibee.....		14,825	25,376	21,680	400	703	63,084
Tullibee filets.....	1,453	675	2,580	3,005	450		9,033
Tullibee, frozen.....					7,470		53,361
White bass.....	1,710	9,750	9,861	15,601	4,419	300	41,641
Whitefish.....	341,114	235,906	246,062	274,494	328,966	279,819	2,718,910
Whitefish, frozen.....		23,316		96,186			354,449
Yellow perch.....	158,326	191,966	204,348	308,971	262,812	327,309	2,459,714
Yellow perch, frozen.....							23,550
Yellow pike.....	70,253	77,957	155,014	145,637	103,340	77,544	1,650,266
Yellow pike, frozen.....				1,550	7,500		56,929
Unclassified.....	1,637	4,238	6,366	6,660	4,602	5,976	38,187
Total.....	1,848,934	1,799,736	2,034,489	2,783,674	2,756,675	2,018,948	26,891,000

Species	January	February	March	April	May	June
SALT-WATER FISH						
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Bluefish.....			58	400	4,700	750
Butterfish.....					2,700	5,775
Cod.....	10,672	1,872	3,005	5,475	6,640	2,070
Cod filets, frozen.....	80,000	9,660	39,050	35,430	31,885	29,590
Croaker.....			19,915			
Flounders.....	1,927	2,704		11,795	11,765	7,885
Haddock.....	7,838	2,160	4,575	14,175	3,525	3,030
Haddock filets, frozen.....	34,750	30,885	19,885	30,830	31,000	23,310
Halibut.....			750	274,207	679,791	358,178
Halibut, frozen.....	372,715	394,065	576,915	45,100		82,538
Herring, sea (sardine).....	7,900	2,000		175		
Jewish (warsaw).....	600	530		1,000	1,200	
Kingfish (king mackerel).....		1,200		100		
Mackerel.....	8,200		900	850	16,000	10,725
Mullet.....	100	200				
Pollock filets, frozen.....		53,605	31,350	52,560	21,620	25,305
Pompano.....	2,891			375	1,492	118
Rosefish filets, frozen.....	139,840	121,725	139,425	166,325	117,540	160,700
Sablefish, frozen.....	6,500	4,000	22,816			
Salmon:						
Chinook (king).....				2,009	45,508	58,175
Chinook (king), frozen.....		1,500				
Chum (fall), frozen.....	10,500	33,000	2,000			
Silver.....						4,950
Silver, frozen.....	8,000	9,500	17,000	7,800		
Unclassified, frozen.....	82,901	20,650	69,244	9,150		

Receipts of fresh and frozen fishery products at Chicago, Ill., 1939—Continued

BY SPECIES AND MONTHS—Continued

Species	January	February	March	April	May	June
SALT-WATER FISH—continued						
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Scup (porkey).....	1,600	1,275	300	875	3,400	4,535
Sea bass.....	200	500	580	1,700	2,267	11,359
Shad.....		700	1,705	27,578	23,076	
Shad, frozen.....			25			
Snapper, red.....	16,470	11,400	4,426	16,875	35,950	1,561
Sole:						
Gray.....	2,226	150	100	1,043	100	
Lemon.....	100		1,186	1,577	75	100
Fillets.....				1,200	600	500
Fillets, frozen.....	17,555		5,660	200		
Spanish mackerel.....	3,200	1,000	50		500	
Swordfish, frozen.....				1,256	4,200	
Whiting.....	8,170	45,875	5,000	300	2,170	750
Whiting fillets, frozen.....			11,000	6,000	12,475	1,500
Wolfish (catfish).....		1,000				
Unclassified.....	9,770	1,702	2,425	4,285	5,175	3,710
Total.....	829,945	752,848	981,860	720,645	1,065,349	797,111
SHELLFISH, ETC.						
Bullfrogs.....		600	1,224	2,344	192	
Clams:						
Hard.....	5,200	7,200	6,940	5,300	12,300	1,200
Soft.....	150	370	150			
Crabs:						
Hard.....	720	734	1,138	8,020	2,040	725
Soft.....		206	1,325	6,171	10,332	11,676
Crab meat.....	3,457	1,615	1,998	5,644	11,765	5,560
Frog legs.....	434	97	248	406	802	1,270
Lobsters.....	9,572	7,150	8,050	9,415	19,076	10,109
Lobster meat.....			169	50	548	300
Oysters, shell.....	116,300	57,900	56,600	53,000		600
Oysters, shucked.....	99,204	199,556	65,301	21,657		18
Scallops, sea.....			1,545	6,000	22,788	260
Shrimp.....	244,425	108,223	113,215	234,572	895,700	779,070
Shrimp, frozen.....			20,000	91,780	30,000	
Spiny lobster tails.....		9,490	4,500	4,000	10,200	3,000
Squid, frozen.....			2,574	6,202	34,742	4,935
Turtle, snapping.....		2,495		1,793		588
Turtle meat.....		103		334	120	112
Unclassified.....	150		30			
Total.....	479,612	395,739	284,997	456,688	1,050,605	819,413
Grand total.....	3,713,278	2,553,876	4,232,148	3,510,466	4,641,600	3,631,908

Species	July	August	September	October	November	December	Total
SALT-WATER FISH							
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Bluefish.....	525	900	494	910	2,555	15,070	26,362
Butterfish.....	6,490	2,400	1,202	1,150	800	1,400	22,237
Cod.....	1,825	5,640	5,900	11,380	3,641	4,295	62,415
Cod filets, frozen.....	9,150	30,000	90,055	7,985	34,505	14,655	411,945
Croaker.....	9,000	1,500	1,500	16,360			47,275
Flounders.....	3,340	3,120	3,360	5,640	2,395	5,785	62,061
Haddock.....	16,155	3,275	5,031	5,625	3,881	13,105	82,365
Haddock filets, frozen.....	66,300	59,500	92,765	17,250	19,000	75,870	501,345
Halibut.....	592,480	496,578	541,615	552,682	31,300		3,526,828
Halibut, frozen.....	30,000	64,792	228,988	339,191	628,447	435,334	3,198,085
Herring, sea (sardine).....	7,300		19,400		31,500	4,000	72,275
Jewfish (warsaw).....		800	1,310	1,575	1,000	2,170	10,185
Kingfish (king mackerel).....				600		600	2,500
Mackerel.....	5,950	7,325	21,684	19,365	16,715	8,510	110,224
Mackerel, frozen.....	6,000		10,000		485	9,625	26,110
Mullet.....			400	3,072	5,307	4,350	13,429
Pollock filets, frozen.....	7,500	6,000	1,500	1,500	31,120	34,650	265,210
Pompano.....	1,158	2,521	2,303	5,951	5,265	17,148	39,222
Rosefish filets, frozen.....	117,000	167,000	254,930	270,550	168,230	106,690	1,938,955
Sablefish, frozen.....				9,800	6,845		49,981

Receipts of fresh and frozen fishery products at Chicago, Ill., 1939—Continued

BY SPECIES AND MONTHS—Continued

Species	July	August	September	October	November	December	Total
SALT-WATER FISH—continued							
Salmon:	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Chinook (king)	49,845	54,944	20,881	5,822			237,179
Chinook (king), frozen			700	38,750	19,300	25,000	85,250
Chum (fall)				15,200			15,200
Chum (fall), frozen		15,000		41,600	53,850	39,325	195,275
Pink (humpback)		7,500	21,000				28,500
Silver	28,200	41,880	62,329	129,888	38,397		305,644
Silver, frozen		10,000	1,000	43,000	39,897	47,738	183,935
Unclassified, frozen							181,945
Scup (porgy)	3,200	1,000	1,250	7,396	3,575	5,225	33,631
Sea bass	5,705	1,300	700	1,900	6,819	1,983	35,013
Sea trout, gray (weakfish)			1,800				1,800
Shad							52,359
Shad, frozen							725
Snapper, red	11,655	10,150	12,680	29,054	16,730	69,838	236,789
Sole:							
Gray		450		1,950	400	2,537	8,956
Lemon	2,800			650	300	150	6,938
Fillets	4,000						6,300
Fillets, frozen							21,594
Spanish mackerel				1,000			32,170
Swordfish, frozen					300	10,000	15,756
Whiting	3,300	24,500		4,780	200	12,120	107,165
Whiting fillets, frozen	7,000	12,061	15,395	1,500	9,500	12,000	88,431
Wolfish (catfish)		1,500		5,130		5,140	12,770
Unclassified	5,566	9,374	12,461	14,130	7,882	6,860	83,340
Total	1,001,444	1,041,010	1,431,133	1,620,316	1,189,141	1,044,917	12,475,719
SHELLFISH, ETC.							
Bullfrogs				115			4,475
Clams:							
Hard	5,650	3,150	8,661	21,055	24,505	38,935	140,066
Soft				525	1,061	373	2,629
Crabs:							
Hard	1,200	990	3,632	4,022	1,068	1,453	25,742
Soft	3,221	11,067	5,644	1,760			51,402
Crab meat	6,152	5,250	7,347	11,706	8,718	10,382	79,584
Crawfish	925		4,656	875			8,456
Frog legs	3,418	2,939	1,166	4,710	392	1,893	17,775
Lobsters	11,850	10,139	25,494	31,930	33,078	29,886	205,749
Lobster meat		609					1,076
Oysters, shell		3,060	59,580	143,095	154,460	98,343	742,938
Oysters, shucked			98,959	188,418	183,033	229,056	1,085,526
Scallops, sea	6,643	1,000	10,228	18,308	22,810	14,004	103,576
Shrimp	528,422	412,750	409,892	707,874	749,045	744,516	5,927,704
Shrimp, frozen			29,500	113,540	93,220	92,724	470,704
Spiny lobster tails	2,600		50	5,200	19,080	26,315	84,435
Squid, frozen	21,200	2,000	4,351	400	11,800	2,000	90,204
Turtle, snapping	1,594		340	938	6	2,081	9,835
Turtle meat		750				195	1,614
Unclassified							180
Total	592,875	453,704	669,490	1,254,471	1,302,276	1,292,156	9,052,026
Grand total	3,443,253	3,294,450	4,135,112	5,658,461	5,248,092	4,356,021	48,418,745

BY ORIGIN AND MONTHS

Origin	January	February	March	April	May	June
DOMESTIC						
Alabama	29,335	14,530	4,228	11,500	41,600	
Arkansas			700	104		24
California	92	94		114	28,612	
Florida	10,237	5,433	4,133	8,575	31,662	2,241
Georgia						
Illinois	166,303	102,089	292,601	224,092	68,247	28,235
Indiana	18,405	17,022	35,035	14,060	4,771	4,952
Iowa	76,688	9,360	70,403	81,118	82,286	62,948
Louisiana	155,089	48,177	136,779	252,210	757,170	602,917
Maine	20,676		51,641	47,322	250	2,400
Maryland	44,239	105,249	13,757	29,654	23,096	11,716
Massachusetts	180,200	261,537	164,194	294,045	284,728	265,279

Receipts of fresh and frozen fishery products at Chicago, Ill., 1939—Continued

BY ORIGIN AND MONTHS—Continued

Origin	January	February	March	April	May	June
DOMESTIC—continued						
Michigan	Pounds 270,875	Pounds 99,011	Pounds 235,280	Pounds 584,619	Pounds 767,710	Pounds 621,697
Minnesota	167,811	23,690	9,412	53,648	53,930	113,787
Mississippi	14,206	14,395	1,050			588
Missouri	443	2,175	2,118	380	543	985
New Jersey	22,722	11,335	16,205	1,675	5,400	150
New York	102,750	47,980	76,590	70,670	61,272	42,412
North Carolina	2,880	934	2,017	4,722	2,895	
Ohio	2,500	300	32,030	398,180	757,495	358,071
Oregon	710	724	1,138	920	1,478	725
Pennsylvania				14,296	9,684	10,052
Rhode Island			600	1,000		
South Carolina		450		130	310	
Texas	67,690	45,648		88,025	150,345	181,282
Virginia	49,830	110,748	74,617	28,923	14,890	2,732
Washington	71,250	25,000	56,292	33,719	120,694	56,155
Wisconsin	264,494	329,292	506,208	810,466	609,824	535,771
Alaska	220,989	136,000	263,346	44,000	118,312	102,000
Total	1,960,416	1,411,173	2,050,372	3,078,765	3,996,634	3,006,995
IMPORTED						
Alberta	195,100	68,788	203,253	39,615		101,500
British Columbia ¹	191,377	301,715	369,337	284,747	487,848	346,188
British Columbia (in bond) ²	(¹)	(¹)	(¹)	(¹)	(¹)	(¹)
Manitoba	1,193,443	683,468	1,370,728	86,324	19,375	57,176
New Brunswick	24,982	2,160	1,500	150	860	1,200
Nova Scotia	133,840	23,885	46,400		198	
Ontario	5,933	14,064	21,452	40,855	137,275	118,854
Saskatchewan	8,187	48,635	169,106			
Total	1,752,862	1,142,703	2,181,776	431,691	645,056	624,913
Grand total	3,713,278	2,553,876	4,232,148	3,510,456	4,641,690	3,631,908

Origin	July	August	September	October	November	December	Total
DOMESTIC							
Alabama	Pounds 19,160	Pounds 10,050	Pounds 2,810	Pounds 55,590	Pounds 19,280	Pounds 51,019	Pounds 259,070
Arkansas					104		932
California			114	196	96	30	28,912
Colorado			5,845	2,735	7,308	1,406	436
Connecticut				180			17,294
Delaware							180
Florida	5,457	4,065	16,869	24,740	26,302	104,786	244,400
Georgia			128	9			137
Illinois	49,704	98,783	72,587	144,265	203,219	158,661	1,608,786
Indiana	5,252	1,510	10,597	2,338	31,697	23,717	169,956
Iowa	97,328	69,797	89,804	143,658	84,938	92,251	960,479
Louisiana	414,312	394,820	121,653	209,446	533,992	652,488	4,279,053
Maine	5,525	300	26,359	12,199	63,901	45,650	276,223
Maryland	2,131	11,667	12,887	10,933	16,855	9,123	291,107
Massachusetts	231,313	313,430	416,397	416,997	315,201	227,206	3,370,527
Michigan	467,263	455,049	559,046	609,938	910,614	658,302	6,219,304
Minnesota	156,502	180,134	213,453	430,123	167,836	164,697	1,740,927
Mississippi	21,085	64		2,136	1,111	1,332	55,969
Missouri	70	152	156	90	486	80	7,678
New Jersey			34,805	64,872	40,340	71,900	269,404
New York	43,895	10,311	87,016	163,787	178,230	102,376	987,883
North Carolina	295	400	1,052	1,909	12,259	7,561	36,924
Ohio	149,317	166,819	141,914	152,333	306,907	24,268	2,489,164
Oregon	1,200	720	240	60,756	26,630	684	95,625
Pennsylvania	628	14,963	18,850	16,988	18,086	17,950	121,497
Rhode Island			1,260	13,890		5,985	22,785
South Carolina							890

¹ Includes "in bond" shipment prior to September.² Consists of catch taken by United States vessels and shipped in bond through British Columbia ports to Chicago.³ Data not available.

Receipts of fresh and frozen fishery products at Chicago, Ill., 1939—Continued

BY ORIGIN AND MONTHS—Continued

Origin	July	August	September	October	November	December	Total
DOMESTIC—continued							
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Texas.....	93,740	26,000	327,710	589,021	311,515	192,610	2,073,616
Virginia.....	15,550	5,580	53,234	127,960	142,971	192,948	819,483
Washington.....	66,800	80,483	191,147	199,172	134,093	81,503	1,116,303
Wisconsin.....	454,746	392,993	421,808	476,768	525,671	436,589	5,764,630
Alaska.....	101,000	75,000	35,698	80,917	90,000	57,253	1,324,515
Total.....	2,402,273	2,317,990	2,864,039	4,013,736	4,169,352	3,382,304	34,654,349
IMPORTED							
Alberta.....	111,850	112,850	135,150			73,875	1,041,979
British Columbia ¹	532,725	535,331	193,563	279,499	46,597	67,167	3,616,089
British Columbia (in bond) ²	(³)	(³)	456,297	556,986	522,159	360,293	1,895,735
Manitoba.....	245,734	188,519	269,265	462,022	87,008	254,262	4,917,324
New Brunswick.....	2,800	3,799	5,591	8,350	0,100	0,150	69,132
Nova Scotia.....	38,800	26,000	109,600		23,120	111,788	513,631
Ontario.....	101,236	104,683	93,584	258,548	360,514	86,925	1,346,923
Quebec.....	2,235	5,278	7,188	52,570	20,942	10,257	107,470
Saskatchewan.....	2,600		835	26,750			256,113
Total.....	1,010,980	976,460	1,271,073	1,644,725	1,078,440	973,717	13,764,306
Grand total.....	3,443,253	3,294,450	4,135,112	5,658,461	5,248,092	4,356,021	48,418,745

¹ Includes "in bond" shipments prior to September.² Consists of catch taken by United States vessels and shipped in bond through British Columbia ports to Chicago.³ Data not available.**FISHERIES OF THE MISSISSIPPI RIVER AND TRIBUTARIES**

The most recent complete catch statistics of the fisheries for the States of the Mississippi River and tributaries are those collected for the year 1931. 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 quantity and 36 percent in value as compared with the quantity and value of the catch in 1922, when the most recent preceding survey was made. Detailed statistics of the fisheries of the Mississippi River and tributaries for 1931 appear in "Fishery Industries of the United States, 1932," by R. H. Fiedler, Appendix III to the Report of the Commissioner of Fisheries for the fiscal year 1933.

A summary of these fisheries in 1931 has been published in the Bureau's annual reports entitled, "Fishery Industries of the United States," by R. H. Fiedler, for the years from 1933 to 1938 inclusive. Information regarding the production of cured manufactured products in the Mississippi River area in 1931 and of mussel-shell products for 1938 appear in the following table. Data on the fisheries of Lakes Pepin and Keokuk and the Mississippi River between the two Lakes for 1938 are shown in succeeding tables.

Industries related to the fisheries of the Mississippi River and tributaries

PRODUCTS MANUFACTURED

Item	Indiana		Illinois, Iowa, and Missouri		Louisiana	
	Quantity	Value	Quantity	Value	Quantity	Value
By manufacturing establishments:						
Salmon, smoked.....pounds			240,000	\$48,800		
Sturgeon, smoked.....do			162,000	39,140		
Mussel-shell products:						
Buttons ¹.....groes			8,376,261	2,189,481		
Poultry feed ².....tons			4,083	23,282		
Lime ³.....do			1,064	998		
Unclassified ⁴.....do				\$22,390		
Unclassified, smoked.....pounds			483,000	414,440		
Total				2,338,531		
By fishermen:						
Alligator hides.....pounds					88,356	\$7,363
Carp, smoked.....do			667	67		
Paddlefish roe, salted.....do	450	\$180	900	540		
Sheepshead, smoked.....do			617	77		
Sturgeon:						
Smoked.....do			1,333	400		
Roe, salted.....do			35	32		
Total	450	180	3,552	1,116	88,356	7,363
Grand total	450	180		2,339,647	88,356	7,363

Item	Minnesota and Nebraska		Mississippi		Ohio, Tennessee, and Pennsylvania	
	Quantity	Value	Quantity	Value	Quantity	Value
By manufacturing establishments:						
Chubs, smoked.....pounds					106,600	\$26,650
Salmon, smoked.....do	(1)	(1)			(1)	(1)
Sturgeon, smoked.....do	(1)	(1)				
Whitefish, smoked.....do	255,000	\$47,200			(1)	(1)
Unclassified, smoked.....do	66,600	19,793			184,900	50,555
Total	321,600	66,993			291,500	77,205
By fishermen:						
Paddlefish roe, salted.....pounds			245	\$92		
Grand total	321,600	66,993	245	92	291,500	77,205

¹ The production of this item is included under unclassified products.

² Data are for 1938.

³ Includes mussel-shell chips and novelties.

⁴ Includes smoked buffalo fish and tullibees.

⁵ Includes smoked eels, salmon, and sturgeon.

⁶ Includes smoked buffalo fish, butterfish, carp, lake trout, paddlefish, sablefish, salmon, tullibees, and whitefish.

NOTE.—Unless otherwise indicated, the data are for 1931. The total value of the manufactured products for the States of the Mississippi River and tributaries was as follows: By manufacturing establishments, \$2,482,729; and by fishermen, \$8,751. Some of the products may have been manufactured from fishery products imported from another State or a foreign country; therefore, they cannot be correlated directly with the catch within the State.

LAKE PEPIN

Fisheries of Lake Pepin, 1938

OPERATING UNITS: BY GEAR

Item	Haul seines	Stake gill nets	Trot lines	Total, exclusive of duplication
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Regular.....	33	29	.....	33
Casual.....	10	44	25	63
Total	43	73	25	96
Boats:				
Motor.....	15	31	12	35
Other.....	3	17	13	25
Apparatus:				
Number.....	15	590	25	.....
Length, yards.....	5,832	.....	.....	.....
Square yards.....	.....	57,608	.....	.....
Hooks.....	.....	.....	2,500	.....

CATCH: BY GEAR

Species	Haul seines		Stake gill nets		Trot lines		Total	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Bowfin.....	3,600	\$51	.....	.....	.....	.....	3,600	\$51
Buffalofish.....	27,900	1,115	10,100	\$505	.....	.....	38,000	1,620
Carp.....	321,500	8,036	264,100	10,142	2,300	\$80	587,900	18,263
Catfish and bullheads.....	69,500	5,553	700	35	9,500	760	79,700	6,348
Mooneye.....	1,500	43	.....	.....	.....	.....	1,500	43
Sheepshead.....	47,000	1,850	300	10	800	27	48,100	1,917
Sucker "mullet".....	26,000	391	.....	.....	.....	.....	26,000	391
Total	497,000	17,068	275,200	10,692	12,000	873	784,800	28,633

OPERATING UNITS: BY STATES

Item	Minnesota	Wisconsin	Total for lake
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>
Regular.....	.....	33	33
Casual.....	9	54	63
Total	9	87	96
Boats:			
Motor.....	4	81	35
Other.....	5	20	25
Apparatus:			
Haul seines.....	.....	15	15
Length, yards.....	.....	5,832	5,832
Stake gill nets.....	.....	590	590
Square yards.....	.....	57,608	57,608
Trot lines.....	9	16	25
Hooks.....	900	1,600	2,500

CATCH: BY STATES

Species	Minnesota		Wisconsin		Total	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Bowfin.....	.....	.....	3,600	\$51	3,600	\$51
Buffalofish.....	.....	.....	38,000	1,620	38,000	1,620
Carp.....	1,000	\$80	586,900	18,203	587,900	18,283
Catfish and bullheads.....	1,500	150	78,200	6,188	79,700	6,348
Mooneye.....	.....	.....	1,500	43	1,500	43
Sheepshead.....	.....	.....	48,100	1,917	48,100	1,917
Sucker "mullet".....	.....	.....	26,000	391	26,000	391
Total	2,500	210	782,300	28,423	784,800	28,633

LAKE KEOKUK

Fisheries of Lake Keokuk, 1938

OPERATING UNITS: BY GEAR

Item	Haul seines	Trammel nets	Trot lines	Fyke nets	Total, exclusive of duplication
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Regular.....	7	7	1	19	22
Casual.....	13	21	8	34	60
Total.....	20	28	9	53	82
Boats:					
Motor.....	6	11	4	24	34
Other.....	7	11	5	18	29
Apparatus:					
Number.....	9	18	45	740	
Length, yards.....	1,598				
Square yards.....		3,928			
Hooks.....			4,500		

CATCH: BY GEAR

Species	Haul seines		Trammel nets		Trot lines		Fyke nets		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Bowfin.....							100	\$2	100	\$2
Buffalofish.....	31,500	\$1,260	8,000	\$340			72,900	2,228	112,400	3,828
Carp.....	100,000	2,000	91,000	1,820	1,700	\$40	156,000	3,120	348,700	6,980
Catfish and bullheads.....	5,000	419	1,500	140	6,000	500	57,700	5,670	70,200	6,729
Paddlefish or spoonbill cat.....	2,400	192							2,400	192
Sheepshead.....	42,000	2,100	5,000	250	1,200	60	29,100	1,455	77,300	3,865
Total.....	180,900	5,971	105,500	2,550	8,900	600	315,800	12,475	611,100	21,596

OPERATING UNITS: BY STATES

Item	Illinois		Iowa		Total for lake
	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	
Fishermen:					
Regular.....	12	10			22
Casual.....	29	31			60
Total.....	41	41			82
Boats:					
Motor.....	18	16			34
Other.....	12	17			29
Apparatus:					
Haul seines.....	1	8			9
Length, yards.....	333	1,265			1,598
Trammel nets.....		18			18
Square yards.....		3,928			3,928
Trot lines.....		10			10
Hooks.....		3,500		1,000	4,500
Fyke nets.....		540		200	740

CATCH: BY STATES

Species	Illinois		Iowa		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
Bowfin.....	100	\$2			100	\$2
Buffalofish.....	64,900	1,906	47,500	\$1,922	112,400	3,828
Carp.....	149,700	2,995	199,000	3,985	348,700	6,980
Catfish and bullheads.....	46,700	4,520	23,500	2,269	70,200	6,729
Paddlefish or spoonbill cat.....			2,400	192	2,400	192
Sheepshead.....	46,300	2,315	31,000	1,550	77,300	3,865
Total.....	307,700	11,738	303,400	9,858	611,100	21,596

MISSISSIPPI RIVER BETWEEN LAKE PEPIN AND LAKE KEOKUK

Fisheries of the Mississippi River between Lake Pepin and Lake Keokuk, 1938

OPERATING UNITS: BY GEAR

Item	Haul seines	Stake gill nets	Trammel nets	Trot lines	Fyke nets	Total, exclusive of duplication
	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Fishermen:						
Regular	84	32	11	1	111	178
Casual	145	102	64	87	205	513
Total	229	134	75	88	316	691
Boats:						
Motor	82	34	42	12	172	282
Other	61	42	15	76	104	256
Apparatus:						
Number	93	982	58	204	4,170	
Length, yards	17,586					
Square yards		93,400	9,642			
Hooks				16,975		

CATCH: BY GEAR

Species	Haul seines		Stake gill nets		Trammel nets	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Bowfin	146,300	\$2,605	10,900	\$262		
Buffalofish	297,300	13,128	62,200	3,152	40,500	\$1,965
Carp	898,900	22,000	539,800	19,744	129,600	2,913
Catfish and bullheads	39,100	2,583	5,900	509	9,000	880
Garfish	3,100	20	800	6		
Mooneye	10,200	227			400	6
Paddlefish or spoonbill cat	500	48				
Pike or pickerel	2,900	170				
Sheepshead	185,200	9,044	8,800	383	13,800	665
Sturgeon, shovelnose					48,500	3,926
Sucker "mullet"	20,600	381	4,500	89	600	12
Total	1,604,100	50,206	632,900	24,145	242,400	10,367

Species	Trot lines		Fyke nets		Total	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
Bowfin	100	\$4	102,100	\$1,654	259,400	\$4,525
Buffalofish	800	35	567,700	26,271	968,500	44,551
Carp	13,700	477	696,200	15,149	2,278,200	60,283
Catfish and bullheads	35,800	3,483	460,500	32,291	550,300	39,746
Eels, common			1,000	91	1,000	91
Garfish	600	4			4,500	30
Mooneye			1,000	30	11,600	268
Paddlefish or spoonbill cat					500	48
Pike or pickerel			41,200	2,473	44,100	2,643
Sheepshead	8,800	465	205,500	9,419	422,100	19,976
Sturgeon, shovelnose	900	85	2,500	214	51,900	4,225
Sucker "mullet"			48,200	985	73,900	1,467
Turtles, snapper			7,400	148	7,400	148
Total	60,700	4,553	2,133,300	88,725	4,673,400	177,996

Fisheries of the Mississippi River between Lake Pepin and Lake Keokuk, 1938—Con.

OPERATING UNITS: BY STATES

Item	Illinois	Iowa	Minnesota	Wisconsin	Total
Fishermen:	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Regular.....	39	96	10	33	178
Casual.....	80	226	57	150	513
Total.....	119	322	67	183	691
Boats:					
Motor.....	58	160	9	55	282
Other.....	64	110	40	42	256
Apparatus:					
Haul seines.....	22	29	6	36	93
Length, yards.....	2,456	6,564	1,700	6,866	17,586
Stake gill nets.....			159	823	982
Square yards.....			15,900	77,500	93,400
Trammel nets.....		58			58
Square yards.....		9,642			9,642
Trot lines.....	76	89	39		204
Hooks.....	7,350	5,725	3,900		16,975
Fyke nets.....	887	2,519		764	4,170

CATCH: BY STATES

Species	Illinois		Iowa		Minnesota		Wisconsin		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Bowfin.....	400	\$6	159,300	\$2,441	3,000	\$164	96,700	\$1,914	259,400	\$4,525
Buffalo fish.....	197,200	8,540	598,400	27,790	20,700	937	152,200	7,284	968,500	44,551
Carp.....	359,400	7,927	1,135,800	23,614	113,400	4,049	669,600	24,693	2,278,200	60,283
Catfish and bullheads.....	94,100	8,942	431,900	28,490	17,200	1,651	7,100	663	550,300	39,746
Eels, common.....			1,000	91					1,000	91
Garfish.....					4,500	30			4,500	30
Mooneye.....	3,600	91	3,200	52			4,800	120	11,600	263
Paddlefish or spoon-bill cat.....			500	48					500	48
Pike or pickerel.....			44,100	2,643					44,100	2,643
Sheepshead.....	104,100	5,230	274,700	12,729	7,100	350	36,200	1,667	422,100	19,976
Sturgeon, shovelnose.....			51,000	4,140	900	85			51,900	4,225
Sucker "mullet".....	1,500	39	44,200	902	1,300	28	26,900	498	73,900	1,467
Turtles, snapper.....	200	4	7,200	144					7,400	148
Total.....	760,500	30,779	2,751,300	103,084	168,100	7,294	993,500	36,839	4,673,400	177,996

FISHERIES OF ALASKA ¹⁴

The commercial catch of fishery products in Alaska during 1938, exclusive of whales, amounted to 793,948,431 pounds valued at \$12,040,022, which is a decrease of 4 percent in quantity and 15 percent in value as compared with the catch in 1937. Of the total catch in 1938, 589,705,625 pounds, valued at \$9,943,090, consisted of salmon; 201,717,150 pounds, valued at \$1,937,902, consisted of other fish; and 2,525,656 pounds, valued at \$159,030, consisted of shellfish. In addition, 173 whales were taken. These fisheries gave employment to 11,007 fishermen, 1,923 persons on transporting craft, and 15,154 persons in fishery wholesale and manufacturing industries—a total of 28,084 persons, which is a decrease of 7 percent as compared with the number employed in 1937.

¹⁴ 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 Fishery and Fur-Seal Industries in 1938," by Ward T. Bower, Administrative Report No. 36, Appendix II to the report of the Commissioner of Fisheries for the year 1939.

Fisheries of Alaska, 1938

SUMMARY: BY DISTRICTS

Item	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Number	Value	Number	Value	Number	Value	Number	Value
PERSONS ENGAGED								
In fishing.....	4,926		3,030		3,051		11,007	
In transporting.....	833		661		429		1,923	
In wholesale and manufacturing industries.....	6,656		4,698		3,800		15,154	
Total.....	12,415		8,389		7,280		28,084	
CRAFT EMPLOYED								
Vessels fishing.....	721		103		11		935	
Boats fishing.....	1,988		1,747		1,350		5,085	
Vessels transporting.....	191		130		80		401	
Scows, houseboats, pile drivers, etc.....	287		257		174		718	
Total.....	3,187		2,237		1,615		7,039	
CATCH								
Fish:	<i>Pounds</i>		<i>Pounds</i>		<i>Pounds</i>		<i>Pounds</i>	
Salmon.....	227,791,885	\$3,529,611	177,194,778	\$2,692,033	184,718,982	\$3,721,446	589,705,625	\$9,943,090
Other.....	65,462,581	1,255,804	134,421,844	672,934	1,832,725	9,164	201,717,150	1,937,908
Shellfish.....	1,070,300	58,594	1,454,516	100,401	840	35	2,525,656	159,030
Total.....	294,324,766	4,844,009	313,071,138	3,465,368	186,552,527	3,730,645	793,948,431	12,040,028
Whales.....	<i>Number</i>		<i>Number</i>		<i>Number</i>		<i>Number</i>	
					173		173	
WHOLESALE AND MANUFACTURING								
Establishments.....	95		97		38		230	
PRODUCTS AS PREPARED FOR MARKET								
Salmon.....	<i>Pounds</i>	13,841,611	<i>Pounds</i>	10,556,963	<i>Pounds</i>	14,593,909	<i>Pounds</i>	38,992,513
Herring.....	150,657,374	460,842	105,332,345	1,647,601	93,866,265	44,641	249,855,984	2,053,084
Halibut.....	20,178,820	980,880	53,974,156		900,500		75,053,478	980,880
Cod.....	13,930,142						13,930,142	
Trout.....			141,845	7,688	146,696	8,513	288,541	16,181
Sablefish.....	68,257	6,004	10,475	887			78,732	6,891
Flounders.....	909,234	38,882					909,234	38,882
Rockfishes.....	232,145	7,050					232,145	7,050
"Lingcod".....	4,376	90					4,376	90
Clams.....	2,154	628					2,154	628
Shrimp.....	122,580	59,290	392,394	193,309	420	175	515,394	252,774
Crabs.....	428,101	165,398	7,700	3,066			435,801	168,474
Whale.....	147,582	50,391	335,694	122,247			483,276	172,638
Total.....	186,680,765	15,611,056	160,194,609	12,431,791	4,874,250	179,641	4,874,250	179,641
					99,788,131	14,826,879	446,663,505	42,869,726

Fisheries of Alaska, 1938—Continued

OPERATING UNITS: BY DISTRICTS

Item	Southeast Alaska	Central Alaska	Western Alaska	Total	Item	Southeast Alaska	Central Alaska	Western Alaska	Total
	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>		<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Fishermen	4,926	3,030	3,051	11,007	Apparatus—Continued.				
Vessels fishing:					Beam trawls	6	1		7
Steam			5	5	Otter trawls			1	1
Net tonnage			417	417	Wheels			241	241
Motor	721	103	6	830	Lines:				
Net tonnage	8,602	2,520	242	11,364	Hand lines (cod fishery)		9	15	24
Boats fishing:					Trawl lines (cod fishery)		6		7
Motor	854	769	59	1,682	Troll lines (salmon fishery)	3,718	4		3,722
Other	1,134	978	1,291	3,403	Skates of lines (halibut fishery)	3,422			3,422
Apparatus:					Crab pots	639	1,554		2,193
Traps	286	170		456	Yards		100		100
Purse seines	458	257	7	722	Herring pounds	9	3,000		3,000
Yards	155,504	61,510	3,000	220,014	Herring pound seines	6			6
Haul seines	26	129		155					
Yards	3,760	25,078		28,838					
Gill nets	427	2,074	2,218	4,719					
Yards	56,450	257,570	342,378	656,398					

CATCH: BY DISTRICTS

[Estimated round weight and value to fishermen]

Item	Southeast Alaska		Central Alaska		Western Alaska		Total	
	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>	<i>Pounds</i>	<i>Value</i>
FISH								
Salmon:								
Blueback, red, or sockeye	17,747,919	\$420,071	45,442,929	\$977,885	171,012,264	\$3,629,284	234,203,112	\$5,027,240
Chinook or king	15,142,340	405,127	1,634,240	41,686	1,777,220	18,916	18,553,800	465,729
Chum, or keta	41,007,546	447,907	23,894,937	234,017	11,867,454	72,625	76,769,937	754,549
Humpback or pink	136,297,080	1,881,842	99,631,608	1,311,549	7,744	67	235,936,432	3,193,458
Silver or coho	17,597,000	374,664	6,591,064	126,896	54,280	554	24,242,344	502,114
Herring	44,453,969	222,270	133,937,333	669,687	1,344,030	6,720	179,735,332	898,677
Halibut	19,366,221	980,880					19,366,221	980,880
Cod			471,417	2,360	488,695	2,444	960,112	4,804

Trout:									
Dolly Varden	77,560	5,751	13,094	887			90,654	6,638	
Steelhead	7,761	253					7,761	253	
Sablefish	1,289,984	38,882					1,289,984	38,882	
Flounders	257,939	7,050					257,939	7,050	
Rockfishes	6,732	90					6,732	90	
"Lingcod"	2,415	628					2,415	628	
Total	293,254,466	4,785,415	311,616,622	3,364,967	186,551,687	3,730,610	791,422,775	11,890,992	
SHELLFISH									
Crabs:									
Dungeness	276,419	24,971	609,984	56,475			886,403	81,446	
King	2,890	225	45,744	4,648			48,624	4,873	
Shrimp	777,801	33,078	14,000	617			791,801	33,695	
Clams:									
Butter	13,200	320	1,056	36			14,266	356	
Razor	(1)	(1)	783,732	38,625	840	35	784,572	38,660	
Total	1,070,300	58,594	1,454,516	100,401	840	35	2,525,656	159,030	
Grand total	294,324,766	4,844,009	313,071,138	3,465,368	186,552,527	3,730,645	793,948,431	12,040,022	

¹ Razor clams packed in Southeast Alaska were not taken in the Territory but were obtained from beaches at Massett, B. C. They are therefore not included in the catch statistics.

NOTE.—In addition to the above statistics, 173 whales were taken in Alaska waters. The round weight and value to fishermen cannot be determined, but the products amounted to 4,874,250 pounds, valued at \$179,641.

Industries related to the fisheries of Alaska, 1938

TRANSPORTING

Item	Southeast Alaska	Central Alaska	Western Alaska	Total	Item	Southeast Alaska	Central Alaska	Western Alaska	Total
	Number	Number	Number	Number		Number	Number	Number	Number
Persons engaged	833	661	429	1,923	Vessels transporting—Continued.				
Vessels transporting:					Motor	191	130	75	396
Steam			5	5	Net tonnage	5,927	4,168	3,894	13,989
Net tonnage			18,608	18,608	Scows, houseboats, pile drivers, etc.	287	257	174	718

Industries related to the fisheries of Alaska, 1938—Continued

WHOLESALE AND MANUFACTURING

Item	Southeast Alaska	Central Alaska	Western Alaska	Total
	Number 6, 656	Number 4, 698	Number 3, 800	Number 15, 154
Persons engaged.....				
Establishments:				
Handling fresh and frozen fish.....	52	5		57
Curing fish.....	22	43	22	87
Canning fish.....	45	53	18	116
Manufacturing byproducts.....	6	10	1	17
Total (exclusive of duplication)	95	97	38	230

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).....	3, 817, 042	\$291, 335					3, 817, 042	\$291, 335
Herring (for bait).....	2, 826, 404	37, 865	1, 250	\$13			2, 827, 654	37, 878
Halibut.....	6, 794, 439	429, 448					6, 794, 439	429, 448
Halibut livers.....	133, 000	66, 500					133, 000	66, 500
Halibut and sablefish viscera.....	240, 787	24, 079					240, 787	24, 079
Trout.....	60, 982	4, 534	1, 500	195			52, 462	4, 729
Sablefish livers.....	32, 045	11, 216					32, 045	11, 216
Flounders.....	150, 000	3, 750					150, 000	3, 750
"Lingcod".....	610	10					610	10
"Lingcod" and rockfish livers.....	1, 544	618					1, 544	618
Crabs:								
Meat.....	2, 765	1, 134	225	90			2, 990	1, 224
Whole in shell.....	15, 865	990	15, 660	944			31, 525	1, 934
Shrimp:								
Meat.....	424, 200	164, 000	7, 700	3, 066			431, 900	167, 066
Whole in shell.....	690	104					690	104
Total	14, 490, 353	1, 035, 583	26, 335	4, 328			14, 516, 688	1, 039, 911
FROZEN								
Salmon (for food).....	7, 183, 446	530, 891	1, 600	60			7, 185, 046	530, 951
Salmon (for bait).....	720, 652	7, 241					720, 652	7, 241
Salmon (for fur farms).....	61, 420	2, 500					61, 420	2, 500
Herring (for bait).....	3, 316, 114	23, 924					3, 316, 114	23, 924
Halibut.....	6, 761, 916	460, 853					6, 761, 916	460, 853
Trout.....	17, 285	1, 470	8, 975	692			26, 270	2, 162
Sablefish.....	776, 825	23, 499					776, 825	23, 499
Rockfishes.....	4, 376	90					4, 376	90
Flounders (for fur farms).....	82, 145	3, 300					82, 145	3, 300
Shrimp.....	3, 211	1, 284					3, 211	1, 284
Total	18, 927, 400	1, 055, 052	10, 575	762			18, 937, 975	1, 056, 804

CURED								
Salmon:								
Mild-cured.....	6,344,000	1,257,247	16,800	1,600	158,400	\$20,084	6,519,200	1,278,931
Pickled.....	9,600	900	313,200	31,228	854,885	90,293	1,177,685	122,421
Dry-salted.....	10,500	1,132	18,000	500	17,300	1,730	45,800	3,362
Dried.....			4,025	140	998,000	71,200	1,002,025	71,340
Eggs for fish food.....	7,300	365					7,300	365
Herring:								
Pickled (for food):								
Scotch-cure.....			1,634,000	97,927	562,150	32,497	2,186,150	130,424
Norwegian-cure.....					192,800	5,784	192,800	5,784
Roused.....			261,350	6,395	155,550	6,360	416,900	12,755
Cod:								
Dry-salted.....			135,119	6,797	146,019	8,421	281,138	15,218
Stockfish.....			6,126	796	552	82	6,678	878
Tongues.....			600	75	125	10	725	85
Sablefish, pickled.....	100,364	4,167					100,364	4,167
Total.....	6,471,764	1,263,811	2,389,220	145,458	3,075,781	236,461	11,936,765	1,645,730
CANNED								
Salmon:								
Blueback, red, or sockeye.....	9,244,368	\$1,626,428	23,127,120	\$3,812,593	88,647,696	\$14,144,776	121,019,184	\$19,583,797
Chinook or king.....	785,760	118,673	1,005,312	162,252	311,962	47,718	2,103,024	328,643
Chum or keta.....	22,773,744	1,710,785	12,128,928	916,467	2,861,472	216,171	37,764,144	2,843,423
Humpback or pink.....	90,564,912	7,346,054	64,613,232	5,136,669			155,178,144	12,481,723
Silver or coho.....	6,900,720	910,963	3,764,128	486,511	16,560	1,937	10,671,408	1,390,511
Clams.....	121,380	59,190	392,394	193,309	420	175	514,194	252,674
Clam juice.....	1,200	100					1,200	100
Crabs.....	128,952	48,267	319,800	121,213			448,761	169,490
Total.....	130,521,036	11,819,360	105,340,923	10,829,014	91,838,100	14,410,777	327,700,069	37,059,151
BYPRODUCTS								
Meal:								
Herring.....	7,279,394	132,032	24,911,116	417,582			32,190,510	549,614
Salmon.....	1,832,000	27,480	242,000	3,933			2,074,000	31,413
Whale:								
Meat meal.....					792,000	15,796	792,000	16,796
Bone meal.....					432,000	5,618	432,000	5,618
Oil:								
Salmon.....	401,910	10,717	180,000	5,040			609,910	15,767
Herring.....	6,756,906	267,021	27,166,440	1,025,684			33,923,348	1,292,705
Whale.....					2,286,000	103,657	2,286,000	103,657
Sperm.....					1,364,260	54,570	1,364,260	54,570
Total.....	16,270,212	437,250	52,427,556	1,452,239	4,874,250	179,641	73,572,018	2,069,130
Grand total.....	186,680,765	15,611,056	160,194,609	12,431,791	99,788,131	14,826,879	446,663,505	42,869,726

NOTE.—The output of fresh and frozen halibut includes all fares of the Alaska fleet, some of which were landed at other than Alaska ports. The amount of livers and viscera landed by the Alaska fleet has not been reported, and the quantity shown herein is the estimated amount landed in Alaska. The total landings of halibut, other than livers and viscera, in Alaska in 1938 amounted to 8,296,907 pounds, valued at \$499,472 (including 26,000 pounds, valued at \$2,000, landed by Canadian vessels).

The output of clams in Southeast Alaska includes 115,390 pounds, valued at \$57,690, which were packed from clams obtained at Massett, B. C.

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	192,591	\$1,626,428	481,815	\$3,812,593	1,846,827	\$14,144,776	2,521,233	\$19,583,797
Chinook or king	16,370	118,673	20,944	162,252	6,499	47,718	43,813	328,643
Chum or keta	474,453	1,710,785	252,686	916,467	59,614	216,171	786,753	2,843,423
Humpback or pink	1,886,789	7,345,054	1,346,109	5,136,669			3,232,878	12,481,723
Silver or coho	143,765	910,863	78,211	486,511	345	1,937	222,321	1,399,311
Total	2,713,948	11,711,803	2,179,765	10,514,492	1,913,285	14,410,602	6,806,998	36,636,897
Clams	8,092	59,190	26,160	193,309	28	175	34,280	252,674
Clam juice	40	100					40	100
Crabs	2,686	48,267	6,663	121,213			9,349	169,480
Grand total	2,724,766	11,819,360	2,212,588	10,829,014	1,913,313	14,410,777	6,850,667	37,059,151

¹ The pack of salmon and crabs has been converted to "standard cases" of 48 1-pound cans, and clams and clam juice to "standard cases" of 48 No. 1 cans.

² Of this number, 7,692 cases, valued at \$57,690, were packed from clams obtained at Massett, B. C.

Supplementary table showing the output of byproducts in tons and gallons

Item	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Meal:								
Herring	3,640 tons	\$132,032	12,455	\$417,582			16,095	\$549,614
Salmon	916 do	27,480	121	3,933			1,037	31,413
Whale:								
Meat meal					396	\$15,796	396	15,796
Bone meal					216	5,618	216	5,618
Oil:								
Salmon	53,588 gallons	10,717	14,400	5,040			67,988	15,757
Herring	900,921 do	267,021	3,622,192	1,025,684			4,523,113	1,292,705
Whale	do				304,800	103,657	304,800	103,657
Sperm	do				181,900	54,570	181,900	54,570
Total		437,250		1,452,239		179,641		2,069,130

WHALING ¹⁵

A total of 2,196 whales were processed by United States firms during the 1938-39 whaling season. Of these, 173 were taken off Alaska during the months from June to October 1938; 917 were captured off West Australia during the same period; and 1,106 were taken in the Antarctic during the months from December 1938 to March 1939. Four companies were licensed by the United States to engage in whaling during the 1938-39 season; however, only three operated. These consisted of one shore station in Alaska and two factory ships, one of which operated off West Australia and the other in the Antarctic. A scarcity of whales, fewer operating units, and more stringent restrictions governing whaling contributed to a decreased catch during the 1938-39 season as compared with that of the previous year when 5,198 whales were processed.

Prior to December 20, 1938, under the joint regulations of the Secretary of the Treasury and the Secretary of Commerce, there was a 35-foot limit on humpback whales, a 50-foot limit on finback whales, and a 60-foot limit on blue whales. However, whaling regulations approved December 20, 1938, pursuant to the June 8, 1937, London Agreement, increased the size limit on blue whales to 70 feet, finback whales to 55 feet, and established a 35-foot limit on sperm whales. Only whaling in the Antarctic was affected by the new regulations, as the season had closed in Australia and Alaska before the adoption of these measures.

On June 24, 1938, representatives of several nations, including those of the United States, meeting in London, agreed to a Protocol to the Agreement of June 8, 1937. This Protocol, proclaimed by the President April 8, 1939, afforded further protection to whales, and at the same time permitted smaller size limits on blue, sperm, and finback whales processed at land stations, the products of which were to be used for local animal or human consumption.

Whaling, 1938-39 Season ¹

OPERATING UNITS: BY AREAS

Area	Shore stations		Factory ships		Killer boats		Total persons employed
	Number	Persons employed	Number	Crew	Number	Crew	
Alaska.....	1	78			5	58	136
Antarctic.....			1	214	8	106	320
West Australia.....			1	116	6	78	194
Total.....	2	78	2	330	19	242	650

¹ Includes the operations of shore stations, factory ships, and killer boats licensed by the United States.

NOTE.—One firm in California obtained a license in 1938, but did not operate.

¹⁵ This section was prepared by Esther E. Dodd, Law Enforcement Division. Additional information concerning the 1938-39 whaling season can be obtained from Bureau of Fisheries Memorandum entitled, "A History of Whaling with Résumé of the Whaling Industry of the United States, 1837-40."

Whaling, 1938-39 Seasons—Continued

CATCH: BY SPECIES AND AREAS

Area	Blue	Hump-back	Sperm	Finback	Total
	Number	Number	Number	Number	Number
Alaska.....	33	12	63	65	173
West Australia.....		917			917
Antarctic.....	554		4	548	1,106
Total.....	587	929	67	613	2,196

NOTE.—In addition to the above catch, 8 whales were harpooned but not recovered.

PRODUCTS MANUFACTURED: BY AREAS

Area	Oil		Meal	
	Body	Sperm	Meat	Bone
	Gallons	Gallons	Tons	Tons
Alaska.....	304,900	181,900	396	216
West Australia.....	2,096,579			
Antarctic.....	4,574,141			
Total.....	6,975,520	181,900	396	216

STATISTICAL SURVEY PROCEDURE

It is customary to include in the annual report of the Division, information in considerable detail on the procedure used in the collection of the fishery statistics published in this report. Due to the necessity for curtailing the cost of the report for 1939, it has been necessary to eliminate most of this type of material. Consequently, for information on procedure the reader is referred to Administrative Report No. 37, entitled "Fishery Industries of the United States, 1938," by R. H. Fiedler, published as Appendix III to the report of the Commissioner of Fisheries for the fiscal year 1939. It has been deemed necessary, however, to include in this report data on conversion factors used for computing the yield of certain commodities. These factors follow:

Measures and yields of oysters

State	Capacity of State bushel	Variation from U. S. standard bushel		Market oysters	
				Yield per State bushel	Yield per standard bushel
		Cubic inches	Percent	Pounds of meats	Pounds of meats
Massachusetts.....	2,150.4			6.37	6.37
Rhode Island.....	2,150.4			7.00	7.00
Connecticut.....	2,150.4			7.63	7.63
New York.....	2,150.4			7.50	7.50
New Jersey.....	2,257.3	+106.9	+5.0	6.05	5.78
Delaware.....	2,257.3	+106.9	+5.0	7.00	6.67
Maryland.....	2,801.5	+661.1	+30.3	6.09	4.67
Virginia.....	3,003.4	+853.0	+39.7	5.92	4.24
North Carolina.....	2,801.9	+651.5	+30.3	5.56	4.27
South Carolina.....	4,071.5	+1,921.1	+89.3	5.98	3.16
Georgia.....	5,343.0	+3,193.5	+148.5	6.83	2.76
Florida.....	3,214.1	+1,063.7	+49.4	4.74	3.17
Alabama.....	2,826.2	+675.8	+31.4	5.01	3.81
Mississippi.....	2,826.2	+675.8	+31.4	5.30	4.03
Louisiana.....	2,148.4	-2.0	-0.1	4.63	4.63
Texas.....	2,700.0	+519.6	+25.6	4.38	3.49

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 standard bushel¹

State	Clams, hard	Clams, soft	Clams, surf	Clams, razor	Mus-sels, sea	Peri-winkles and cockles	Scal-lops, bay	Scal-lops, sea	Lim-pets	Conchs
Maine.....	11.00	15.00	.....	.....	12.00	18.00	.....	6.00	.....	.....
New Hampshire.....	.....	15.00	.....	.....	.....	.....	.....	.....	.....	.....
Massachusetts.....	11.13	13.93	17.00	30.08	12.00	18.00	6.00	6.00	.....	.....
Rhode Island.....	15.81	20.00	12.00	.....	13.00	18.00	7.00	7.00	13.00	.....
Connecticut.....	12.04	20.00	.....	.....	.....	.....	6.50	.....	.....	19.75
New York.....	8.00	16.00	12.00	.....	10.00	.....	5.00	6.00	.....	18.00
New Jersey.....	9.49	19.04	16.83	.....	.....	.....	.....	4.29	.....	.....
Delaware.....	9.52	.....	.....	.....	11.43	.....	.....	.....	.....	.....
Maryland.....	6.14	.....	.....	.....	.....	.....	.....	.....	.....	.....
Virginia.....	5.73	7.16	.....	.....	7.16	.....	.....	.....	.....	.....
North Carolina.....	6.14	.....	.....	.....	.....	.....	6.14	.....	.....	.....
Florida.....	5.04	.....	.....	.....	.....	.....	2.99	.....	.....	.....

¹ Prior to 1938 data on the yields of meats were computed on the basis of State bushels of the size prescribed by the individual States, rather than on the basis of the U. S. standard bushel of 2,150.4 cubic inches capacity.

Other conversion factors.—The principal other conversion factors that have been used in this report are as follows:

Crustaceans:

- Crabs, soft and peelers (Connecticut, Rhode Island, New Jersey, New York, Delaware, Maryland, and Virginia). To convert number of crabs to weight in pounds, divided by 4.
- Crabs, soft and peelers (North Carolina and South Carolina). To convert number of crabs to weight in pounds, divide by 7.
- Crabs, soft and peelers (Louisiana) .. To convert number of crabs to weight in pounds, divide by 2.71.
- Crabs, hard (Maine)..... To convert number of crabs to weight in pounds, divide by 3.32.
- Crabs, hard (Massachusetts)..... To convert number of crabs to weight in pounds, divide by 3.97.
- Crabs, hard (Connecticut)..... To convert number of crabs to weight in pounds, divide by 2.88.
- Crabs, hard (South Carolina)..... 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 2.07.
- Crabs, hard (Alabama and Georgia) . To convert number of crabs to weight in pounds, divide by 2.4.
- Crabs, hard (Mississippi)..... To convert number of crabs to weight in pounds, divide by 2.09.
- Crabs, hard (Louisiana)..... To convert number of crabs to weight in pounds, divide by 2.12.
- Crabs, hard (Texas)..... To convert number of crabs to weight in pounds, divide by 2.10.
- Crabs, hard (other Atlantic Coast States). To convert number of crabs to weight in pounds, divide by 3.
- Crabs, rock..... To convert number of crabs to weight in pounds, divide by 10.
- Crabs, stone..... To convert number of crabs to weight in pounds, multiply by 1.06.

Sponges, dried (Florida):

Large wool.....	To convert number of bunches to weight in pounds, multiply by 10.
Medium and small wool.....	To convert number of bunches to weight in pounds, multiply by 5.
Wool rags.....	To convert number of bunches to weight in pounds, multiply by 4.73.
Grass.....	To convert number of bunches to weight in pounds, multiply by 1.5.
Wire and yellow.....	To convert number of bunches to weight in pounds, multiply by 1.95.

COMMON AND SCIENTIFIC NAMES OF FISHERY PRODUCTS

In order to prevent misunderstanding in 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
Alewife.....	{Branch herring, wall-eyed or big-eyed herring. Blueback, glut herring.....	<i>Pomolobus pseudoharengus</i> .
Amberjack.....		<i>Pomolobus vestitalis</i> . <i>Seriola</i> species.
Anchovy.....		<i>Engraulis mordax</i> . <i>Anchoiella delicatissima</i> . <i>Anchoiella compressa</i> .
Angelfish.....		<i>Pomacanthus arcuatus</i> . <i>Holacanthus isabelita</i> .
Barracuda.....		<i>Sphyræna argentea</i> .
Black bass.....	{Smallmouth bass. Largemouth bass.....	<i>Micropterus dolomieu</i> . <i>Micropterus salmoides</i> .
Bluefish.....	Tailor.....	<i>Pomatomus saltatrix</i> .
Blue pike.....	Pike perch, blue pickerel (Canada).....	<i>Stizostedion vitreum glaucum</i> .
Blue runner or hardtail.....	Runner.....	<i>Caranx crysos</i> .
Bonito.....		<i>Sarda sarda</i> . <i>Sarda chiliensis</i> .
Bowfin.....		<i>Amia calva</i> .
Buffalofish.....		<i>Ictiobus</i> species.
Butterfish.....		<i>Poronotus triacanthus</i> .
Burbot.....	Lawyer, ling.....	<i>Lota maculosa</i> .
Cabio.....	Coalfish, crab eater, cobia.....	<i>Rachycentron canadus</i> .
Cabrilla.....	Rock bass.....	<i>Epinephelus analogus</i> (Pacific coast).
Carp.....	German carp.....	<i>Cyprinus carpio</i> . <i>Ameiurus</i> species.
Catfish and bullheads.....		<i>Ictalurus</i> species. <i>Leptops olivaris</i> .
Cero.....	Painted mackerel.....	<i>Scomberomorus regalis</i> .
Chub.....	Tullibee in Canada; longjaw, bluefin, blackfin in United States.....	All <i>Leucichthys</i> except <i>artedi</i> (in Great Lakes).
Cigarfish.....	Scad.....	<i>Decapterus punctatus</i> .
Cisco.....	Herring in Canada.....	<i>Leucichthys artedi</i> (Lake Erie only).
Cod.....	Codfish.....	<i>Gadus macrocephalus</i> (Pacific coast). <i>Gadus callarias</i> (Atlantic coast).
Crapple.....	{White crappie. Black crappie, strawberry bass, calico bass.....	<i>Pomoxis annularis</i> . <i>Pomoxis sparoides</i> .
Crevalle.....		<i>Caranx hippos</i> .
Croaker.....	Crocus, hardhead.....	<i>Micropteron undulatus</i> .
Cunner.....	Chogset, blue perch, bergall.....	<i>Tautoglabrus adspersus</i> .
Cusk.....		<i>Brosme brosme</i> .
Dolly Varden trout.....	Salmon trout, bull trout.....	<i>Salvelinus malma</i> .
Dolphin.....		<i>Coryphaena hippurus</i> .
Drum:		
Black.....		<i>Pogonias cromis</i> .
Red.....	Channel bass, redfish, spotted bass.....	<i>Sciaenops ocellatus</i> .
Eel:		
Common.....		<i>Anguilla rostrata</i> .
Conger.....		<i>Leptocephalus conger</i> .

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
Flounder:		
Gray sole		<i>Glyptocephalus cynoglossus</i> .
Lemon sole		<i>Pseudopleuronectes dignabilis</i> .
Yellowtail and dab		{ <i>Limanda ferruginea</i> .
Blackback		<i>Hippoglossoides platessoides</i> .
Fluke		<i>Pseudopleuronectes americanus</i> .
"Sole"		<i>Paralichthys dentatus</i> .
California halibut		<i>Paraleuronectidae</i> species (Pacific coast).
Unclassified		<i>Paralichthys californicus</i> .
Flyingfish:		<i>Neuronectidae</i> species.
Frigate mackerel	"Boo Hoo"	<i>Cypselurus californicus</i> .
Garfish		<i>Axius thazard</i> .
Gizzard shad	Nanny shad, mud shad	<i>Tylosurus</i> species.
Goldfish	Allmouth	<i>Dorosoma cepedianum</i> .
Goosefish	Dogfish	<i>Carassius auratus</i> .
Grayfish	Spiny dog	<i>Lophius piscatorius</i> .
	Smooth dog	<i>Squalus pinnacili</i> (Pacific coast).
		<i>Squalus acanthias</i> .
		<i>Mustelus mustelus</i> .
Grouper:	"Sea bass"	{ <i>Ephinephelus</i> species.
		<i>Mycteroperca</i> species.
Grunt:	Margatefish, sailors choice (Key West)	<i>Haemulon</i> species.
Haddock:	Squirrel hake, Boston hake, ling, black hake, mud hake	<i>Melanogrammus aeglefinus</i> .
	Merluccio	<i>Urophycis</i> species (Atlantic coast).
Hake:		
Hallbut		<i>Merluccius productus</i> (Pacific coast).
Hardhead		<i>Hippoglossus hippoglossus</i> .
Harvestfish	Starfish, dollarfish, pappyfish, butterfish (N. C.)	<i>Orthodon microlepidotus</i> (Pacific coast).
		<i>Pepilius alepidotus</i> .
Herring:		
Lake	Herring	<i>Leucichthys artedi</i> (Great Lakes, except Erie).
Round		<i>Etrumeus sadina</i> .
Sea		{ <i>Clupea harengus</i> (Atlantic coast).
		<i>Clupea pallasi</i> (Pacific coast).
Herring smelt	Sea smelt	<i>Argentina silus</i> .
Hickory shad	Tallor shad, skip	<i>Pomolobus medticris</i> .
Hogchoker		<i>Achirus fasciatus</i> .
Hogfish	Capitaino, porro porro	<i>Lachnolaimus maximus</i> (Florida).
	Pacific	<i>Trachurus symmetricus</i> .
	Atlantic—(See tuna.)	
Horse mackerel		
Jewfish		<i>Promicrops itaiara</i> .
Kingfish	King mackerel, cerro	{ <i>Scomberomorus cavalla</i> (Atlantic coast).
	Little ronador, croaker	<i>Scomberomorus regalis</i> (Atlantic coast).
King whiting	Northern whiting, kingfish, sea mink	<i>Genyonemus lineatus</i> (California).
Lake trout		<i>Menticirrhus</i> species.
Lamprey		<i>Cristiomer mamaycush</i> .
Launce	Sand eel, lant, sand launce	<i>Petromyzon marinus</i> .
"Lingcod"	Cultus cod, blue cod, buffalo cod, ling	<i>Ammodytes americanus</i> .
		<i>Ophiodon elongatus</i> .
Mackerel		{ <i>Scomber scombrus</i> (Atlantic coast).
		<i>Scomber diego</i> (Pacific coast).
Menhaden	Mossbunker, pogy, fatback	<i>Brevoortia tyrannus</i> .
Minnow		<i>Cyprinidae</i> species.
Mojarra		<i>Gerridae</i> species.
Mooneye	Toothed herring	<i>Hiodon</i> species.
Moonfish		{ <i>Vomer setipinnis</i> .
		<i>Selene vomer</i> .
Mullet	Jumping mullet	<i>Mugil</i> species.
Mummichog	Mayfish, killifish	<i>Fundulus</i> species.
Muttonfish		<i>Lutjanus analis</i> .
Paddlefish	Spoonbill cat	<i>Polyodon spathula</i> .
Perch (California)	See surfishes.	
Permit	See pompano.	
Pigfish	Hogfish (N. C.)	<i>Orthopristis chrysopterus</i> .
Pike or pickerel	Great Lakes pike	{ <i>Esox reticulatus</i> .
		<i>Esox lucius</i> .
Pilchard	Sardine	<i>Sardina caerulea</i> .
Pinfish	Bream, salt-water bream	<i>Lagodon rhomboides</i> .
Pollock		<i>Pollachius virens</i> .
	Parmit, great pompano	<i>Trachinotus goodii</i> .
Pompano		<i>Trachinotus</i> species (Atlantic coast).
		<i>Palometa similina</i> (Pacific coast).
Porgy	Porgoe	<i>Calamus</i> species.
Quillback	Spearfish or skimpfish	<i>Carpitodes</i> species.
Roach	Golden Shiner	<i>Notemigonus crysoleucas</i> .
	Redeye, goggle-eye	<i>Ambloplites rupestris</i> (Mississippi River to Atlantic seaboard).
Rock bass	Groupers	<i>Paralabrax nebulifer</i> (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
Rockfish.....	Rock cod.....	<i>Sebastes</i> species (Pacific coast).
Rosefish.....		<i>Sebastes marinus</i> .
Rudderfish.....	{ Blue bass, greenfish.....	<i>Girella nigricans</i> (Pacific coast).
	{ Halfmoon.....	<i>Medialuna californiensis</i> (Pacific coast).
Sablefish.....	Black cod.....	<i>Anoplopoma fimbria</i> .
Salmon:		
Atlantic.....		<i>Salmo salar</i> (Atlantic coast).
Pacific:		
Blueback, red or sockeye.....		<i>Oncorhynchus nerka</i> .
Chinook or king.....	Tyee, spring.....	<i>Oncorhynchus tshawytscha</i> .
Chum or keta.....	Dog salmon.....	<i>Oncorhynchus keta</i> .
Humpback or pink.....		<i>Oncorhynchus gorbuscha</i> .
Silver or coho.....		<i>Oncorhynchus kisutch</i> .
Steelhead.....	(See steelhead trout.)	
Sand perch.....		<i>Bairdiella chrysuru</i> .
Sauger.....	Sand pike.....	<i>Stizostedion canadense</i> .
Sculpin.....		Cottidae species.
Sculpin.....		<i>Stenotomus</i> species.
Sea bass.....	{ Paugy or porgy, fair maid.....	<i>Stereolepis gigan</i> (Pacific coast).
	{ Black jewfish or black sea bass.....	<i>Centropristes striatus</i> (Atlantic coast).
	{ Black sea bass, blackfish.....	<i>Cynoscion nobilis</i> (Pacific coast).
	{ White sea bass.....	<i>Bagre marina</i> .
	{ Gaftopsail.....	<i>Prionotus</i> species.
Sea catfish.....		<i>Alosa sapidissima</i> .
Sea robin.....		<i>Carcharodon</i> species; <i>Mustelus</i> species;
Shad.....	American shad.....	<i>Carcharhinus</i> species; <i>Sphyrna</i> species
Shark.....		{ <i>Archosargus probatocephalus</i> (Atlantic coast).
		{ <i>Archosargus unimaculatus</i> (Florida).
		{ <i>Aplodinotus grunniens</i> (fresh water).
Sheepshead.....	Drum, fresh water.....	<i>Pinelinoctopon pulcher</i> .
Sheepshead, California.....	Redfish, fathead.....	<i>Bairdiella chrysuru</i> .
Silver perch.....	Sand perch.....	<i>Menidia</i> species.
Silverside.....	Spearing.....	<i>Raja</i> species.
Skate.....		<i>Scomberomox saurus</i> .
Skipper.....	Billfish.....	<i>Osmerus mordax</i> (Atlantic coast and Great Lakes).
Smelt.....		Argentinidae species (Pacific coast).
	Eulachon.....	<i>Thuleichthys pacificus</i> .
Snapper:		
Lane.....	Schoolmaster.....	<i>Lutianus apodus</i> .
Mangrove.....	Gray snapper.....	<i>Lutianus griseus</i> .
Red.....		<i>Lutianus blackfordii</i> .
Snook.....	Robalo, sergeantfish.....	<i>Centropomus undecimalis</i> .
Spadefish.....	Porgy (N. C.).....	<i>Chaetodipterus faber</i> .
Spanish mackerel.....		<i>Scomberomorus maculatus</i> .
Spilftail.....		<i>Pogonichthys macrolepidotus</i> .
Spot.....	Lafayette, goody.....	<i>Leiostomus xanthurus</i> .
Squawfish.....	Sacramento pike.....	<i>Ptychocheilus grandis</i> .
Squeteague:		
Gray.....	Gray trout, weakfish, trout.....	<i>Cynoscion regalis</i> .
Spotted.....	Spotted weakfish, spotted trout.....	<i>Cynoscion nebulosus</i> .
White.....	Sand trout.....	<i>Cynoscion arenarius</i> .
Squirrel hake.....	(See hake.)	
Steelhead trout.....	Salmon trout.....	<i>Salmo gairdnerii</i> .
Striped bass.....	Rockfish, rock.....	<i>Roccus saxatilis</i> .
Sturgeon.....		<i>Acipenser</i> species.
Sturgeon, shovelnose.....		<i>Scaphirhynchus platyrhynchus</i> .
Sucker.....	Fresh-water mullet.....	Catostomidae species.
Sunfish.....	Bream, perch.....	Centrarchidae species.
Surfscum.....	Perch.....	Embiotocidae species.
Swellfish.....	Puffer, swell toad, balloonfish, globe-fish.....	<i>Spheroides maculatus</i> .
Swordfish.....		<i>Xiphias gladius</i> .
Tautog.....	Blackfish, oysterfish.....	<i>Tautoga onitis</i> .
Tenpounder.....	Elops, big-eyed herring.....	<i>Elops saurus</i> .
Tilfish.....		<i>Lopholatilus chamaeleonticeps</i> .
Tomcod.....		{ <i>Aterogadus tomcod</i> (Atlantic coast).
Trinletail.....		{ <i>Microgadus proximus</i> (Pacific coast).
Tullibee.....	(See chub.)	<i>Tobates surinamensis</i> .

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
Tuna and tunalike fishes:		
Albacore.....	Longfin tuna.....	<i>Germo alalunga.</i> <i>Thunnus saliens.</i> <i>Thunnus thynnus.</i> <i>Thunnus secundodorialis.</i> <i>Sarda sarda</i> (Atlantic coast). <i>Sarda chiliensis</i> (Pacific coast).
Bluefin.....	Tuna.....	<i>Euthynnus pelayms.</i> <i>Neothunnus macropterus.</i>
Bonito.....		<i>Reinhardius hippoglossoides</i> (off New England.)
Skipjack.....	Striped tuna.....	<i>Balistes carolinensis</i> (off Florida).
Yellowfin.....	Greenland halibut.....	<i>Acanthocybium solandri.</i> <i>Roccus chrysops.</i>
Turbot.....	American turbot, triggerfish.....	
Wahoo.....		
White bass.....	White lake bass.....	
Whitebait.....	Small fry of several species.	
Whitefish:		
Common.....		<i>Coregonus clupeiformis</i> (Great Lakes). <i>Caulolatilus princeps</i> (Pacific coast).
Menominee.....		<i>Prosopium quadrilaterale.</i> <i>Morone americana</i> (Atlantic coast).
White perch.....	Silver hake.....	<i>Merluccius bilinearis.</i> <i>Anarhichas lupus.</i>
Whiting.....		<i>Perca flavescens.</i>
Wolfish.....		<i>Stizostedion vitreum vitreum.</i>
Yellow perch.....	Wall-eyed pike, pike perch, dore.....	<i>Ocyurus chrysurus</i> (Atlantic coast).
Yellow pike.....		<i>Seriola dorsalis</i> (Pacific coast).
Yellowtail.....		
Crab:		
Hard.....	Hard-shell crab, blue crab.....	<i>Callinectes sapidus.</i> <i>Cancer magister</i> (Pacific coast). <i>Cancer irroratus</i> (Atlantic coast).
Dungeness.....	Dungeness crab.....	<i>Callinectes sapidus.</i>
Rock and peelers.....	Rock crab, hard crab.....	<i>Paralithodes camtschatica</i> (Pacific coast)
King.....	Soft-shelled crab, blue crab.....	<i>Limulus</i> (Atlantic coast).
King or horsehoe.....		<i>Menippe mercenaria.</i>
Stone.....		
Crawfish:		
Fresh-water.....	Crayfish.....	<i>Cambarus</i> species (Atlantic coast). <i>Astacus</i> species (Pacific coast). <i>Panulirus argus</i> (Atlantic coast). <i>Panulirus interruptus</i> (Pacific coast).
Sea.....	Rock lobster, crayfish.....	
Lobster:		
Common.....		<i>Homarus americanus</i> (Atlantic coast).
Spiny.....	(See sea crawfish.)	
Shrimp.....		<i>Penaeus setiferus.</i> <i>Penaeus brasiliensis</i> (Atlantic and Gulf coasts). <i>Pandalus</i> species (Pacific coast). <i>Pandalopsis</i> species (Pacific coast). <i>Crangon</i> species (Pacific coast). <i>Halotis</i> species.
Abalone.....		
Clam:		
Cockle.....	Butter.....	<i>Cardium corbis</i> (Pacific coast). <i>Saxidomus nuttall.</i>
Hard.....	Round clam, cherrystone, quahog, little neck.....	<i>Tivela stultorum</i> (Pacific coast). <i>Venus mercenaria</i> (Atlantic coast). <i>Venus mortoni</i> (Florida coast). <i>Tivela stultorum</i> (Pacific coast).
Pismo.....		<i>Ensis</i> species (Atlantic coast).
Razor.....		<i>Siliqua patula</i> (Pacific coast).
Soft.....	Soft shell clam, sand clam, nannynose, manulose.....	<i>Mya arenaria.</i>
Surf.....	Skimmer.....	<i>Macra solidiassino.</i> <i>Acmæa testudinialis.</i>
Limpet.....		<i>Strombus</i> species.
Conch.....		<i>Buxycon</i> species.
Coquina.....	Pompano shells.....	<i>Donax variabilis.</i>
Mussel:		
Sea.....		<i>Mytilus californianus</i> (Pacific coast). <i>Mytilus edulis.</i> <i>Quadrula</i> species. <i>Lamprolis</i> species.
Fresh-water.....		<i>Unio</i> species. <i>Symphynota</i> species. <i>Octopus punctatus</i> (Pacific coast).
Octopus.....		
Oyster:		
Eastern.....		<i>Ostrea virginica.</i>
Pacific (introduced).....	Japanese.....	<i>Ostrea gigas.</i>
Western.....	Olympia.....	<i>Ostrea lurida</i> (Pacific coast).
Periwinkle.....		<i>Littorina</i> 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
Scallop:		
Bay		{ <i>Pecten irradians</i> (Atlantic coast).
Sea		{ <i>Pecten aequisulcatus</i> (Pacific coast).
		<i>Pecten magellanicus</i> .
Squid		{ <i>Loligo opalescens</i> (Pacific coast).
		{ <i>Loligo pealei</i> (Atlantic coast).
Sea urchin		Echinoidae class.
Starfish		Asteroidae class.
Terrapin	Diamond-back terrapin	<i>Malaclemmys</i> species.
Turtle:		
Green		<i>Chelonia mydas</i> .
Loggerhead		<i>Thalassochelys caretta</i> .
Hawksbill		<i>Chelonia imbricata</i> .
Snapping	Hard shell, alligator turtle	{ <i>Chelydra serpentina</i> .
Soft shell		{ <i>Macrochelys lacertina</i> .
Frog		<i>Trionyx</i> species.
Irish moss		<i>Rana</i> species.
Kelp		<i>Chondrus crispus</i> .
		<i>Macrocystia</i> species; <i>Nerocystis</i> species;
		<i>Pelagophycus</i> species; <i>Alaria</i> species.
Blood worm		<i>Glycera dibranchiata</i> .
Sand worm		<i>Nereis virens</i> .
Sponge:		
Glove		<i>Spongia graminea</i> (Hyatt) <i>Euspongia</i>
		<i>officianulis</i> (L.).
Grass		<i>Hippospongia equina cerebriformis</i> .
Sheepswool		<i>Hippospongia canaliculata gossypina</i> .
Yellow		<i>Hippospongia equina elastica</i> .
Trepang	Sea cucumber	{ <i>Cucumaria frondosa</i> .
		{ <i>Thyene briareus</i>

UNITED STATES DEPARTMENT OF THE INTERIOR
HAROLD L. ICKES, *Secretary*
BUREAU OF FISHERIES
CHARLES E. JACKSON, *Acting Commissioner*

Administrative Report No. 42

PROPAGATION AND DISTRIBUTION OF FOOD FISHES

FISCAL YEAR 1940

By GLEN C. LEACH, M. C. JAMES
and E. J. DOUGLASS

APPENDIX IV TO REPORT OF COMMISSIONER OF FISHERIES
FOR THE FISCAL YEAR 1940



UNITED STATES
GOVERNMENT PRINTING OFFICE
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ADMINISTRATIVE REPORT SERIES

Since the advent of the Administrative Report Series, considerable confusion has arisen concerning its system of numbering the separates composing it. Inasmuch as the Reports of the Divisions vary in order from year to year, many have found their designations as "Appendix No. I, II, III, or IV" very confusing. To relieve this, it has been decided to number them as "Administrative Report No.—." Inasmuch as 20 separates had already been printed in this series before starting the numbers, it was deemed advisable to begin the numbering with Administrative Report No. 21. Of course, numbers cannot be printed on those already off the press, but for the information of those who wish to know what the first 20 were, they are numbered for filing purposes as follows:

- No. 1. Report, Commissioner of Fisheries, 1931.
- No. 2. Alaska Fishery and Fur-Seal Industries, 1930.
- No. 3. Fishery Industries of the United States, 1930.
- No. 4. Progress in Biological Inquiries, 1930.
- No. 5. Propagation and Distribution of Food Fishes, 1931.
- No. 6. Report, Commissioner of Fisheries, 1932.
- No. 7. Alaska Fishery and Fur-Seal Industries, 1931.
- No. 8. Fishery Industries of the United States, 1931.
- No. 9. Progress in Biological Inquiries, 1931.
- No. 10. Propagation and Distribution of Food Fishes, 1932.
- No. 11. Alaska Fishery and Fur-Seal Industries, 1932.
- No. 12. Progress in Biological Inquiries, 1932.
- No. 13. Fishery Industries of the United States, 1932.
- No. 14. Propagation and Distribution of Food Fishes, 1933.
- No. 15. Fishery Industries of the United States, 1933.
- No. 16. Alaska Fishery and Fur-Seal Industries, 1933.
- No. 17. Progress in Biological Inquiries, 1933.
- No. 18. Propagation and Distribution of Food Fishes, 1934.
- No. 19. Alaska Fishery and Fur-Seal Industries, 1934.
- No. 20. Fishery Industries of the United States, 1934.

Note that the last Commissioner's Report was for 1932. Since then its place has been taken by a reprint from the Report of the Secretary of Commerce under the title "Bureau of Fisheries." Inasmuch as it is no longer a Bureau publication, it is not numbered; but it will be supplied to any who request the Report of the Commissioner for any year since 1932.

PROPAGATION AND DISTRIBUTION OF FOOD FISHES, FISCAL YEAR 1940¹

By GLENN C. LEACH, *Chief*, M. C. JAMES, *Assistant Chief*, and E. J. DOUGLASS,
Superintendent of Distribution, Division of Fish Culture

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INTRODUCTION

During the fiscal year 1940 the fish and eggs released from Federal fish hatcheries totaled approximately 617,300,000 less than in the previous year. The 1940 output amounted to 7,407,246,940; the reduction being 7.7 percent.

There was no curtailment of activities to account for this recession. However, with certain groups of fish the hatchery activities are governed by the same factors which cause fluctuations in the natural populations. Hence, hatchery production cannot be geared to a definite predetermined level, and all fish-culturists recognize that hatchery output will vary to a moderate degree from year to year. The nature of these fluctuations is discussed elsewhere in this report.

The older conception that artificial propagation and distribution of fish is a guaranteed stimulus for greater abundance and an assurance against depletion has been modified. The current attitude is to view the hatchery production as a supplement to natural production, or as a raw material upon which management practices can be based. This view imposes an obligation to give more careful consideration to all proposals for the extension of fish-cultural work into new fields, and

¹ Administrative Report No. 42, Appendix IV to the Report of the U. S. Commissioner of Fisheries for the fiscal year 1940. Approved for publication May 19, 1941.

to review the status of current activities. By concentrating hatchery production in comparatively restricted areas, positive results can generally be achieved. The cost of such local benefits may be excessive and judgment must be based upon the benefits accruing to fish populations as a whole.

The basic principles of animal husbandry are naturally applicable to the breeding of fish. Increased attention has therefore been given to selection of hatchery breeding stock and to the development of suitable diets. Sanitation has been emphasized as one of the best means of preventing undue mortality, and experimentation, with refinements in technique and equipment, has been conducted.

The emphasis during the year under review has been in the direction of improving existing hatcheries as to plant, equipment, and operating efficiency, with less thought to any program of expansion.

SPECIES PROPAGATED

The Bureau hatcheries propagated, or handled in salvage activities, 50 different species. The larger percentage of this list covered the fresh-water and anadromous types, although the salt-water groups accounted for the major part of the output numerically.

Dolly Varden trout appeared in the listing for the first time in several years. There has been relatively little change, however, in the category of species propagated, because of the fact that the list already covers practically all forms which are readily amenable to methods of artificial culture.

Several varieties, such as the yellow or white perch, are propagated as a side line at hatcheries primarily intended for other species. These perch would not be handled unless the facilities were available during the off season on the hatching of shad.

The selection of the game species to be propagated at each of the hatcheries has been predicated upon a demand, which is an outgrowth of the geographical range of species. This takes into consideration the fact that many species have been transplanted beyond their normal range. Very little work of transplanting has been undertaken in recent years because of the belief that the fish population of the country has been quite thoroughly dispersed into the zones to which the species can be adapted. There is further evidence of the fact that distinctions between game and nongame species have largely broken down. Such distinctions are recognizable now only in the State fish and game laws, which frequently make an arbitrary separation of the two groups.

Catfishes (*Siluridae*):

- Yellow cat (*Opladelus olivaris*).
- Spotted channel cat (*Ictalurus punctatus*).
- Bullhead (*Ameiurus nebulosus*).

Buffalofish (*Catostomidae*): Common buffaloes (*Ictiobus* sp.).

Shad and herring (*Clupeidae*):

- Shad (*Alosa sapidissima*).
- Glut herring (*Pomolobus aestivalis*).

Whitefishes and Lake herring (*Coregonidae*):

- Common whitefish (*Coregonus clupeaformis*).
- Lake herring, cisco (*Leucichthys* sp.).

Salmons and trouts (*Salmonidae*):

- King, chinook, or quinnat salmon (*Oncorhynchus tshawytscha*).
- Chum salmon (*Oncorhynchus keta*).
- Coho, or silver salmon (*Oncorhynchus kisutch*).

- Red, sockeye, or blueback salmon (*Oncorhynchus nerka*).
- Pink, or humpback salmon (*Oncorhynchus gorbuscha*).
- Landlocked sockeye salmon, silver trout (*Oncorhynchus kenerlyi*).
- Steelhead trout (*Salmo gairdnerii*).
- Atlantic salmon (*Salmo salar*).
- Landlocked salmon (*Salmo sebago*).
- Golden trout (*Salmo aqua-bonita*).
- Rainbow trout (*Salmo irideus*).
- Cut-throat trout, blackspotted trout (*Salmo clarkii*).
- Brown, or Loch Leven trout (*Salmo fario* var.).
- Lake trout, mackinaw trout (*Cristivomer namaycush*).
- Brook trout (*Salvelinus fontinalis*).
- Dolly Varden trout (*Salvelinus malma*).
- Grayling (*Thymallidae*): Montana grayling (*Thymallus montanus*).
- Pikes (*Esoxidae*): Pike and pickerel (*Esox* sp.).
- Sunfishes (*Centrarchidae*):
 - Crappie (*Pomoxis annularis* and *P. sparoides*).
 - Largemouth black bass (*Micropterus salmoides*).
 - Smallmouth black bass (*Micropterus dolomieu*).
 - Kentucky bass (*Micropterus pseudoplites*).
 - Rock bass (*Ambloplites rupestris*).
 - Warmouth bass (*Chaenobryttus gulosus*).
 - Bluegill sunfish (*Lepomis incisor*).
 - Green sunfish (*Lepomis cyanellus*).
 - Redbreasted bream (*Lepomis auritus*).
 - Red-eared sunfish (*Lepomis heros*).
 - Common sunfish (*Lepomis gibbosus*).
- Mojarras de rio (*Cichlidae*).
- Rio Grande perch (*Herichthys cyanoguttatus*).
- Perches (*Percidae*):
 - Pikeperch (*Stizostedion vitreum*).
 - Yellow perch, ringed perch (*Perca flavescens*).
- White basses (*Serranidae*):
 - White bass (*Roccus chrysops*).
 - Striped bass (*Roccus saxatilis*).
 - White perch (*Morone americana*).
- Drums (*Sciaenidae*): Fresh-water drum, sheepshead (*Aplodinotus grunniens*).
- Cods (*Gadidae*):
 - Cod (*Gadus callarias*).
 - Haddock (*Melanogrammus aeglefinus*).
 - Pollock (*Pollachius virens*).
- Mackerel (*Scombridae*): Common mackerel (*Scomber scombrus*).
- Flounders (*Pleuronectidae*): Winter flounder (*Pseudopleuronectes americanus*).
- Lobster (*Homaridae*): Lobster (*Homarus americanus*).

Summary, by species, of the output of fish and fish eggs during the fiscal year ended June 30, 1940

Species	Eggs	Fry	Fingerlings	Total
Catfish		39,000	2,950,715	2,995,715
Buffalo fish	95,872,250		437,600	95,309,850
Sbald		42,105,000	99,500	42,204,500
Whitefish	2,000,000	5,690,000		7,690,000
Glut herring		170,000		170,000
Lake herring		420,000		420,000
Striped bass		5,917,000		5,917,000
Chiuook salmon	2,340,000	22,797,700	16,309,875	41,447,575
Chum salmon	795,000	4,437,680	250,200	5,482,880
Humpback salmon		230,790	217,000	447,790
Silver salmon			1,493,765	1,493,765
Sockeye salmon	110,380		2,279,125	2,395,005
Sockeye salmon, landlocked	548,950		650,685	1,199,535
Landlocked salmon			15,645	15,645
Steelhead trout	138,550		1,829,935	1,968,485
Rainbow trout	16,043,060	411,840	11,146,405	27,601,305
Blackspotted trout	32,894,080	9,363,330	9,229,205	51,186,615
Loch Leven trout	75,640	101,250	3,152,815	3,329,705
Lake trout	599,500	1,773,500	284,660	2,657,660
Brook trout	13,236,560	1,468,760	11,835,600	26,540,920
Golden trout			19,855	19,855
Dolly Varden trout	43,750			43,750
Grayling	4,349,000		255,245	4,604,245

Summary, by species, of the output of fish and fish eggs during the fiscal year ended June 30, 1940—Continued

Species	Eggs	Fry	Fingerlings	Total
Pike and pickerel.....	6,782,810	940,140	8,910	7,731,860
Crappie.....			1,683,595	1,683,595
Black bass, largemouth.....		2,884,100	7,336,455	10,220,555
smallmouth.....		1,065,760	485,676	1,551,425
Kentucky bass.....		10,000	28,295	38,295
Rock bass.....			208,985	208,985
Warmouth bass.....			37,545	37,545
Sunfish.....			10,067,925	10,067,925
Rio Grande perch.....			104,680	104,680
Pikeperch.....	1,378,360	8,750,000		10,128,360
Yellow perch.....		243,082,000	70,375	243,152,375
Fresh-water drum.....			5,600	5,600
White bass.....			30,745	30,745
White perch.....		2,280,000	1,845	2,281,845
Mackerel.....		8,277,000		8,277,000
Cod.....	2,613,064,110	191,980,100		2,805,044,210
Haddock.....	1,066,164,500			1,066,164,500
Flatfish.....	6,607,000	761,525,280		768,132,280
Pollock.....	1,962,705,490	174,382,490		2,137,087,980
Lobster.....	600,000	8,084,000		8,684,000
Miscellaneous fishes.....			497,000	497,000
Total.....	5,826,058,990	1,498,156,710	83,031,240	7,407,246,940

PRODUCTION

As stated in the introduction, there was a reduction of 7.7 percent in the 1940 distribution. Analysis of the 1939 and 1940 totals, however, shows that the difference was due to local conditions, and was restricted in its effect.

A reduction of 352,000,000 fish and eggs in 1940 was traceable to a change in the operation of the Put in Bay (Ohio) station, which produced that number of pikeperch and whitefish in 1939, then operated jointly with the State of Ohio. In 1940 this station was transferred to the full custody of the State, and the Bureau discontinued listing the output.

Also, the drop can be attributed in part to a shortage in the production of cod, haddock, and flounders. Activity with this group is governed by weather conditions, and the intensity of local commercial operations from which the eggs are obtained. Both of these factors were adverse during the winter of 1939-40.

As a matter of fact, 24 species were distributed in increased numbers, among them 6 species of trout, 1 variety of Pacific salmon, shad, striped bass, buffalofish, and lobster. There was a reduction of approximately 2,410,000 in the output of the black basses, which also are subject to adverse weather conditions during the spawning season. About 45 species were handled at the various hatcheries, exclusive of rescued fishes, during the year.

Despite the reduction in total output, there was little change in the actual number of the fingerlings and larger sizes of game fish. It is gratifying to note that the production of game and pan species amounted to 151,114,500; an actual, as well as proportional increase. These forms comprised 2.04 percent of the total output, but it must be recognized that practically all of the species propagated are sought for recreation at certain times or places.

There was no large increase in production facilities, although increase in the number and size of ponds at some stations provided additional hatching and rearing facilities. A normal carry-over of

fish remained on hand at the end of the year to provide for the distribution of large fingerlings and legal-sized fish during 1941. The new hatchery at Inks Dam, Tex., constructed with the aid of the N. Y. A., entered into production, distributing a moderate number of bass and pondfish in the waters of the Lower Colorado flood control impoundments.

CONSTRUCTION ACTIVITIES

The major part of fish-hatchery construction during the year was in continuation of projects previously started. The 1940 appropriation carried funds for the establishment of hatcheries in Illinois and New Jersey, a substation in Maine, and/or the enlargement of the East Orland (Maine) Hatchery. Difficulty in selecting a site, and absence of State enabling legislation, prevented any action in Illinois. In New Jersey it was not possible to obtain a suitable site at a price low enough to permit adequate development.

A site near Salem, Maine, was selected for a small trout-rearing and bass-cultural unit, and the title was cleared late in the year. Construction of this unit was not started prior to June 30. At the East Orland Station, buildings and ponds were rehabilitated and provision was made for resumption of the propagation of Atlantic salmon. All appropriations for the above projects were continued available, and none of the projects were abandoned.

At the start of the year, previously approved hatchery projects at Hebron, Ohio, New London, Minn., and Farlington, Kans., entered a more active phase of construction. At the two former, appropriated funds were supplemented by W. P. A. allotments, and a large work camp was assigned to New London. Construction of the Kansas project was retarded by adverse weather conditions, and none of the establishments were developed to the point where fish-cultural work could be undertaken by the close of the year.

Toward the end of the 1939 fiscal year, allotments of P. W. A. funds were made available which provided \$30,000 for the construction of a bass hatchery at Carbon Hill, Ala., and \$60,000 for the development of fish-cultural facilities in Yellowstone Park. Of the latter sum, \$20,000 was reallocated for the construction of the Glacier National Park hatchery at Creston, Mont. With the exception of the Yellowstone Park project, these jobs were nearing completion at the end of the year. The construction of the Glacier Park hatchery was taken over by the Bureau when the project was in an incomplete status. This work was initiated by the National Park Service, and upon the exhaustion of funds available to that agency it was necessary for the Bureau to assume responsibility for completion.

W. P. A. allotments totaling \$188,047 were allocated to 20 fish-cultural stations for repairs, improvements, and further developmental work. Among the projects undertaken was the construction of four rearing ponds at Moorefield, W. Va., to serve as an auxiliary to the Leetown (W. Va.) station. This allotment supplemented the regular construction appropriations. Seventeen projects of a similar nature, which had been financed by W. P. A. allotments during the previous year, were continued in operation until these funds were expended. In addition, several W. P. A. projects were approved under State quotas covering similar work. The flexibility permitted under the procedure of transferring W. P. A. funds to the Bureau has been of

great value in meeting unforeseen contingencies at the numerous field stations. There follows a listing of the Federal W. P. A. projects operated during the year. Among the larger projects under State quota was one providing for a continuation of the development of the bass hatchery at Arcadia, R. I.

Stations receiving W. P. A. allotments during the fiscal year 1940

Location	Amount of W. P. A. project	Location	Amount W. P. A. project
Florida: Welaka.....	\$10,000	New York: Cortland.....	\$5,000
Georgia:		Ohio: Hebron.....	54,720
Cohutta.....	13,054	Pennsylvania: Lamar.....	10,000
Warm Springs.....	10,000	Tennessee: Erwin.....	1,510
Indiana: Rochester.....	10,000	Texas: Fort Worth.....	5,000
Iowa: Fairport.....	2,500	Washington: Birdsview.....	2,500
Louisiana: Natchitoches.....	5,000	West Virginia:	
Maine: East Orland.....	4,000	Moorefield.....	6,500
Michigan: Northville.....	5,000	White Sulphur Springs.....	3,395
Montana: Creston.....	15,000		
New Hampshire: Nashua.....	10,000	Total.....	188,047
New Mexico:			
Dexter.....	6,890		
Santa Rosa.....	7,078		

In February 1940, a transfer of \$40,000 was made by the Bureau of Reclamation to provide for the construction of a pondfish hatchery at Austin, Tex. The production from this unit is destined to supplement that from the Inks Dam (Tex.) hatchery in stocking the series of reservoirs developed by the Lower Colorado Authority. At the close of the year the active phase of the construction had been barely started, though equipment and materials were being procured. The site for this unit was donated by the city of Austin.

COOPERATION WITH OTHER CONSERVATION AGENCIES

The Division of Fish Culture is vitally concerned in placing its products—fish and fish eggs—in environments where the greatest dividends will be derived from stocking. Because the Bureau's staff of biologists has been entirely inadequate to conduct surveys of all the inland waters of the United States, fish applications from individuals and clubs are submitted to more than 20 State fish and game commissions for approval before stocking the waters with the species requested. In some States the authorities stipulate the species, number, and size that will give best results; while in others the stocking programs have been formulated and the combined output of the State and Federal hatcheries has been budgeted to conform to these programs. The exchange of eggs and fish, especially trout and related species, has been of mutual benefit in a number of States.

The Bureau continued to cooperate with the National Park Service in the restocking of waters under its control. It appears that an all-time record will be established with regard to the number of black-spotted trout eggs collected from waters in Yellowstone Park this season.

In the Tennessee Valley area, three-way agreements between the Bureau of Fisheries, the Tennessee Valley Authority, and the States of Alabama, Tennessee, and North Carolina have been made effective. The Tennessee Valley Authority completed a pondfish hatchery, having a water area of 111 acres, on the Elk River in Alabama. The personnel assigned to that hatchery is now collecting brood stock and treating the pond bottoms to reduce the loss of water through seepage. The hatchery operated at Norris, Tenn., was enlarged during the year. The State conservation departments will distribute the fish produced at these units for the stocking of waters in that part of the Tennessee Valley area within their respective boundaries.

The New Jersey Board of Fish and Game Commissioners donated the services of its staff for the surveying of potential Federal pondfish hatchery sites in New Jersey. Further assistance was received from various State agencies in setting up W. P. A. projects to cover extensive construction programs at Federal hatcheries.

In view of the tremendous amount of angling in the waters within the national forests, there has been close cooperation between the Forest Service, of the Department of Agriculture, and the Bureau in an effort to maintain good fishing in those areas. More than 21,140,940 fish were assigned to the Forest Service for the stocking of suitable waters during the past year. Trout-rearing units were operated in the Chattahoochee, Nantahala, Pisgah, Allegheny, Huron, Marquette, Chequamegon, and Superior National Forests, and approximately 1½ million trout were reared to large fingerling, or legal size before liberation. A tabulation of these assignments follows:

Fish planted in Forest Service waters, by regions, fiscal year 1940

Forest and species	State	Fry	Fingerlings, etc.	Total
REGION 1				
Beaverhead: Blackspotted trout	Montana		230,650	230,650
Bitter Root:	Montana			
Golden trout			2,000	2,000
Grayling			21,450	21,450
Rainbow trout			4,480	4,480
Cabinet: Blackspotted trout	Montana		114,000	114,000
Coeur d'Alene:	Idaho			
Blackspotted trout		20,400	297,525	317,925
Brook trout			25	25
Rainbow trout			65,000	65,000
Custer:	Montana			
Grayling			15,000	15,000
Rainbow trout			37,240	37,240
Deer Lodge:	Montana			
Blackspotted trout			96,000	96,000
Brook trout			49,475	49,475
Grayling			9,000	9,000
Rainbow trout			30,000	30,000
Gallatin:	Montana			
Blackspotted trout			322,000	322,000
Brook trout			21,260	21,260
Golden trout			6,000	6,000
Grayling			38,600	38,600
Rainbow trout			135,000	135,000
Helena: Blackspotted trout	Montana		95,000	95,000
Kaniksu:	Idaho			
Blackspotted trout			110,300	110,300
Brook trout			62,720	62,720
Rainbow trout			10,775	10,775
Lewis and Clark: Blackspotted trout	Montana		26,800	26,800
Lolo:	Montana			
Blackspotted trout			108,100	108,100
Rainbow trout			3,200	3,200
St. Joe: Rainbow trout	Idaho		8,000	8,000

Fish planted in Forest Service waters, by regions, fiscal year 1940—Continued

Forest and species	State	Fry	Fingerlings, etc.	Total
REGION 2				
Arapaho:				
Blackspotted trout.....			37,000	37,000
Brook trout.....			104,600	104,600
Rainbow trout.....			20,000	20,000
Steelhead trout.....			18,300	18,300
Black Hills:	South Dakota.			
Blackspotted trout.....			64,000	64,000
Brook trout.....			178,510	178,510
Loch Leven trout.....			600	600
Rainbow trout.....			130,280	130,280
Cochetopa:	Colorado.			
Blackspotted trout.....			165,000	165,000
Brook trout.....			48,000	48,000
Rainbow trout.....			28,000	28,000
Gunnison:	Colorado.			
Blackspotted trout.....			150,000	150,000
Brook trout.....			91,600	91,600
Rainbow trout.....			135,000	135,000
Harney: Rainbow trout.....	South Dakota.		40,650	40,650
Holy Cross:	Colorado.			
Blackspotted trout.....			71,000	71,000
Brook trout.....			119,280	119,280
Rainbow trout.....			50,000	50,000
Medicine Bow:	Wyoming.			
Blackspotted trout.....			142,380	142,380
Rainbow trout.....			267,735	267,735
Montezuma:	Colorado.			
Blackspotted trout.....			51,000	51,000
Brook trout.....			68,000	68,000
Rainbow trout.....			83,000	83,000
Pike:	Colorado.			
Blackspotted trout.....			52,500	52,500
Brook trout.....			82,860	82,860
Loch Leven trout.....			15,000	15,000
Rainbow trout.....			90,800	90,800
Rio Grande:	Colorado.			
Blackspotted trout.....			297,300	297,300
Brook trout.....			389,000	389,000
Rainbow trout.....			167,200	167,200
Roosevelt:	Colorado.			
Blackspotted trout.....			20,160	20,160
Brook trout.....			50,000	50,000
Rainbow trout.....			101,200	101,200
Routt:	Colorado.			
Blackspotted trout.....			59,180	59,180
Brook trout.....			10,200	10,200
Rainbow trout.....			7,500	7,500
San Isabel:	Colorado.			
Blackspotted trout.....			10,000	10,000
Brook trout.....			480	480
Shoshone:	Wyoming.			
Blackspotted trout.....			746,000	746,000
Brook trout.....			97,250	97,250
Rainbow trout.....			37,500	37,500
Uncompahgre:	Colorado.			
Blackspotted trout.....			20,000	20,000
Brook trout.....			77,400	77,400
Washakie:	Wyoming.			
Blackspotted trout.....			32,640	32,640
Brook trout.....			43,220	43,220
Rainbow trout.....			3,900	3,900
White River:	Colorado.			
Blackspotted trout.....			119,585	119,585
Brook trout.....			32,000	32,000
Rainbow trout.....			42,500	42,500
REGION 3				
Carson:	New Mexico.			
Blackspotted trout.....			92,000	92,000
Rainbow trout.....			4,500	4,500
Cibola:	New Mexico.			
Catfish.....			20	20
Sunfish.....			16,000	16,000
Cocodino: Black bass, largemouth.....	Arizona.		20,000	20,000
Gila:	New Mexico.			
Black bass:				
Largemouth.....			20,000	20,000
Smallmouth.....			15,000	15,000
Crappie.....			5,000	5,000
Lincoln: Crappie.....	New Mexico.		1,700	1,700
Santa Fe: Black bass, smallmouth.....	New Mexico.		500	500

Fish planted in Forest Service waters, by regions, fiscal year 1940—Continued

Forest and species	State	Fry	Fingerlings, etc.	Total
REGION 4				
Ashley:	Utah.			
Blackspotted trout			53,760	53,760
Rainbow trout			19,200	19,200
Boise: Rainbow trout	Idaho		30,000	30,000
Cache:	Utah.			
Blackspotted trout			15,840	15,840
Brook trout			145,790	145,790
Rainbow trout			3,600	3,600
Challis:	Idaho.			
Blackspotted trout			10,240	10,240
Rainbow trout			72,140	72,140
Dixie: Rainbow trout	Utah		1,000	1,000
Fish Lake:	Utah.			
Blackspotted trout			5,000	5,000
Rainbow trout			6,000	6,000
Humboldt:	Nevada.			
Blackspotted trout			57,000	57,000
Brook trout			25,000	25,000
Rainbow trout			44,520	44,520
La Sal: Rainbow trout	Utah		20,000	20,000
Lemhi: Rainbow trout	Idaho		44,820	44,820
Manti:	Utah.			
Blackspotted trout			23,600	23,600
Brook trout			12,780	12,780
Rainbow trout			22,000	22,000
Mindoka:	Idaho.			
Blackspotted trout			10,000	10,000
Rainbow trout			48,000	48,000
Nevada: Rainbow trout	Nevada		69,545	69,545
Salmon:	Idaho.			
Blackspotted trout			163,940	163,940
Golden trout			22,280	22,280
Rainbow trout			374,080	374,080
Sawtooth:	Idaho.			
Blackspotted trout			50,500	50,500
Brook trout			80,000	80,000
Landlocked sockeye salmon			294,400	294,400
Rainbow trout			106,900	106,900
Targhee:	Idaho.			
Blackspotted trout			41,000	41,000
Brook trout			5,000	5,000
Teton:	Wyoming.			
Blackspotted trout		212,000	221,090	433,090
Brook trout		187,500	132,000	319,500
Lake trout			13,700	13,700
Tolyabe: Rainbow trout	Nevada		27,640	27,640
Uinta:	Utah.			
Blackspotted trout			73,110	73,110
Rainbow trout			9,000	9,000
Wasatch:	Utah.			
Blackspotted trout			169,860	169,860
Brook trout			44,800	44,800
Rainbow trout			46,120	46,120
Wyoming:	Wyoming.			
Blackspotted trout			70,040	70,040
Rainbow trout			2,785	2,785
REGION 6				
Columbia:	Washington.			
Blackspotted trout			262,000	262,000
Brook trout			417,700	417,700
Chinook salmon		932,700	229,330	1,162,030
Rainbow trout			414,335	414,335
Mount Baker:	Washington.			
Blackspotted trout			322,450	322,450
Rainbow trout			132,500	132,500
Olympic: Rainbow trout	Washington		24,560	24,560
REGION 7				
Allegheny:	Pennsylvania.			
Brook trout			200,000	200,000
Loch Loven trout			10,000	10,000
Rainbow trout			58,800	58,800
George Washington:	Virginia.			
Black bass, largemouth			2,240	2,240
Brook trout			12,715	12,715
Rainbow trout			20,515	20,515
Sunfish			3,000	3,000
Jefferson:	Virginia.			
Brook trout			47,640	47,640
Rainbow trout			52,595	52,595

Fish planted in Forest Service waters, by regions, fiscal year 1940—Continued

Forest and species	State	Fry	Fingerlings, etc.	Total
REGION 7—Continued				
Monongahela: Black bass:	West Virginia.			
Largemouth			1,325	1,325
Smallmouth			750	750
White Mountain: Brook trout	New Hampshire.	25,000	38,605	63,605
REGION 8				
Apalachicola:	Florida.			
Crappie			800	800
Sunfish			14,200	14,200
Black Warrior: Sunfish	Alabama		8,000	8,000
Chatahoochee:	Georgia.			
Black bass, largemouth			640	640
Brook trout			50,475	50,475
Rainbow trout			44,025	44,025
Sunfish			4,000	4,000
Cherokee:	Tennessee.			
Brook trout			281,990	281,990
Rainbow trout			478,235	478,235
Sunfish			1,620	1,620
Conecuh:	Alabama.			
Black bass, largemouth			6,400	6,400
Sunfish			3,850	3,850
De Soto:	Mississippi.			
Black bass, largemouth			1,500	1,500
Sunfish			7,500	7,500
Francis Marion: Black bass, largemouth	South Carolina		20,000	20,000
Holley Springs: Sunfish	Mississippi		7,000	7,000
Kisatchie:	Louisiana.			
Black bass, largemouth			59,750	59,750
Sunfish			210,000	210,000
Nantahala:	North Carolina.			
Brook trout		50,000	32,230	82,230
Loch Leven trout			240	240
Rainbow trout		35,000	16,960	51,960
Ocala:	Florida.			
Black bass, largemouth			158,885	252,885
Sunfish		96,000	208,500	308,500
Ouachita:	Arkansas.			
Black bass:				
Largemouth			15,000	15,000
Smallmouth			20,000	20,000
Sunfish		20,000	400	400
Ozark: Black bass, smallmouth	Arkansas		24,000	24,000
Pisgah:	North Carolina.			
Brook trout			8,785	8,785
Loch Leven trout			9,910	9,910
Rainbow trout			21,090	24,990
Sumpter:	South Carolina.			
Brook trout			1,150	1,150
Rainbow trout			24,000	24,000
Talladega:	Alabama.			
Black bass, largemouth			9,400	9,400
Sunfish			5,000	5,000
Unaka: Rainbow trout	North Carolina		2,100	2,100
REGION 9				
Chequamegon:	Wisconsin.			
Black bass, largemouth			2,000	2,000
Brook trout			13,200	13,200
Crappie			400	400
Loch Leven trout			7,500	7,500
Sunfish			3,975	3,975
Chippewa:	Minnesota.			
Black bass, largemouth			75	75
Brook trout			900	900
Crappie			645	645
Rainbow trout			11,050	11,050
Clark:	Missouri.			
Black bass:				
Largemouth		30,000	40,000	70,000
Smallmouth		60,000		60,000
Catfish			1,000	1,000
Crappie			810	810
Sunfish			2,550	2,550

Fish planted in Forest Service waters, by regions, fiscal year 1940—Continued

Forest and species	State	Fry	Fingerlings, etc.	Total
REGION 9—Continued				
Gardner:	Missouri.			
Black bass, largemouth			2,700	2,700
Brook bass			1,700	1,700
Sunfish			750	750
Hiawatha: Sunfish	Michigan.		33,600	33,600
Huron:	Michigan.			
Black bass, largemouth			1,750	1,750
Sunfish			6,440	6,440
Manistee:	Michigan.			
Black bass:				
Largemouth			19,125	19,125
Smallmouth			2,475	2,475
Rainbow trout			29,000	29,000
Sunfish			2,500	2,500
Mark Twain:	Missouri.			
Black bass:				
Largemouth			74,150	74,150
Smallmouth			24,000	24,000
Catfish			600	600
Crappie			240	240
Rainbow trout			11,895	11,895
Sunfish			1,600	1,600
Marquette:	Michigan.			
Black bass, largemouth			2,900	2,900
Brook trout			48,000	48,000
Loch Leven trout			2,600	2,600
Sunfish			625	625
Yellow perch			2,600	2,600
Nicolet:	Wisconsin.			
Brook trout			143,600	143,600
Rainbow trout			22,000	22,000
Ottawa:	Michigan.			
Brook trout			26,775	26,775
Sunfish			4,200	4,200
Superior:	Minnesota.			
Brook trout			682,000	682,000
Crappie			1,175	1,175
Lake trout		351,000	20,000	371,000
Loch Leven trout			108,000	108,000
Pikeperch		4,140,000		4,140,000
Pike and pickerel		100,000		100,000
Rainbow trout			51,150	51,150
Sunfish			18,980	18,980

The Bureau of Reclamation has continued its efforts to preserve the runs of salmon in the Columbia and Sacramento Rivers, where the survival of this species is threatened by the construction of huge dams. In connection with this work, one of the four salmon hatcheries originally contemplated has been partially completed and placed in limited operation.

In organizing the various cooperative procedures with the States, several general conferences with State conservation officials have been held in connection with conferences and meetings concerned with wildlife programs. In addition, there has been frequent individual contact with various State departments in an effort to settle specific problems. As an example, there may be mentioned the discussions with the Missouri Conservation Department looking toward the zoning of the State for fish-distribution purposes.

As an indication of the magnitude of assignments to Federal waters under the jurisdiction of agencies other than the Forest Service, there follows a tabulated statement in which it will be noted that six different agencies were the beneficiaries of such assignments, and some stocking

also was carried on in waters under the control of several other Federal organizations:

Fish and fish eggs planted in Federal waters, other than Forest Service, fiscal year 1940

Species	Eggs	Fry	Fingerlings, etc.	Total
BUREAU OF RECLAMATION				
Black bass, largemouth			634, 675	634, 675
Crappie			13, 800	13, 800
Rainbow trout			43, 000	43, 000
FARM SECURITY ADMINISTRATION				
Catfish			7, 840	7, 840
Crappie			16, 625	16, 625
Sunfish			800	800
OFFICE OF INDIAN AFFAIRS				
Black bass, largemouth			400	400
Blackspotted trout	100, 125		49, 600	149, 725
Brook trout			25, 345	25, 345
Catfish			20, 160	20, 160
Crappie			5, 280	5, 280
Rainbow trout			28, 795	28, 795
Sunfish			260	260
NATIONAL PARK SERVICE				
Black bass, largemouth		4, 000	44, 400	48, 400
Blackspotted trout	3, 516, 350	8, 342, 855	1, 000, 185	13, 459, 390
Brook trout		100, 000	411, 200	511, 200
Grayling	2, 847, 990			2, 847, 990
Rainbow trout	60, 160	376, 840	406, 905	833, 905
Sunfish			7, 320	7, 320
SOIL CONSERVATION SERVICE				
Black bass, largemouth		69, 000	31, 500	90, 500
Catfish			16, 500	16, 500
Crappie			4, 000	4, 000
TENNESSEE VALLEY AUTHORITY				
Black bass, largemouth		430, 000	22, 250	452, 250
Kentucky bass			25, 630	25, 630
Pikeperch		500, 000		500, 000
Rainbow trout			25, 000	25, 000
Rock bass			1, 520	1, 520
Sunfish			53, 000	53, 000
Miscellaneous fishes			30, 000	30, 000

ASSIGNMENTS OF FISH AND FISH EGGS TO STATES, TERRITORIES, AND FOREIGN COUNTRIES

The fish-cultural programs of 41 States were promoted by the assignment of over 69 million fish and eggs. This is in comparison with over 165 million allotted during the fiscal year 1939. The recession is explained by the fact that diversion of flounder fry to the State of Rhode Island declined from 121,455,000 in 1939 to 11,403,000 in 1940, the drop being due to small egg collections of this species at the Woods Hole (Mass.) station. There was, however, a net increase of approximately 10 million in the allotments of miscellaneous species.

Many of the fish listed in the following table were simply turned over to the States for immediate distribution, thereby relieving the Bureau of this responsibility. As heretofore, however, millions of eggs went into the State hatcheries to constitute the principal source of supply for certain varieties of trout. The States generally recip-

located by filling Federal fish applications for waters in the vicinity of their hatcheries. It will be noted that the Bureau hatched and turned over to the Maine lobster-rearing station 7,172,000 lobster fry, in comparison with 46,450 lobster fry handled in 1939.

The policy illustrated by this activity is the most concrete evidence of the fruition of the program of coordinating State and Federal fish production and distribution. The totals listed in the following table are included within the gross output of the Federal hatcheries and are therefore not to be considered as a separate category within the general summaries.

Assignments of fish and fish eggs to State fish commissions, fiscal year 1940

States and species	Eggs	Fry	Finger- lings, etc.	Total
Alabama:				
Black bass, largemouth			66,515	66,515
Crappie			200	200
Sunfish			289,745	289,745
Arizona:				
Black bass, largemouth			50,000	50,000
Blackspotted trout	200,000			200,000
Brook trout	500,000			500,000
Arkansas: Sunfish			7,950	7,950
Colorado:				
Blackspotted trout	1,000,200			1,000,200
Brook trout			7,540	7,540
Steelhead trout			15,000	15,000
Connecticut: Black bass, smallmouth		298,000		298,000
Florida:				
Black bass, largemouth			91,150	91,150
Sunfish			176,900	176,900
Georgia:				
Black bass:				
Largemouth			103,600	103,600
Smallmouth			875	875
Crappie			146,200	146,200
Kentucky bass			645	645
Rainbow trout	270,000		8,400	278,400
Sunfish			273,450	273,450
Idaho:				
Black bass, smallmouth		6,000		6,000
Blackspotted trout	1,580,910			1,580,910
Brook trout		128,000	306,630	432,630
Dolly Varden trout	43,750			43,750
Grayling	250,250		15,000	265,250
Landlocked sockeye salmon	74,250		119,185	193,435
Rainbow trout	575,500		53,000	628,500
Illinois:				
Black bass:				
Largemouth			400	400
Smallmouth		50,000		50,000
Catfish			3,600	3,600
Loch Leven trout			5,000	5,000
Sunfish			207,000	207,000
Indiana:				
Brook trout			115,200	115,200
Loch Leven trout			98,100	98,100
Rainbow trout			128,000	128,000
Iowa:				
Black bass, largemouth			29,850	29,850
Brook trout			50,000	50,000
Crappie			4,500	4,500
Rainbow trout			50,000	50,000
Sunfish			90,500	90,500
Kentucky:				
Black bass:				
Largemouth		13,650		13,650
Smallmouth		16,500		16,500
Rock bass			3,000	3,000
Sunfish			2,400	2,400
Maine:				
Chinook salmon	25,000			25,000
Lobster		7,172,000		7,172,000
Maryland:				
Brook trout			650	650
Rainbow trout			35,500	35,500
Shad		3,000,000		3,000,000

Assignments of fish and fish eggs to State fish commissions, fiscal year 1940—Con.

States and species	Eggs	Fry	Fingerlings, etc.	Total
Massachusetts: Rainbow trout	50,000			50,000
Michigan: Rainbow trout	1,364,500			1,364,500
Minnesota: Bass bass, largemouth			48,400	48,400
Missouri:				
Black bass:				
Largemouth			20,400	20,400
Smallmouth		120,000		120,000
Montana:				
Black bass, largemouth			6,050	6,050
Blackspotted trout	2,850,890			2,850,890
Brook trout			90,525	90,525
Catfish			34,615	34,615
Crappie			23,960	23,960
Golden trout			100	100
Grayling			4,500	4,500
Loch Leven trout			127,000	127,000
Rainbow trout			10,280	10,280
Sunfish			19,705	19,705
Nebraska:				
Brook trout			3,000	3,000
Rainbow trout			4,200	4,200
Nevada:				
Blackspotted trout			10,000	10,000
Brook trout			10,000	10,000
Rainbow trout			10,000	10,000
Sunfish			3,000	3,000
New Hampshire:				
Brook trout	50,000		312,985	362,985
Loch Leven trout			100	100
New Jersey: Rainbow trout	73,020			73,020
New Mexico:				
Black bass:				
Largemouth			190,265	190,265
Smallmouth			52,450	52,450
Blackspotted trout	1,600,340			1,600,340
Catfish			24,500	24,500
Crappie			48,460	48,460
Rainbow trout	622,730			622,730
Sunfish			322,750	322,750
New York:				
Brook trout			21,150	21,150
Rainbow trout	400,000		10,625	410,625
North Carolina:				
Black bass:				
Largemouth			47,000	47,000
Smallmouth			1,750	1,750
Rainbow trout	600,000		6,580	606,580
Sunfish			27,000	27,000
Ohio: Rainbow trout			67,200	67,200
Oregon:				
Blackspotted trout	2,331,110			2,331,110
Brook trout			137,090	137,090
Rainbow trout			58,590	58,590
Steelhead trout	100,050			100,050
Pennsylvania: Loch Leven trout			240,000	240,000
Rhode Island: Flatfish		11,403,000		11,403,000
South Carolina:				
Black bass, largemouth			7,500	7,500
Loch Leven trout			2,975	2,975
Rainbow trout	125,000			125,000
South Dakota:				
Loch Leven trout			1,000	1,000
Rainbow trout			10,105	10,105
Tennessee: Rainbow trout	75,000			75,000
Texas:				
Sunfish			42,250	42,250
Warmouth bass			3,200	3,200
Utah:				
Blackspotted trout	1,500,100			1,500,100
Brook trout	505,060		24,825	529,885
Grayling	500,220			500,220
Vermont:				
Black bass:				
Largemouth			14,550	14,550
Smallmouth		15,000		15,000
Brook trout		620,000	128,400	748,400
Landlocked salmon			15,645	15,645
Loch Leven trout			31,800	31,800
White perch			1,000	1,000

Assignments of fish and fish eggs to State fish commissions, fiscal year 1940—Con.

States and species	Eggs	Fry	Fingerlings, etc.	Total
Virginia:				
Brook trout			81,540	81,540
Rainbow trout			194,850	194,850
Sunfish			22,475	22,475
Yellow perch		18,924,000		18,924,000
Washington:				
Blackspotted trout	550,300		117,580	667,880
Brook trout			285,950	285,950
Rainbow trout	460,000		287,485	747,485
Sockeye salmon	100,730		10,000	110,730
West Virginia:				
Brook trout			15,245	15,245
Loch Leven trout			30,390	30,390
Rainbow trout			100,865	100,865
Wisconsin:				
Black bass, largemouth			263,600	263,600
Brook trout			40,000	40,000
Loch Leven trout			19,000	19,000
Rainbow trout			32,000	32,000
Sunfish			600	600
Wyoming:				
Blackspotted trout	2,500,380		3,000	2,503,380
Brook trout			19,200	19,200
Grayling	300,130		10,000	310,130
Loch Leven trout			47,600	47,600
Rainbow trout			12,400	12,400
Total	21,181,420	41,764,150	6,426,835	69,372,405

Slightly more than 2½ million eggs of three species went into overseas shipments. The Territory of Hawaii and Puerto Rico each received rainbow-trout eggs, the species being well established in each of these areas; but with little or no natural reproduction. The shipment of lake-trout eggs to Peru was quite successful in comparison with the failure of the previous attempt. Whitefish eggs also survived the long trip but were lost during the subsequent incubation period.

An appropriation to finance such cooperative work with the American republics is highly necessary in view of the technical difficulties encountered. Such an appropriation became available for the fiscal year 1941.

Shipments of fish eggs to territories, possessions, and foreign countries, fiscal year 1940

Country and species	Number	Station from which shipped
Colombia: Rainbow trout	51,070	Eagle Nest, N. M.
Hawaii: Rainbow trout	25,000	Birdsview, Wash.
Peru:		
Lake trout	234,500	Cape Vincent, N. Y.
Whitefish	2,000,000	Put in Bay, Ohio.
Puerto Rico: Rainbow trout	255,200	Bourbon, Mo.
Total	2,565,770	

STATION OUTPUT

One hundred and four units contributed to the gross production at the Federal hatcheries during 1940. These included cooperative units and the major Forest Service nurseries, as well as the hatcheries established by statutory provision. While the Put in Bay (Ohio)

station is credited with a production of whitefish and pikeperch, such a showing is made because of the fact that eggs furnished by the State of Ohio were transferred to other activities by shipment from Put in Bay. A new cooperative unit located at Mullan, Idaho, is listed in production for the first time. This complete hatchery was constructed by a local sportsmen's organization, and operating responsibility has been assumed by the Bureau.

For administrative reasons the segregation of hatcheries into main stations (numbering 53) and substations (numbering 51) was continued. Such a designation is arbitrary and does not necessarily reflect the relative importance of the different activities in terms of fish production. Several units were operated seasonally, including the Yellowstone Park Hatchery, the Weldon (N. C.) substation, and the Eagle Nest Lake (N. Mex.) egg-collecting station. An additional unit entering production was the pondfish hatchery at Inks Dam, near Burnet, Tex.

Upon completion of the present construction program only the States of Delaware, Connecticut, and Maryland will be without at least one Federal fish-cultural unit. In a number of instances the numerical output of a station was deliberately curtailed in order to permit the rearing of fish to larger size before distribution.

Stations and substations operated, and the output of each, fiscal year 1940

Stations, substations, and species	Eggs	Fry	Fingerlings	Total
Berlin, N. H.: Brook trout.....		249, 100	351, 585	600, 685
<i>St. Johnsbury, Vt.:</i>				
Brook trout.....		530, 000		530, 000
Loch Leven trout.....			41, 800	41, 800
Landlocked salmon.....			15, 645	15, 645
Black bass, largemouth.....			20, 300	20, 300
<i>Birdsview, Wash.:</i>				
Blackspotted trout.....			152, 000	152, 000
Brook trout.....			131, 500	131, 500
Rainbow trout.....	51, 000		99, 775	150, 775
Steelhead trout.....	38, 500		810, 000	848, 500
Chinook salmon.....			696, 290	696, 290
Humpback salmon.....			237, 000	237, 000
Silver salmon.....			736, 900	736, 900
Sockeye salmon.....			17, 645	17, 645
<i>Baker Lake, Wash.:</i>				
Blackspotted trout.....			180, 450	180, 450
Brook trout.....			77, 900	77, 900
Rainbow trout.....			50, 000	50, 000
<i>Mount Rainier, Wash.:</i>				
Blackspotted trout.....			173, 570	173, 570
Brook trout.....			91, 000	91, 000
Rainbow trout.....			14, 500	14, 500
<i>Spokane, Wash.:</i>				
Blackspotted trout.....			39, 980	39, 980
Brook trout.....			88, 400	88, 400
Rainbow trout.....			267, 085	267, 085
<i>Boothbay Harbor, Maine:</i>				
Cod.....	1, 282, 103, 000			1, 282, 103, 000
Flatfish.....		612, 900, 000		612, 900, 000
Haddock.....	253, 582, 000			253, 582, 000
Pollock.....	1, 060, 000, 000			1, 060, 000, 000
Lobster.....	600, 000	7, 532, 000		8, 132, 000
<i>Bozeman, Mont.:</i>				
Blackspotted trout.....		527, 500	1, 445, 560	1, 973, 060
Brook trout.....			756, 885	756, 885
Golden trout.....			8, 715	8, 715
Loch Leven trout.....			127, 000	127, 000
Rainbow trout.....			601, 615	601, 615
Grayling.....			252, 550	252, 550
<i>Ennis, Mont.:</i>				
Blackspotted trout.....			453, 050	453, 050
Brook trout.....			72, 200	72, 200
Loch Leven trout.....			1, 277, 080	1, 277, 080
Rainbow trout.....			600, 245	600, 245
Grayling.....			2, 695	2, 695

NOTE.—Stations italicized are substations of the preceding station in roman type.

Stations and substations operated, and the output of each, fiscal year 1940—Continued

Stations, substations, and species	Eggs	Fry	Fingerlings	Total
<i>Miles City, Mont.:</i>				
Black bass, largemouth			25, 675	25, 675
Catfish			133, 075	133, 075
Crappie			94, 725	94, 725
Sunfish			83, 445	83, 445
<i>Cape Vincent, N. Y.:</i>				
Brook trout		224, 000		224, 000
Lake trout	299, 500	201, 000		500, 500
Loch Leven trout		86, 000	3, 970	89, 970
Rainbow trout			3, 630	3, 630
Lake herring		140, 000		140, 000
Whitefish		4, 460, 000		4, 460, 000
Black bass, smallmouth		28, 250	127, 220	155, 470
<i>Barneveld, N. Y.:</i>				
Brook trout			191, 750	191, 750
Loch Leven trout			31, 500	31, 500
Rainbow trout			41, 550	41, 550
<i>Cortland, N. Y.:</i>				
Brook trout			95, 360	95, 360
Loch Leven trout			44, 460	44, 460
Rainbow trout			20, 315	20, 315
<i>Watertown, N. Y.:</i>				
Brook trout			81, 295	81, 295
Loch Leven trout			94, 720	94, 720
Rainbow trout			14, 110	14, 110
<i>Carson, Wash.:</i>				
Blackspotted trout			282, 000	282, 000
Brook trout			292, 700	292, 700
Rainbow trout			379, 900	379, 900
Chinook salmon		932, 700	425, 200	1, 357, 900
<i>Little White Salmon, Wash.:</i> Chinook salmon	300, 000	11, 343, 000		11, 643, 000
<i>Big White Salmon, Wash.:</i>				
Brook trout			178, 000	178, 000
Rainbow trout			985, 305	985, 305
Chinook salmon	2, 000, 000	10, 522, 000	7, 620, 485	20, 142, 485
<i>Clackamas, Oreg.:</i>				
Blackspotted trout			11, 000	11, 000
Brook trout			154, 090	154, 090
Rainbow trout			119, 690	119, 690
Chinook salmon			348, 500	348, 500
<i>Battle Creek, Calif.:</i> Chinook salmon	40, 000		4, 532, 180	4, 572, 180
<i>Butte Falls, Oreg.:</i>				
Rainbow trout			463, 945	463, 945
Steelhead trout	100, 050		712, 620	812, 670
Chinook salmon			1, 391, 560	1, 391, 560
Silver salmon			57, 445	57, 445
<i>Mill Creek, Calif.:</i> Chinook salmon			1, 033, 310	1, 033, 310
<i>Clark Fork, Idaho:</i>				
Blackspotted trout			181, 900	181, 900
Brook trout		126, 000	417, 530	543, 530
Dolly Varden trout	43, 750			43, 750
Rainbow trout			5, 775	5, 775
Landlocked sockeye salmon	548, 950		119, 185	668, 135
<i>Craig Brook, Maine:</i>				
Brook trout	3, 200, 000		269, 495	3, 469, 495
Lake trout			7, 500	7, 500
White perch			1, 000	1, 000
<i>Crawford, Nebr.:</i>				
Blackspotted trout			980, 000	980, 000
Brook trout			281, 900	281, 900
Loch Leven trout			12, 000	12, 000
Rainbow trout			361, 300	361, 300
Black bass			21, 270	21, 270
Catfish			65, 200	65, 200
Crappie			22, 160	22, 160
Rock bass			13, 880	13, 880
Yellow perch			3, 345	3, 345
<i>Dexter, N. Mex.:</i>				
<i>Black bass:</i>				
Largemouth			238, 085	238, 085
Smallmouth			3, 200	3, 200
Catfish			24, 850	24, 850
Crappie			71, 150	71, 150
Sunfish			180, 900	180, 900
<i>Santa Rosa, N. Mex.:</i>				
<i>Black bass:</i>				
Largemouth			36, 100	36, 100
Smallmouth			49, 750	49, 750
Catfish			1, 100	1, 100
Sunfish			188, 550	188, 550

Stations and substations operated, and the output of each, fiscal year 1940—Continued

Stations, substations, and species	Eggs	Fry	Fingerlings	Total
Duluth, Minn.:				
Brook trout			694,000	694,000
Lake trout	300,000	1,572,500	25,000	1,897,500
Loch Leven trout			111,000	111,000
Rainbow trout			9,000	9,000
Lake herring		280,000		280,000
Pikeperch		6,700,000		6,700,000
Pike and pickerel		200,000		200,000
Whitefish		1,200,000		1,200,000
Edenton, N. C.:				
Black bass: Largemouth		50,500	69,590	120,090
Crappie			1,875	1,875
Sunfish			93,800	93,800
Warmouth bass			13,000	13,000
Glut herring		170,000		170,000
Shad		13,600,000	12,000	13,612,000
White perch		2,280,000	845	2,280,845
Yellow perch		1,360,000	535	1,360,535
<i>Weldon, N. C.:</i> Striped bass		5,917,000		5,917,000
Elephant Butte, N. Mex.:				
Black bass: Largemouth			664,075	664,075
Crappie			7,200	7,200
Sunfish			31,000	31,000
Erwin, Tenn.:				
Brook trout			306,675	306,675
Loch Leven trout			8,100	8,100
Rainbow trout			622,800	622,800
Black bass:				
Largemouth		500,000	85,915	585,915
Smallmouth			1,600	1,600
Rock bass			14,950	14,950
Sunfish			75,095	75,095
Fairport, Iowa:				
Black bass:				
Largemouth		98,000	93,940	191,940
Smallmouth			500	500
Catfish		39,000	316,125	355,125
Crappie			39,375	39,375
Sunfish			612,120	612,120
White bass			245	245
Buffalofish	50,300,000		4,200	50,304,200
Drum			200	200
Miscellaneous fishes			11,000	11,000
Flintville, Tenn.:				
Rainbow trout			179,200	179,200
Black bass:				
Largemouth			350	350
Smallmouth			405	405
Rock bass			4,200	4,200
Sunfish			16,150	16,150
Fort Belvoir, Va.:				
Black bass, largemouth			165	165
Crappie			2,715	2,715
Sunfish			26,200	26,200
Shad		27,920,000		27,920,000
Yellow perch		241,722,000		241,722,000
Glacier National Park, Mont.:				
Blackspotted trout		2,122,860		2,122,860
Rainbow trout		376,840		376,840
Gloucester, Mass.:				
Cod	1,330,965,110	191,980,100		1,522,945,210
Flatfish		16,406,280		16,406,280
Haddock	812,582,500			812,582,500
Pollock	902,705,490	174,382,490		1,077,087,980
Lobster		552,000		552,000
Hagerman, Idaho:				
Blackspotted trout			243,900	243,900
Brook trout			102,500	102,500
Rainbow trout			629,300	629,300
Landlocked sockeye salmon			531,400	531,400
Salmon, Idaho:				
Blackspotted trout			104,090	104,090
Brook trout		2,060	4,500	6,560
Golden trout			11,140	11,140
Rainbow trout	1,419,300		372,290	1,791,590
Hartsville, Mass.:				
Brook trout			301,600	301,600
Rainbow trout			31,165	31,165
Black bass, smallmouth		612,000		612,000
Catfish			10,840	10,840

Stations and substations operated, and the output of each, fiscal year 1940—Continued

Stations, substations, and species	Eggs	Fry	Fingerlings	Total
LaCrosse, Wis.:				
Brook trout			829, 410	829, 410
Loch Leven trout			266, 400	266, 400
Rainbow trout			231, 725	231, 725
Black bass, largemouth		21, 000	162, 390	183, 390
Catfish			7, 000	7, 000
Crappie			9, 520	9, 520
Sunfish			13, 700	13, 700
Yellow perch			3, 300	3, 300
Belleue, Iowa:				
Black bass, largemouth			17, 050	17, 050
Catfish			108, 000	108, 000
Crappie			281, 000	281, 000
Sunfish			518, 000	518, 000
Buffalofish	42, 750, 000		289, 000	43, 039, 000
Miscellaneous fishes			454, 000	454, 000
Genoa, Wis.:				
Black bass:				
Largemouth			764, 575	764, 575
Smallmouth			36, 490	36, 490
Catfish			100	100
Crappie			40	40
Sunfish			5, 320	5, 320
Guttenberg, Iowa:				
Black bass, largemouth			7, 075	7, 075
Catfish			1, 726, 605	1, 726, 605
Crappie			363, 105	363, 105
Sunfish			362, 485	362, 485
White bass			22, 200	22, 200
Buffalofish	2, 822, 250		132, 600	2, 954, 850
Drum			2, 600	2, 600
Pike and pickerel	6, 782, 810	740, 140	5, 510	7, 528, 460
Pikeperch	438, 360			438, 360
Yellow perch			1, 950	1, 950
Marquette, Iowa:				
Black bass, largemouth			3, 650	3, 650
Catfish			480, 000	480, 000
Crappie			269, 000	269, 000
Sunfish			146, 620	146, 620
White bass			8, 300	8, 300
Buffalofish			11, 800	11, 800
Drum			2, 800	2, 800
Pike and pickerel			3, 400	3, 400
Yellow perch			300	300
Lake Mills, Wis.:				
Brook trout			59, 875	59, 875
Loch Leven trout			56, 500	56, 500
Rainbow trout			44, 200	44, 200
Black bass:				
Largemouth			88, 020	88, 020
Smallmouth			17, 350	17, 350
Crappie			6, 500	6, 500
Sunfish			147, 500	147, 500
Lake Park, Ga.:				
Black bass, largemouth			20, 800	20, 800
Catfish			10, 700	10, 700
Crappie			391, 100	391, 100
Sunfish			818, 900	818, 900
Lamar, Pa.:				
Brook trout			385, 130	385, 130
Loch Leven trout	10, 640		525, 710	536, 350
Rainbow trout			269, 280	269, 280
Black bass:				
Largemouth			8, 635	8, 635
Smallmouth			7, 360	7, 360
Catfish			9, 390	9, 390
Sunfish			18, 845	18, 845
Ogletown, Pa.:				
Brook trout			88, 500	88, 500
Rainbow trout			42, 300	42, 300
Las Vegas, Nev.:				
Black bass, largemouth			56, 000	56, 000
Sunfish			18, 000	18, 000
Leadville, Colo.:				
Blackspotted trout			519, 665	519, 665
Brook trout	3, 824, 560		1, 107, 465	4, 932, 025
Lake trout			21, 700	21, 700
Loch Leven trout			96, 110	96, 110
Rainbow trout			605, 170	605, 170
Steelhead trout			20, 580	20, 580
Creede, Colo.:				
Blackspotted trout			540, 300	540, 300
Brook trout	6, 078, 000		902, 900	6, 980, 900
Rainbow trout	550, 000		548, 500	1, 098, 500

Stations and substations operated, and the output of each, fiscal year 1940—Continued

Stations, substations, and species	Eggs	Fry	Fingerlings	Total
<i>Eagle Nest, N. Mex.:</i>				
Blackspotted trout.....			189,000	189,000
Rainbow trout.....	2,228,445		277,000	2,505,445
<i>Leetown, W. Va.:</i>				
Blackspotted trout.....			12,720	12,720
Brook trout.....		100	61,690	61,690
Loch Leven trout.....			67,700	67,700
Rainbow trout.....	414,055		189,380	603,435
Black bass:				
Largemouth.....			15,065	15,065
Smallmouth.....			58,560	58,560
Crappie.....			80	80
Sunfish.....			3,315	3,315
<i>Louisville, Ky.:</i>				
Black bass:				
Largemouth.....		16,650	12,420	29,070
Smallmouth.....		93,700	4,335	98,035
Crappie.....			2,360	2,360
Rock bass.....			17,550	17,550
Sunfish.....			32,625	32,625
<i>Mammoth Spring, Ark.:</i>				
Black bass:				
Largemouth.....		50,000	191,835	241,835
Smallmouth.....		306,000	118,325	424,325
Rock bass.....			23,200	23,200
Sunfish.....			78,100	78,100
<i>Manchester, Iowa:</i>				
Brook trout.....			191,980	191,980
Loch Leven trout.....			84,245	84,245
Rainbow trout.....	2,843,700		143,890	2,987,590
Rock bass.....			12,500	12,500
<i>Marion, Ala.:</i>				
Black bass, largemouth.....		27,500	505,205	532,705
Crappie.....			3,440	3,440
Rock bass.....			2,035	2,035
Sunfish.....			1,185,475	1,185,475
<i>Cohutta, Ga.:</i>				
Black bass:				
Largemouth.....		49,000	142,895	191,895
Smallmouth.....		6,800	875	7,675
Catfish.....			3,000	3,000
Kentucky bass.....		10,000	2,665	12,665
Sunfish.....			31,620	31,620
<i>Lymon, Miss.:</i>				
Black bass, largemouth.....			332,990	332,990
Sunfish.....			840,500	840,500
<i>Marianna, Fla.:</i>				
Black bass, largemouth.....		17,000	112,545	129,545
Crappie.....			1,300	1,300
Sunfish.....			320,475	320,475
<i>Tupelo, Miss.:</i>				
Black bass, largemouth.....		213,000	397,780	610,780
Sunfish.....			269,215	269,215
<i>Warm Springs, Ga.:</i>				
Black bass, largemouth.....		4,000	284,125	288,125
Sunfish.....			4,110	4,110
<i>Mullan, Idaho:</i>				
Blackspotted trout.....		20,400	297,525	317,925
Brook trout.....			25	25
Rainbow trout.....			73,000	73,000
<i>Nashua, N. H.:</i>				
Brook trout.....			168,570	168,570
Loch Leven trout.....			280	280
Rainbow trout.....			950	950
Catfish.....			3,000	3,000
<i>Neosho, Mo.:</i>				
Rainbow trout.....	1,729,600		77,405	1,807,005
Black bass, largemouth.....		9,000	15,940	24,940
Crappie.....			44,900	44,900
Rock bass.....			13,500	13,500
Sunfish.....			12,310	12,310
<i>Bourbon, Mo.:</i> Rainbow trout.....	3,635,000			3,635,000
<i>Forest Park, Mo.:</i>				
Black bass:				
Largemouth.....			41,125	41,125
Smallmouth.....			2,700	2,700
Catfish.....			5,850	5,850
Crappie.....			11,305	11,305
Sunfish.....			59,550	59,550
<i>Natchitoches, La.:</i>				
Black bass, largemouth.....			97,360	97,360
Catfish.....			875	875
Crappie.....			675	675
Sunfish.....			615,600	615,600
Warmouth bass.....			11,360	11,360

Stations and substations, operated and the output of each, fiscal year 1940—Continued

Stations, substations, and species	Eggs	Fry	Fingerlings	Total
<i>Tishomingo, Okla.:</i>				
Black bass, largemouth.....			147,890	147,890
Catfish.....			440	440
Crappie.....			13,450	13,450
Sunfish.....			512,705	512,705
<i>Northville, Mich.:</i>				
Brook trout.....		848,570		848,570
Loch Leven trout.....		100,300		100,300
Rainbow trout.....		309,125		309,125
Black bass:				
Largemouth.....			6,415	6,415
Smallmouth.....			27,400	27,400
Sunfish.....			41,690	41,690
<i>Charlevoix, Mich.:</i>				
Lake trout.....			160,000	160,000
Steelhead trout.....			22,200	22,200
<i>Orangeburg, S. C.:</i>				
Black bass, largemouth.....		17,000	574,110	591,110
Catfish.....			23,990	23,990
Crappie.....			1,300	1,300
Sunfish.....			171,130	171,130
Warmouth bass.....			1,685	1,685
Yellow perch.....			2,875	2,875
<i>Hoffman, N. C.:</i>				
Black bass, largemouth.....			151,625	151,625
Catfish.....			25	25
Crappie.....			8,890	8,890
Sunfish.....			278,285	278,285
<i>Pisgah Forest, N. C.:</i>				
Brook trout.....			8,785	8,785
Loch Leven trout.....			10,150	10,150
Rainbow trout.....			21,460	21,460
<i>Pittsford, Vt.:</i>				
Brook trout.....	119,000		64,225	183,225
Rainbow trout.....	94,000		8,650	102,650
<i>Put in Bay, Ohio:</i>				
Pikeperch.....	940,000	1,250,000		2,190,000
Whitefish.....	2,000,000			2,000,000
<i>Quinalt, Wash.:</i>				
Rainbow trout.....			28,460	28,460
Steelhead trout.....			134,155	134,155
Chinook salmon.....			357,070	357,070
Silver salmon.....			90,080	90,080
Bockeyes salmon.....	116,380		2,261,480	2,377,860
<i>Duckabush, Wash.:</i>				
Chinook salmon.....			7,280	7,280
Chum salmon.....		1,572,000	38,620	1,610,620
Humpback salmon.....		230,790		230,790
Silver salmon.....			100,055	100,055
<i>Quilcene, Wash.:</i>				
Blackspotted trout.....			89,250	89,250
Brook trout.....			52,650	52,650
Rainbow trout.....			600	600
Steelhead trout.....			130,380	130,380
Chum salmon.....	795,000	2,865,680	90,900	3,751,580
Silver salmon.....			509,285	509,285
<i>Rochester, Ind.:</i>				
Black bass:				
Largemouth.....			282,095	282,095
Smallmouth.....			20,955	20,955
Catfish.....			6,575	6,575
Crappie.....			2,865	2,865
Rock bass.....			94,790	94,790
Sunfish.....			572,800	572,800
Yellow perch.....			58,070	58,070
<i>Rochester, N. Y.:</i>				
Loch Leven trout.....	65,000	15,250	26,395	106,645
Lake trout.....			1,940	1,940
Rainbow trout.....			37,705	37,705
Black bass:				
Largemouth.....			16,600	16,600
Smallmouth.....			2,500	2,500
<i>Carpenters Brook, N. Y.:</i>				
Brook trout.....			175,350	175,350
Lake trout.....			15,000	15,000
Loch Leven trout.....			14,815	14,815
Rainbow trout.....			23,940	23,940
<i>Saratoga, Wyo.:</i>				
Blackspotted trout.....	69,750	10,570	502,535	582,855
Brook trout.....			117,970	117,970
Loch Leven trout.....			24,600	24,600
Rainbow trout.....			589,285	589,285

Stations and substations operated, and the output of each, fiscal year 1940—Continued

Stations, substations, and species	Eggs	Fry	Fingerlings	Total
Spearfish, S. Dak.:				
Blackspotted trout			130,000	130,000
Brook trout	15,000		326,510	341,510
Loch Leven trout			84,985	84,985
Rainbow trout	125,660		403,125	528,785
Springville, Utah:				
Blackspotted trout			456,600	456,600
Brook trout			210,435	210,435
Loch Leven trout			16,845	16,845
Rainbow trout	75,000		596,965	671,965
Black bass, largemouth			1,900	1,900
Sunfish			21,000	21,000
Bear Lake, Utah:				
Blackspotted trout			596,400	596,400
Brook trout			320,390	320,390
Lake trout			19,820	19,820
Rainbow trout			63,480	63,480
Chum salmon			120,680	120,680
Uvalde, Tex.:				
Black bass, largemouth		358,450	583,555	947,005
Crappie			50	50
Rio Grande perch			91,500	91,500
Sunfish			206,960	206,960
Fort Worth, Tex.:				
Black bass, largemouth			56,840	56,840
Catfish			16,375	16,375
Crappie			13,045	13,045
Sunfish			191,795	191,795
Warmouth bass			1,300	1,300
Inks Dam, Tex.:				
Black bass, largemouth			62,050	62,050
Crappie			2,925	2,925
San Angelo, Tex.:				
Black bass, largemouth			317,400	317,400
Catfish			3,600	3,600
Crappie			4,400	4,400
Sunfish			461,975	461,975
San Marcos, Tex.:				
Black bass, largemouth		284,000	202,580	486,580
Crappie			300	300
Rio Grande perch			13,160	13,160
Rock bass			5,310	5,310
Sunfish			242,065	242,065
Warmouth bass			10,200	10,200
Walhalla, S. C.:				
Brook trout		50,000	212,490	262,490
Loch Leven trout			20,000	20,000
Rainbow trout		35,000	85,885	120,885
Chattahoochee, Ga.:				
Brook trout			33,215	33,215
Rainbow trout			38,145	38,145
Franklin, N. C.:				
Brook trout			29,080	29,080
Rainbow trout			12,170	12,170
Welaka, Fla.:				
Black bass, largemouth		412,000	383,300	795,300
Sunfish			289,110	289,110
White Sulphur Springs, W. Va.:				
Brook trout			45,700	45,700
Loch Leven trout			6,120	6,120
Rainbow trout	815,000		62,025	877,025
Woods Hole, Mass.:				
Flatfish	6,607,000	132,219,000		138,826,000
Mackerel		8,277,000		8,277,000
Wytheville, Va.:				
Brook trout			349,365	349,365
Rainbow trout	1,385,000		345,650	1,730,650
Black bass:				
Largemouth			1,860	1,860
Smallmouth		19,000	6,150	25,150
Rock bass			5,550	5,550
Sunfish			6,275	6,275
Pikeperch		300,000		300,000
New Castle, Va.:				
Brook trout			22,195	22,195
Rainbow trout			53,310	53,310
Harrison Lake, Va.:				
Black bass, largemouth		327,000	8,040	335,040
Crappie			12,845	12,845
Sunfish			209,810	209,810
Shad		685,000	87,500	672,500

Stations and substations operated, and the output of each, fiscal year 1940--Continued

Stations, substations, and species	Eggs	Fry	Fingerlings	Total
<i>Norris, Tenn.:</i>				
Rainbow trout.....			12,000	12,000
Black bass, largemouth.....		430,000	22,250	452,250
Kentucky bass.....			25,630	25,630
Rock bass.....			1,520	1,520
Sunfish.....			82,800	82,800
Pikeperch.....		500,000		500,000
Miscellaneous fishes.....			32,000	32,000
<i>Smokemont, N. C.:</i>				
Brook trout.....			98,360	98,360
Rainbow trout.....			79,200	79,200
<i>Yellowstone Park, Wyo.:</i>				
Blackspotted trout.....	32,524,330	6,300,000	1,423,020	40,247,350
Rainbow trout.....	677,300			677,300
Grayling.....	4,349,000			4,349,000
<i>Jackson, Wyo.:</i>				
Blackspotted trout.....		382,000	224,690	606,690
Brook trout.....		287,500	191,000	478,500
Lake trout.....			13,700	13,700
Total.....	5,826,058,990	1,498,156,710	83,031,240	7,407,246,940

EGG COLLECTIONS

The 1940 egg collections showed a reduction in comparison with 1939 which was somewhat proportional to the reduction in hatchery output. Three marine species, cod, haddock, and flatfish, accounted for the major part of this reduction. The practice of producing trout eggs in hatcheries especially adapted to this purpose was continued, and some exchanges were effected with commercial producers. The take of brown, or Loch Leven trout eggs was increased noticeably, as the breeding stocks of this species began to attain maturity. The failure of the usual source of supply of wild brown-trout eggs several years ago forced the adoption of a policy of producing these eggs from domesticated stock. Correlation of the egg collections with the hatchery output should not be construed as an indication of mortality, since the carry-over of hatchery stock at the end of each fiscal year is a source of fish for distribution during the succeeding year.

Comparison of egg collections, fiscal years 1939 and 1940

Species	1939	1940	Species	1939	1940
Shad.....	48,257,000	51,759,000	Grayling.....	5,117,600	4,060,200
Whitefish.....	52,464,000	9,215,000	Pikeperch.....	966,755,100	10,841,400
Chinook salmon.....	63,124,000	46,059,100	Pike-pickercel.....		8,246,100
Chum salmon.....	11,196,100	5,418,000	Yellow perch.....	301,668,000	245,731,000
Silver salmon.....	3,080,000	1,118,700	White perch.....	8,300,000	4,000,000
Sockeye salmon.....	2,969,000	2,093,300	Cod.....	3,197,555,700	2,838,406,000
Landlocked sockeye salmon.....		481,900	Haddock.....	1,178,983,700	1,066,164,500
.....		686,000	Pollock.....	1,560,497,100	2,176,499,000
Humpback salmon.....		113,000	Flatfish.....	1,318,397,100	853,782,000
Atlantic salmon.....			Mackerel.....	11,060,000	9,102,000
Rainbow trout.....	30,155,900	33,097,900	Lake herring.....	5,325,000	1,245,000
Blackspotted trout.....	42,898,600	52,911,500	Glut herring.....	8,140,000	717,000
Loch Leven trout.....	899,500	3,043,400	Striped bass.....	3,143,000	8,075,000
Lake trout.....	2,852,000	1,079,300	Buffalofish.....	78,681,500	95,872,250
Brook trout.....	11,576,700	16,497,400	Lobster.....	12,991,600	8,142,500
Steelhead trout.....	3,386,900	2,477,900			
Dolly Varden trout.....		46,000	Total.....	8,929,774,000	7,557,571,350
Golden trout.....	18,200				

NOTES ON OPERATIONS

COMMERCIAL SPECIES

Pacific salmon.—The Leavenworth (Wash.) station and its auxiliaries are being developed for the expressed purpose of establishing the run of salmon from the upper Columbia River in tributary streams. The construction of the Grand Coulee Dam placed an insurmountable barrier to the runs of fish up the Columbia River to the uppermost spawning grounds. Since the Leavenworth unit was not sufficiently completed before the 1939 fall run to handle the adult salmon, the fish of this run were planted in waters that emptied into the Columbia River below the dam. The lower holding pond on Icicle Creek was completed in time to be stocked with chinook and blueback salmon from the spring run of 1940. These fish will be retained until the eggs mature and can be taken. The Bureau cooperated with the Washington Game Department by rearing rainbow-trout fingerlings which were received from the Big White Salmon station. The State supplied the labor necessary for their care, and the Bureau furnished the feed. The construction work at the Leavenworth station is approximately 50 percent complete. The hatchery building, which is equipped with 288 troughs, is complete. Work was started at the substations at Entiat and Winthrop, Wash. Congressional authority has not been secured and work was not begun on the proposed substation at Okanagan Falls, on the Okanagan River, B. C., where attention should be concentrated on the propagation of blueback salmon.

Owing to the abnormally low run of salmon, the Quinault (Wash.) station collected approximately 12 percent fewer eggs than last year. In 1933 the station initiated an experimental attempt to establish sockeye salmon runs in Falls Creek by planting large-size fingerling fish. At present quite extensive runs are established, and it is possible to obtain practically all the sockeye eggs required on or near the hatchery grounds. Not only does this result in an important saving, but the eggs are decidedly superior to those transported from distant points. Rather surprising results were obtained from a group of approximately 2,000 marked steelhead trout liberated in Falls Creek in November 1938 and March 1939. When liberated, these fish averaged about one-half pound in weight. During the spring of 1940, 42 of these trout were recovered in the traps. They were in fine condition and weighed approximately 4 pounds each. These trout were held for ripening in the dirt brood-stock pond without loss, and after they were spawned they were returned to Falls Creek. It has been exceedingly rare for steelhead trout to be taken in a trap in Falls Creek prior to this year. The entire output of chinook, silver, and sockeye salmon, steelhead, and rainbow trout were distributed in the State of Washington. The boathouse was moved to a new location.

The collection of chinook-salmon eggs at the Little White Salmon station this year was approximately 20 percent less than last year. Due to the lack of space, 300,000 eyed eggs were planted in the Little White Salmon River. No rearing pools have been constructed, so the output of fish was planted in the advanced-fry stage. The salmon flesh secured in spawning operations was frozen and placed in storage for future use as fish food by other stations. The new hatchery building under construction at the close of the fiscal year

1939 was completed, except for the necessary piping and troughs. Rocks were removed from the seining and trapping grounds on the river.

The Birdsvew (Wash.) unit, in addition to collecting eggs from its brood stock of rainbow trout, took eggs from wild steelhead trout, silver, chinook, and humpback salmon. Chinook salmon, brook, rainbow, and blackspotted trout eggs were received from other stations. During the summer months the hatchery was operated at full capacity. All runs of Pacific coast salmon were considerably below normal during the past year.

The Carson (Wash.) station handled brook and rainbow trout as well as chinook salmon. The latter species was handled largely to relieve crowded conditions at the Big White Salmon unit. The brook trout contracted western gill disease, and the resultant loss was rather heavy. The total output of trout was distributed by the Forest Service in waters of the Columbia National Forest. The chinook salmon were liberated in Wind River, a tributary to the Columbia.

Chinook and silver salmon, and steelhead and rainbow trout were propagated at the Butte Falls (Oreg.) station. The station's water supply pipeline broke on July 6, necessitating the liberation of all hatchery fish in Butte Creek. While over one-half million more chinook-salmon eggs were taken this year than last, the total collection of all eggs handled was approximately one-third greater than for the previous year. In addition to the new 80-foot span of bridge constructed to support the hatchery water supply pipeline replacement, various minor repairs were made to buildings and equipment.

The collection of eggs at the Clackamas (Oreg.) station and its substations was slightly less than half the number collected last year. The shortage is attributable in part at least to unfavorable weather conditions and the extremely low percentage of female fish in the chinook salmon runs of Mill Creek and Battle Creek, Calif. The take of spring chinook-salmon eggs was approximately one-third the take of fall eggs of the same species. The collection of silver-salmon and steelhead-trout eggs was very satisfactory, and salmon, rainbow, brook, and blackspotted trout were propagated. Experiments with the use of chlorine in the water supply at Clackamas indicate that 0.35 part per million may be added without ill effects. Experiments were also conducted to ascertain the suitability of a new deep-well water supply to fish-cultural operations. The water was found to be relatively low in oxygen content, but it is believed that with proper aerating facilities it will be entirely satisfactory. A new hatchery building at the Delph Creek substation was completed.

The substation at Duckabush, Wash., collected eggs from more species of salmon than last year, although the total take of eggs was somewhat lower. Early- and late-run chum, silver, chinook, and humpback salmon were trapped and spawned, and the carcasses taken to the Quilcene dehydrating plant for processing into salmon meal. Due to limited pond area, most of the fish were planted as advanced fry in adjacent waters.

In addition to collecting chinook salmon eggs, the Big White Salmon substation handled brook and rainbow trout. This year's collection of salmon eggs exceeded all previous records. Even though eggs were transferred to other stations, it was necessary to plant a large number of the salmon as advanced fry. The remainder were fed

until they were about 1½ inches in length, when part of them were liberated to relieve overcrowding, and the others were fed until they reached a length of about 2½ inches. The only major construction was the installation of a new water-supply line.

The Quilcene (Wash.) station and the Walcott Slough egg-collecting unit operated normally. Chum-salmon and steelhead-trout spawn was collected from wild fish, and cutthroat-trout eggs from the station brood stock. Blackspotted-, brook-, and rainbow-trout eggs were received from other sources. The collection of chum-salmon eggs was below normal. This shortage is attributed to the fact that the 1936 output of chum fingerlings was planted elsewhere than in the Walcott Slough. Satisfactory results were obtained with the use of apple flour as roughage in the food formula. Alder sawdust is now being tried in place of the apple pomace. Chum salmon were distributed as fry. The other species handled were held to relatively large fingerling size before they were liberated. The refrigeration plant under construction at the close of last year was completed, and meat grinding and refrigeration equipment was installed. All buildings were completely wired for electricity. The N. Y. A. gave much helpful assistance. In addition to making fry trays and office furniture for various units in the region, the N. Y. A. shop at Port Townsend overhauled and repainted all trucks and other machinery in need of mechanical repairs.

MARINE SPECIES

The Boothbay Harbor (Maine) station began collecting pollock eggs in the Portland section on November 1. The collections increased until the last of November and then declined until December 15, at which date the take did not warrant the expense of further operations. During this period 1,060,000,000 eggs were taken, fertilized, and liberated on natural spawning grounds. This was an increase of 105 percent over the preceding year. In collecting cod eggs it has been the custom in past years to place spawntakers aboard the larger commercial fishing boats during the spawning season to take ripe eggs from the catch. The Bureau's boats collected the eggs on the fishing grounds, fertilized, and planted them on spawning beds. This year the commercial fishermen moved to more distant fishing grounds, thus curtailing the Bureau's operations. Fishermen aboard the vessels were employed to take the eggs, fertilize, and plant them, and one of the Bureau's spawntakers was at hand to check the take and plantings. The method was more economical than that used in the past, but it is questionable if the eggs were of the same high quality as in previous years. The cod egg-taking season began March 22 and closed June 25. The total number of eggs collected was 1,282,103,000, which was 90.3 percent of last year's record.

Haddock operations were carried on in conjunction with codfish activities. The commercial net fishermen were paid 5 cents per quart for eggs collected and planted. The first collections were made April 4 and operations continued until June 4, during which period 253,582,000 eggs were taken. Of the 681,000,000 flounder eggs secured and incubated in the hatchery, a 90 percent hatch was obtained. During June 1940, 7,532,000 lobster eggs were hatched naturally, of which 4,842,000 were assigned to the State of Maine and 2,690,000 were

planted locally. Efforts are being made by the Bureau and the State of Maine to rear more of the lobsters through the fourth stage.

Propagation of pollock, cod, haddock, flounders, and lobsters was continued at the Gloucester (Mass.) station, and hatchery operations greatly exceeded those of 1939. Offshore work varied, owing to the fishermen's strike on the larger trawlers. Increased prices prevailed on all groundfish during winter and spring, thus affording an opportunity for the smaller boats to operate. It was also possible for the gill-net fleets—the main source of egg supply for the hatcheries—to operate for a longer period. Both the quality and quantity of pollock eggs and fry handled were exceptionally high. The collection of pollock eggs for the entire season totaled 1,116,498,870, of which number 213,793,370 were incubated in the hatchery and yielded 174,382,490 fry which were liberated in suitable spots in Massachusetts Bay. Immediately after fertilization, 902,705,490 green pollock eggs were liberated in offshore work. Cod operations were carried on in conjunction with the pollock activities. Hatchery work with this species was much more extensive than in previous years. Egg collections for the entire season aggregated 1,556,302,810, and of this number 227,783,930 yielded 191,980,100 fry. In offshore work 1,330,965,110 eggs were liberated on the fishing grounds immediately after fertilization. The customary small-mesh nets were not used by the gill netters during the spring season, consequently there were no collections of haddock eggs for incubation in the hatchery. Offshore activities grossed 812,582,500 haddock eggs, which exceeds last year's take by nearly one hundred million. All liberations were made in Georges Banks. Flatfish egg-collecting operations were conducted with station fyke nets again this year. From the eggs collected 16,404,280 fry were hatched and liberated on the grounds in Gloucester outer harbor, from which the eggs were secured. Several attempts were made to obtain gravid fish from other spots around Cape Ann, but it was impossible to determine the value of these undertakings as the station did not have a sufficient number of nets to properly cover the spawning grounds. The lobster-cultural work was carried on in cooperation with the Massachusetts Department of Conservation, as heretofore. In January, 62 seed lobsters were secured from the State and 15 were collected from the gill netters. From these seeders 505,470 eggs were obtained and incubated in McDonald hatching jars, and 177,000 second- and third-stage lobsters were liberated along the Massachusetts coast from Newburyport to Boston. There were also 375,000 young lobsters liberated in July 1939 from eggs on hand at the termination of the fiscal year 1939, making the total liberations for the current year 552,000. As the station was completely rehabilitated last year under the auspices of the P. W. A. and W. P. A. projects, no major construction work was necessary. However, minor repairs were made to station buildings and equipment, both floating and automotive.

Flounder operations were begun in the Woods Hole (Mass.) area on January 3, when three fyke nets were set in Waquoit Bay. The number of nets was increased as conditions warranted until 24 nets were in use. Although a catch of only 435 suitable spawners was obtained, which is approximately one-fifth of the average take of previous years, they produced 156,378,000 eggs. From this number

132,219,000 fry, 3,684,000 eyed eggs, and 2,923,000 green eggs were planted. As the planting of flounder fry in Long Island Sound and Narragansett Bay has produced good results, a portion of the production was liberated in those waters. Most of the remainder was planted in the coastal waters of Massachusetts, and a limited number were assigned to the Rhode Island Fish and Game Commission. From commercial fishermen 9,102,000 mackerel eggs were obtained which produced 8,277,000 fry for liberation in Vineyard Sound and Buzzards Bay.

GREAT LAKES SPECIES

The role of hatcheries in maintaining the supply of commercial species in the Great Lakes is a highly debatable issue. Commercial fishermen generally advocate more hatchery activities, although their cooperation in supplying eggs is not fully satisfactory. It is pointed out, in opposition, that the decline in abundance of whitefish, lake trout, and lake herring continued during the years when hatchery activities were at their peak. There has been no clear determination of the relative efficiency of natural versus artificial reproduction in this field. It is clear, however, that the salvaging of mature eggs from fish caught during the open fishing season is a contribution to the industry, and the hatcheries operate on this basis. Also, there is evidence that the rearing of lake trout to fingerling size before planting, as is done at the Charlevoix (Mich.) station, will give more positive results.

Due to the fact that waters in which the Duluth (Minn.) station collects lake-trout and whitefish eggs were closed to fishing during the spawning season of both species, the take of these eggs was light. About 801,200 green lake-trout eggs were collected, 7,404,800 eyed eggs were received from the Michigan Department of Conservation, and 400,000 eyed eggs were obtained by transfer. The whitefish eggs taken were of poor quality and the hatch was only about 50 percent of normal. An effort was made to persuade the herring fishermen to take eggs from their catches, but little cooperation was secured. Pikeperch eggs were collected in cooperation with the Forest Service, and although the take was normal the quality of the eggs was slightly lower than for previous years. The majority of the fry were distributed in the waters of Superior National Forest. During these operations 230,000 northern-pickrel eggs were taken for experimental incubation and approximately 87 percent hatched, which demonstrates that this species can be successfully propagated artificially. Brook-, brown-, and rainbow-trout eggs were received by transfer and hatched for general distribution and for stocking the Cascade rearing ponds in Superior National Forest.

The Cape Vincent (N. Y.) station, due to a lack of funds and poor fishing weather during the height of the spawning season for lake trout, was able to secure only 278,000 eggs. When eyed, 234,500 of these eggs were shipped to Peru for the stocking of Lake Titicaca. A shipment of 300,000 lake-trout eggs was received by transfer from Duluth, Minn., to replace those sent to Peru. A total of 6,335,000 whitefish eggs were received from local fishermen, and the resultant fry were planted in Lake Ontario. The lake-herring eggs secured from commercial fishermen were few and of poor quality, but such fry as were obtained were released in Lake Ontario. The station's

production of trout and pondfishes is discussed under the heading "Trout and Pondfish Stations."

ANADROMOUS SPECIES, ATLANTIC COAST

At the Fort Belvoir (Va.) unit, the take of shad eggs was substantially increased. Due to favorable water temperatures throughout the season, the hatch was 95.7 percent. The fry, with the exception of 3,000,000 which were assigned to the Conservation Commission of Maryland for planting in streams tributary to Chesapeake Bay, were planted in the Potomac River. Collection of yellow-perch eggs fell off slightly, although more than 243 million were taken. Of these, 41,124,000 were transferred to the hatchery for incubation and the remainder were placed in wire hatching baskets and incubated in natural waters. When the fry reached the free-swimming stage they escaped from the baskets. The benefits derived from planting yellow perch in suitable localities is well illustrated by the results obtained in the Wicomico River in Maryland. This river and its tributaries have been stocked with yellow perch fry annually since 1937, and a Maryland Conservation Commission inspector reports the following results: The first fish appeared in commercial quantities in 1939, when a catch of 75 barrels was reported "where none had been taken for years before." In 1940 it was reported that "as much as 3,500 pounds were caught in nets in 1 day in the upper Wicomico River * * *"

The Edenton (N. C.) station propagated four anadromous species of the Atlantic coast. Although the cold winter and late spring caused a delay in the run of fish, and the late freezing of the rivers and Albemarle Sound destroyed so many of the stakes of the Dutch-net fishermen that new settings were necessary, slightly over 1½ million yellow-perch eggs were collected and approximately 1½ million fry were produced. Because the shad run started much later than usual, the North Carolina Department of Conservation and Development extended the fishing season 5 days to compensate. This was a distinct aid to the hatchery, as the warmer water at the close of the season appreciably increased the number of ripe fish taken. The total shad-egg collection was almost double last year's, and 13,600,000 fry were planted in Albemarle Sound and its tributaries. About 200,000 fry were held in the rearing pond for continued tagging experiments. A number of tagged shad released at the Skinner's Point Fishery in May 1939 were taken within 4 miles of the point during the spring. Study is being made of reports that the shad run in Albemarle Sound all summer. More than 4,000,000 white-perch eggs were taken in Washington County, across Albemarle Sound, and the fry were planted in waters near the hatchery. When the ponds were drained for removal of pondfish, a number of white-perch fingerlings were found. These were planted in a local pond, as an experiment to study the ability of the white perch to adapt itself and propagate in landlocked waters.

The Weldon (N. C.) hatchery was operated from May 1 to May 20 for the collection and hatching of striped bass. Although runs of these fish were considered below normal, the collection was about two and one-half times greater than last year, and 5,917,000 fry were planted in Roanoke and Tar Rivers. The results of herring-egg

collections were only partly successful, due to the inexperience of the spawntakers, and only 170,000 fry were liberated in local waters.

The Harrison Lake (Va.) hatchery cooperated with the Virginia Commission of Game and Inland Fisheries in setting up batteries for hatching shad on the Chickahominy River near Holdcroft, on the Pamunkey River at the Pamunkey Indian Reservation, and on the Mattaponi River at the Mattaponi Indian Reservation. All equipment for these stations was supplied by the Harrison Lake hatchery and operated by the Commission of Game and Inland Fisheries. These units produced 2,827,000 shad fry, and the Harrison Lake station produced 585,000 fry and 87,500 fingerling shad.

GAME-FISH PROPAGATION

The fact that sport fishing is growing more popular yearly is definitely indicated by an increase of approximately 6 percent in the number of fishing licenses purchased in 1938-39 over the season of 1937-38. It is estimated, including those who are not required to have licenses, that the total number of persons who enjoyed the sport of angling in 1938-39 was probably about 12,000,000. To meet this increasing demand the Bureau of Fisheries is expanding fish production as rapidly as funds permit. In addition to enlarging the existing units, several new hatcheries are being constructed in various sections. The Bureau, through the Division of Scientific Inquiry, is continually studying the environmental factors detrimental to the growth of fish. Such problems as the effects of pollution, flood and drought, and natural food supply are being investigated and programs formulated for managing game fish of the inland waters so as to benefit the largest possible number of anglers. The following reports of the year's activities at individual stations gives an accurate picture of the efforts being made to accomplish this end.

ROCKY MOUNTAIN TERRITORY

A number of new collecting fields were operated by the station at Leadville, Colo., resulting in an encouraging increase in the number of eyed eggs shipped to other stations and a slight increase in the number of fingerlings distributed. Seven species of trout were distributed. Several of the station buildings were painted, and the foreman's cottage was remodeled.

The unit at Creede, Colo., operated a new field unit for taking eggs at Electra Lake, near Durango. More than 2 million rainbow trout eggs were collected from this lake, and the total take of rainbow and brook trout eggs was more than 5¼ million. Including eggs collected, eyed, and hatched on a cooperative basis, and eggs received by transfer, this unit handled a total of approximately 15¼ million trout eggs. Much of the distribution was performed by other conservation agencies cooperating with the hatchery.

The Eagle Nest (N. Mex.) unit is operated on a seasonal basis. Due to the long winter season it is impractical to produce fish larger than the fingerling stage. Approximately 3¼ million eggs were collected from wild rainbow trout. Almost two-thirds of the eyed eggs were transferred to other stations and to the New Mexico Department of Game and Fish. The hatch of blackspotted and rainbow trout was entirely satisfactory.

In Utah the Springville unit distributed 1¼ million fingerling and adult fish. The take of rainbow-trout eggs was only about one-half the number collected last year, consequently fewer eyed eggs were shipped to other stations. Approximately 1 million rainbow-trout eggs were incubated. In addition brook, Loch Leven, and black-spotted trout were hatched and distributed. Between 45 and 50 percent of the trout produced were allotted to national forests and national parks. The limited area of the ponds restricted the production of warm-water fish to 2 species, largemouth black bass and sunfish, and 9,542 fingerlings were harvested per acre during the fall of 1940. Twenty new troughs, which were constructed last year, were installed in the hatchery.

The substation at Bear Lake, Utah, propagated four species of trout, and more than 1 million fingerlings were distributed. Blackspotted- and rainbow-trout eggs were collected from wild fish trapped in tributaries to Bear Lake. Since only one trap was operated this spring, the take of eggs was considerably less than last year. Lake- and brook-trout eggs were received by transfer, and the fingerling chum salmon which were carried over from last year were planted in the Hyrum and Pineview reservoirs.

Because of unfavorable conditions at the former Glacier Park unit, the National Park Service secured a new site near Creston, Mont. The equipment was moved to the new Glacier National Park Station and temporarily installed to enable production of fish to continue while the hatchery building and ponds were being constructed. All brook and rainbow trout hatched were held as a nucleus for future brood stock. The Bureau assumed complete charge of construction on December 1, 1939, and the work was prosecuted, under a P. W. A. grant, with W. P. A. labor. At the close of the fiscal year the cottage, utility building, hatchery building, and water-supply system were completed. The landscaping, fencing, and other minor projects, are only partially complete. In addition to the 24.5-acre brood-stock pond, 23 rearing ponds were completed and 6 are in use. It is planned to propagate blackspotted, brook, and rainbow trout, and grayling, when this station reaches full production.

Owing to an outbreak of furunculosis, all the brook trout at the Saratoga (Wyo.) station were disposed of. The water supply was treated with chlorine, followed by derris root, and there has been no evidence of the return of this disease. More than 3 million black-spotted-, brook-, Loch Leven, and rainbow-trout eggs were incubated. Four new concrete ponds 60 by 6 feet were built, posts were set, and wires were strung to keep out predatory birds. Remodeling of the superintendent's house was about 50 percent completed.

The Jackson (Wyo.) station was operated during the entire year. Blackspotted, brook, and lake trout were propagated. Since no brood stock are kept, and no wild eggs are collected, all eggs are received by transfer from other Federal and State hatcheries. The fish were distributed by the National Park Service and the Forest Service in the waters of the Grand Teton National Park, and the Teton National Forest. More than 1 million fish were distributed, and approximately one-half million fish were on hand on June 30, 1940. The C. C. C. maintained a camp at that station until December 18, 1939, under the direct supervision of the Forest Service. The personnel of the camp was engaged in various activities such as landscaping grounds, grading

pond banks, and painting buildings and equipment. These additions materially increased the capacity and efficiency, and enhanced the appearance of the property.

The Las Vegas (Nev.) unit reports a substantial increase in the output, even though weather conditions were extremely unfavorable during the bass-spawning season. The recurrence of high winds and extreme temperature fluctuations caused large numbers of the bass to leave the nests after the eggs were deposited. The consequent delay in completion of spawning resulted in retarded development which postponed much of the distribution until after June 30. Sunfish production was very satisfactory. Bass production was 7,000 and bream 20,000, per acre. A shortage of water is reported, due to decreased flow of the two artesian wells.

The cooperative substation at Mullan, Idaho, received the major portion of its eggs from the Idaho Fish and Game Department. Trout began spawning much earlier in this region than last year, and better results are expected from all lots of eggs handled. Rainbow and blackspotted trout were propagated. All fish were planted in Shoshone County, in the Coeur d'Alene and St. Joe National Forests, by the Idaho Fish and Game Department in cooperation with the U. S. Forest Service and the C. C. C.

The Hagerman (Idaho) station made some changes in fish-cultural practices. Feeding formulas and methods were modified with the rainbow-trout brood stock, which resulted in a larger take of superior eggs. Although fish resulting from domestic eggs show a larger loss in the sac stage than those from wild eggs, the growth of the former is decidedly more rapid. More than 1½ million fingerlings and adults were planted during the year and there are on hand slightly more than 2¼ million fingerlings and one-half million eggs. Rainbow trout is the only species held as brood stock, but brook and blackspotted trout and sockeye salmon (landlocked) eggs were received by transfer and hatched.

The Sun Valley (Idaho) substation was operated from April 1 to May 18 for the collection of rainbow-trout eggs. A W. P. A. project included the grading of 1 mile of road to connect with the county road with 2 bridges. The W. P. A. also completed 3 new rearing ponds which have a carrying capacity of one-half million fingerling trout to the 3-inch stage. Development of a 5-acre park is about 30 percent complete.

The Salmon (Idaho) station propagated rainbow, brook, blackspotted, and golden trout. Rainbow-trout eggs were collected from Williams Lake, and the other species were received as eyed eggs. Although fewer green eggs were collected this year than last the resultant number of eyed eggs was only slightly less, since extra care exercised in the selection of spawners, fertilization, and transporting eggs to the hatchery resulted in an average of 90 percent eyed eggs as compared to an average of only 66 percent in 1939.

The Bozeman (Mont.) station had an unusually successful year. The loss of fry and fingerlings was very small and growth was excellent. The 3-year-old rainbow trout brood stock spawned to a limited extent this year. Rainbow, brook, brown, and blackspotted trout eggs received from other Federal and State hatcheries, and 300,000 eyed Montana grayling eggs were received from the Yellowstone Park station. Hatching and feeding of this species proved successful, as

a total of 252,550 fingerling graylings were distributed—approximately one-seventh of which were 5 to 6 inches in length. Distribution was carried out in cooperation with the Forest Service, the National Park Service, the Indian Service, the Montana Fish and Game Commission, and private agencies.

The total output of the Ennis (Mont.) substation was approximately 2½ million, and the collection of rainbow-trout eggs was slightly greater than last season. Fry from the station brood stock were stronger and faster-growing than fry resulting from eggs collected from wild rainbow trout. There was also an increase in the take of Loch Leven trout eggs from wild fish. No Montana grayling were hatched this year and the grayling carried over from 1939 were all planted. Many needed improvements and additions were made by W. P. A. workers. Extensive landscaping of hatchery grounds, construction of 2 ponds for brood stock, graveling of roads, construction of rock terraces, flagstone walks, and painting of buildings were the major accomplishments.

Harvesting the fingerling crop at the Miles City (Mont.) pondfish station was begun in September and completed in November. The yield was entirely satisfactory, resulting in a net increase of slightly more than 20 percent over last year. Five species of warm-water fishes were propagated. The brood stock came through the winter with practically no loss except to the channel catfish, practically all of which disappeared. Two holding ponds below Lake Garberson and a 2-acre pond were completed with W. P. A. labor. Two concrete pools were constructed on the station lawn for display purposes, and stocked with specimens.

Unsettled weather at spawning time in 1939 caused fewer fish to be carried over for fall delivery at the Dexter (N. Mex.) station. About one-ninth of the fish distributed were from 5 inches in length to legal size. Six species of warm-water fishes were propagated, with an average of 5,886 fish per acre. Two ponds were completed and an artesian well was drilled to augment the station water supply.

There was a marked increase in production at the Santa Rosa (N. Mex.) unit, but the total capacity for bass was not reached. The production of green and bluegill sunfish was slightly more than double the combined output of largemouth black bass, smallmouth black bass, and catfish. Fifteen local ponds were stocked on a cooperative basis. Quite a number of the smallmouth black bass which were introduced into this section 2 years ago have been caught recently by sportsmen. The construction of a garage and storage room was completed, a new pond was excavated, and the pond levees were ripped at all necessary points.

The production of the Elephant Butte (N. Mex.) station was very gratifying. There was an increase in the output of approximately one-fourth million over last year. The problem of predatory bird control appears to have been satisfactorily solved by stretching wires above the pools at intervals of 25 feet. The experimental feeding of ground carp and other rough fish to bass fingerlings gave very satisfactory results. Not only do the fish make more rapid growth, but cannibalism is greatly reduced. Extensive repairs were made to the roads and dykes.

The Spearfish (S. Dak.), unit maintains brood stock of both brook and rainbow trout. This year's egg collections were below normal,

due to an excessive number of barren females among the rainbow brood stock. Station records indicate that the temperature of the water supply is gradually rising. The barren females and surplus males were culled from the brood stock and released in public waters. Blackspotted and Loch Leven eggs were received by transfer. The State hatchery at Rapid City filled numerous Forest Service applications for nearby waters and the Bureau filled State applications for the stocking of waters in close proximity to the Spearfish station. Two ponds are being completely rebuilt by W. P. A. labor. The drainage channel was extended 176 feet to afford a bypass for upper ponds to avoid running all waste water through a lower series. The roadways were widened and repaired.

No brood stocks are maintained at the Spokane (Wash.), substation and no eggs were collected from wild stock. From eggs received from other hatcheries a normal output was obtained. The fish were distributed by the Washington Department of Game, chiefly in the waters of Spokane and adjacent counties.

The unit in Mount Rainier National Park collected no eggs this year, as the rainbow-trout brood stock were not sufficiently developed to spawn. Rainbow, brook, and blackspotted trout were handled. Due to the low temperature of the water supply, very little dry feed can be used. Practically the entire production was planted by the Park Service in waters of the Mount Rainier National Park.

The seasonal substation at Baker Lake, Wash., was operated from July 1 to September 17. Blackspotted-trout eggs were received from the station in Yellowstone National Park, and an excellent hatch was secured. Brook- and rainbow-trout fingerlings were received by transfer. The Forest Service transported and planted practically the entire output within the boundaries of the Mount Baker National Forest. In addition to hatchery operations, salmon were captured and planted in Baker Lake and its tributaries. The Baker River sockeye salmon run appears to be increasing.

The output of the Clark Fork (Idaho) station was increased more than 135 percent over the production for the preceding year. Dolly Varden trout were propagated in addition to the four species previously handled. The landlocked sockeye salmon and the Dolly Varden trout eggs were taken from wild stock trapped on Bull Creek and Spring River by the Idaho Fish and Game Department. Approximately 1½ million trout and salmon were produced. The major portion of the distribution was accomplished through cooperation with the Fish and Game Department of Idaho, and the Forest Service.

NEW ENGLAND TROUT STATIONS

The Hartsville (Mass.) unit handled brook and rainbow trout and two species of pondfish during the year. The first-year spawning brook trout produced 118,700 eggs which were supplemented from other hatcheries. Rainbow-trout eggs were received from the Lee-town (W. Va.) station. Smallmouth black bass fry were collected from Wangum Lake, Conn., in cooperation with the Connecticut State Board of Fisheries and Game. Adult catfish were trapped from Willetts Pond, near New Marlboro, Mass., and distributed to applicants or planted in adjacent waters. Six cooperative trout-rearing nurseries were furnished trout and periodical inspections were

made of such units during the season for the purpose of furnishing technical advice to the cooperators.

Four species of trout were handled by the East Orland (Maine) hatchery. The take of green eggs from the station's brook-trout brood stock was 4,569,985, of which 3,200,000 eyed eggs were shipped to other Bureau stations. Lake-trout eggs were received from the Cape Vincent (N. Y.) station, and rainbow-trout eggs from the Neosho (Mo.) unit. Approximately 5,000 rainbow-trout fingerlings are being held for future brood stock. The State of Maine Department of Inland Fisheries and Game and the Salmon Club of Bangor cooperated in the collecting and transporting of wild Atlantic salmon to the hatchery for spawntaking. Twenty-five fish were collected, and from 11 of these 113,000 green eggs were taken. An attempt is being made to collect salmon from a fish trap installed at the up-river end of the fishway at the Bangor dam and hold them for future spawning. The trap was installed in June 1940 and a number of salmon have been taken.

Rainbow, brook, and brown trout and catfish were handled at the Nashua (N. H.) hatchery. Dry feeds were successfully used, and trout were produced much more economically. The repair of the station property which was damaged by a hurricane last year was almost completed. W. P. A. labor cut and yarded approximately 300,000 board feet of white pine logs, and slightly more than half the logs had been sawed into lumber by the close of the fiscal year. One carload of the lumber was shipped to the station at Craig Brook, Maine. There also was approximately 400 cords of wood cut from the tree tops and limbs.

Due to an infestation of furunculosis in 1939, all the brood stock at the National Forest (N. H.) station was disposed of and it was necessary to secure eggs from another source. One million brook-trout eggs were purchased from a commercial hatchery, from which a hatch of 96.9 percent was obtained. No further loss was sustained from furunculosis, but some sac fry were lost from whitespot disease. Further loss occurred in June, due to oetomitis which readily responded to treatment. Fry, fingerlings, and yearlings were distributed in the States of Maine, New Hampshire, and Vermont. There was very little expense connected with the distribution, as the fish that were not called for by applicants were distributed by fish and game departments. Under the auspices of the W. P. A., many needed repairs and improvements were made to buildings and ponds.

The fish-cultural activities of the St. Johnsbury (Vt.) unit were carried on in close cooperation with the Fish and Game Service of Vermont. Brook-trout eggs were hatched and distributed in the fry stage. The output of brook-trout fry was somewhat less than in previous years, but this was offset by the increase in the number of brown trout and landlocked salmon handled. Smallmouth black bass fry were received from the Hartsville (Mass.) station and placed in rearing ponds for subsequent distribution. The brown-trout and landlocked-salmon eggs handled were collected from wild fish by the Vermont Fish and Game Service.

The Pittsford (Vt.) station handled brook and rainbow trout. A sufficient stock of brook-trout brood fish is held to assure a minimum production of 50,000 fingerlings for distribution. Very satisfactory results are reported on the selective breeding for increased egg pro-

duction. Reports on this and other investigation activities appear in the reports of the Division of Scientific Inquiry.

The Cortland (N. Y.) hatchery does not maintain a brood stock, and all eggs handled were received from other stations. Brook, brown, rainbow and lake trout were propagated, and the results obtained were gratifying. Under the auspices of the N. Y. A. and W. P. A., extensive repairs and improvements were made to buildings, roads, and grounds. Summaries of the experimental activities and scientific investigations appear elsewhere.

The Carpenters Brook unit, which is operated in cooperation with Onondaga County, collected eggs from its brood stock as follows: 100,140 brook-trout, 147,750 brown-trout, and 14,630 rainbow-trout and 199,670 brook-trout eggs, and 35,000 lake-trout eggs were received from other stations. Approximately 75 percent of the resulting fish were distributed as fingerlings, and the remainder are being held for liberation as yearlings.

COMBINATION TROUT AND POND FISH STATIONS

No trout eggs were taken at the Lamar (Pa.) hatchery this year. Eggs received from other points produced 1,180,150 trout, and approximately 400,000 of these fish were transferred in the small fingerling stage to the Ogetown and Alleghany National Forest substations and cooperative nurseries where they are to be fed until late fall and liberated in public waters. In addition to trout, the Lamar hatchery propagated 5 species of warm-water fishes—comprising largemouth and smallmouth black bass, yellow perch, catfish, and sunfish. The aggregate output of pondfishes was 44,230 fingerlings. This unit has 15 completed ponds, each approximately 1 acre in area, and 3 under construction. Ponds were excavated and other improvements were made under the auspices of the W. P. A. and the C. C. C., and N. Y. A. employees also assisted with the general work.

The Flintville (Tenn.) station received rainbow-trout eggs from the White Sulphur Springs (W. Va.) hatchery. In addition to 179,200 3- and 4-inch fingerling rainbow trout for the stocking of Alabama, Georgia, Ohio, and Tennessee waters, 34,000 fingerlings were on hand at the end of the year. Largemouth black bass, smallmouth black bass, rock bass, and sunfish also were propagated. However, due to the small pond acreage available for the culture of warm-water species, the output of most of these forms was relatively small. Several thousand black bass and sunfish were received from the Marion (Ala.) hatchery and distributed for the stocking of central Tennessee waters. The successful artificial hatching of red-horse-sucker eggs engendered enthusiastic interest by the fishermen of this area.

The Powder Mill Park (N. Y.) hatchery, which is operated in cooperation with Monroe County, maintained a stock of adult trout from which sufficient brook-, brown-, and rainbow-trout eggs were collected to meet its needs. In addition to these three species, lake trout also were handled. This station reared practically its entire output of trout to yearling size before releasing them in the waters of Monroe County. Only 2½ acres are available for the culture of pondfishes, yet 16,600 largemouth and 2,500 smallmouth black bass fingerlings were produced.

At the Manchester (Iowa) unit 206,400 more rainbow-trout eggs were taken than last year, even though a shortage of water caused the loss of a number of brood fish before spawning. Of the 3,198,400 green eggs taken, 94 percent eyed. Only 172,000 of these eggs were held at the hatchery. The brook trout resulting from eggs received from another hatchery were infected with western gill disease and required constant treatment. Brown-trout eggs were received from the Michigan Department of Conservation. The smallmouth black bass failed to spawn normally and consequently the output was small. Arrangements have been made to secure new brood stock for next year. The rock bass produced a normal crop. The area for the production of pondfish is very limited, only 2.13 acres being available.

At the Lcetown (W. Va.) station a total of 1,363,600 rainbow-trout eggs and 270,600 brown trout eggs were taken. The low hatch of trout eggs was attributable to dietary deficiency. During the year 189,380 rainbow trout, 61,690 brook trout, and 67,700 brown trout were distributed, and 32,370 trout of 6 inches or more in length were furnished to the George Washington National Forest. Approximately 58,560 smallmouth black bass were distributed direct to applicants or transferred to Wytheville and New Castle, Va., for supplying applicants in these sections. Artificial feeding of smallmouth black bass was carried on in 8 of the new ponds. These fish exceeded the growth of bass produced on natural food; in some cases by several inches. Experiments with blackhead minnows as forage fish showed that the production of smallmouth fingerling bass was in reverse proportion to the number of adult forage minnows used.

The Lake Mills (Wis.) station is not equipped to maintain a stock of brood trout. Brook-, brown-, and rainbow-trout eggs were received from other hatcheries and the resultant fish were distributed in waters of Wisconsin, Michigan, and northern Illinois. This station has a pond area of 29 acres, with 35 ponds available for the production of warm-water fishes. Largemouth and smallmouth black bass, crappie, and sunfish were propagated. There were approximately 8,940 pondfish produced per acre, or a total output of 259,370 fingerlings.

The Northville (Mich.) hatchery produced both trout and pondfishes, in addition to supervising the propagation of lake trout and steelhead trout at the Charlevoix substation and the rearing of trout at cooperative nurseries in the Marquette National Forest (Sullivan Creek), Huron National Forest (Pine River), Clare County, and the Fontinalis Club. The trout were transferred from the Northville Station to the nurseries by Fisheries Car No. 9 during the early part of May. Rainbow- and brook-trout eggs were received from other Bureau stations while the brown-trout eggs were supplied by the Michigan Department of Conservation. In addition to the trout work, three species of pondfishes were propagated. About 27,400 smallmouth black bass, 6,415 largemouth black bass, and 41,690 sunfish fingerlings were distributed. These fish were produced in 4.8 acres of water, which is the total acreage available for the culture of warm-water fishes.

The take of rainbow-trout eggs at the Neosho (Mo.) unit was slightly less than for the last year because approximately 1,000 2-year-old females failed to reach maturity. Selective breeding was practiced, and no eggs were retained to hatch for brood stock except

from females producing approximately 1,300 eggs per pound of fish, which eyed 90 percent or more. Trout eggs were shipped to a number of Bureau stations. The number of warm-water fishes produced was limited by the small amount of available pond area (6.776 acres). Due to unseasonable weather which prevailed during the spawning season, the bass production was unusually small. The schools of bass fry apparently broke up much younger this year than usual because of high winds during the hatching season. The total output of all sizes of bass for the year was 24,940.

The cooperative substation at Bourbon, Mo., materially increased its production of rainbow-trout eggs, and 91 percent of the green eggs taken were eyed.

The production of trout from the Cape Vincent (N. Y.) station and its auxiliaries at Cortland, Watertown, and Barneveld, was approximately 1¼ million, several thousand of which were of legal size. The activities with pondfish were confined entirely to the propagation of smallmouth black bass, with an output of this species in excess of 150,000 fingerlings—an increase of more than 60 percent over last year's production.

APPALACHIAN AND BLUE RIDGE TROUT STATIONS

The Pisgah Forest (N. C.) station, which is located on the Davidson River in the Pisgah Forest and operated in cooperation with the Forest Service, liberated its production in waters within the Federal area in which it is located. The various waters were stocked in accordance with a program formulated on data collected from stream surveys made by the Division of Scientific Inquiry. It was very difficult to hold the trout over the winter, as the temperature of the water remained at 32° F. for several days, causing as much as 6 inches of ice to form on the ponds during a single night.

The Smokemont (N. C.) hatchery, which is located in the Great Smoky Mountains National Park, reported a production of 177,560 brook and rainbow trout ranging in length from 3 to 6 inches. These trout were utilized in restocking waters of the Great Smoky Mountains National Park and the Cherokee Indian Reservation. The present water-supply system at Smokemont is unsatisfactory for fish-cultural purposes and the National Park Service has under consideration the construction of an open flume, or raceway to replace the present metallic underground pipe. In the meantime, it is the intention to incubate some trout eggs during the coming season at the Walhalla (S. C.) hatchery, and transfer the resulting fish to Smokemont when they are approximately 1 inch long.

The output of rainbow, brook, and brown trout at the Walhalla hatchery was in excess of 400,000. While 52,445 of these fish were assigned directly to the Forest Service, 231,000 were transferred to the Nantahala and Chattahoochee National Forest rearing units where they were held until fall before being liberated in the streams of those two public areas. At the end of the year, approximately 500,000 fingerling trout of the three species handled were on hand at Walhalla.

The majority of the fish produced in all of the trout hatcheries and rearing units in this area are now being planted according to a carefully planned program. Game-fish management is undergoing a

broad-scale trial in this region where the fishing pressure is relatively intense. The results to date have emphasized a dependence upon hatcheries and the necessity for rearing the fish to legal size.

PONDFISH STATIONS

Probably a larger percentage of sportsmen are dependent upon the warm-water fishes for recreation than upon any other group. Increasing temperatures of the inland streams, due to deforestation, decreased flowage of water, etc., have rendered many which formerly produced cold-water fishes too warm for their continued survival. The stocking of such waters has placed an additional drain upon the production of pondfish hatcheries. To produce fish for these waters, as well as newly created ponds, lakes, and reservoirs, the Bureau is adding new units in various sections of the country and increasing the size of existing hatcheries as rapidly as funds for such operations are provided. Although progress is being made in the study of artificial feeding of pondfishes, no artificial ration has been found that successfully supplants the natural diet. Therefore, the production of pondfishes is still largely dependent upon the area of the ponds available, which ponds must synthesize a supply of food sufficient for their growth to the desired size. Supplementing the natural food production to a certain degree has helped to meet the problem.

The Fairport (Iowa) hatchery conducted its fish-cultural activities along routine lines, and attained normal success in the production and distribution of six species of spiny-rayed fishes. Buffalo-fish eggs amounting to 50,300,000, obtained from commercial fishermen operating along the Mississippi River in the vicinity of the station, were fertilized and returned to the spawning grounds. Very little salvage work was necessary along the Mississippi River, but since this unit is properly equipped to handle such operations it cooperated with local sportsmen and the Iowa Conservation Department in transferring game fish and pan fish from stagnant inland waters to suitable nearby waters.

Due to adverse weather conditions during the spawning season, the production of largemouth black bass at the Rochester (Ind.) station was far below that of last season. Nevertheless, the total output of the eight species of warm-water fishes handled at this hatchery and its auxiliary at Argos was in excess of 1 million fingerlings. This station was favored with a W. P. A. project which made possible regrading several pond bottoms and banks, riprapping approximately 16,000 square feet of creek bank, landscaping grounds, and excavating a 5-acre pond. Cattle manure was used for fertilizer, and the production of daphnia for fish food was quite successful; especially during the early spring months. The nine flowing wells—the source of water supply at the Argos unit—were cleaned, thus increasing the flow of all wells except one by approximately 50 percent.

The Senecaville (Ohio) substation was opened on May 7 and shortly thereafter 74,000 advanced black bass fry were transferred from Rochester to that point for stocking the rearing ponds.

Although the Welaka (Fla.) station has not been placed on a full productive basis, the output of black bass and bream for the year was in excess of 1 million—this production being the largest since the station has been under the jurisdiction of the Bureau. Approximately

460,000 of the output were assigned to the Ocala National Forest for restocking waters in that public area. Improvements were made to the station under the auspices of the W. P. A. as follows: Completed drainage system for the series of 24 one-acre ponds; installed 30-inch drain in Beecher holding lake; regraded bottoms of ponds, including Beecher holding lake; removed obsolete water system; installed laboratory heating system; and numerous minor repairs to buildings.

Compared with last year's total output at the Uvalde (Tex.) unit, there was a total reduction of 13 percent, with an increase of approximately 26 percent in the production of largemouth black bass. These differences were due to an emphasis on bass production which resulted in tripling the output of this species in comparison with other varieties. Approximately 1½ million fish were distributed, including 206,700 fingerling sunfish and 91,400 Rio Grande perch. In addition to the above, a total of 480 adult brood stock were assigned to the new unit at Inks Dam, Burnet, Tex. The extremely unfavorable weather conditions prevalent at many of the hatcheries during the spawning season of the bass was not experienced at Uvalde.

The production of the two species propagated at the Burnet hatchery was entirely satisfactory. The year's yield of largemouth black bass was 19,390 per acre of water, and the production of crappie was 3,655 per acre. A total of 64,975 fingerling fish were produced. Construction and painting of all station buildings, including residence, garage, office, and bachelor quarters, shop-garage, and fish-holding house were completed. The grading and landscaping of the building area was completed and water lines for sprinkling were installed. The hatchery grounds were enclosed with a woven wire fence and cattle guards were constructed at the more important entrances. Although all 14 ponds are completed, a number remain to be treated to reduce seepage.

Owing to intensive daphnia culture and artificial feeding, the San Marcos (Tex.) unit was able to effect a substantial increase in the production of fingerling fish; even though the pond area of approximately 12½ acres was not increased. Two or more species are produced in each of a number of the ponds. The maximum per-acre production of fingerling fish at this hatchery was achieved with bream, at 80,000, followed by largemouth black bass at 51,000.

The San Angelo (Tex.) station, which has a pond area of 45 acres, produced more than 787,000 black bass, sunfish, channel catfish, and crappie, all of fingerling size. No major construction work was prosecuted, but minor repairs were made to buildings and ponds.

The program to enlarge the pond system at the Fort Worth (Tex.) station was continued during the year. This unit now has 20 ponds embracing a total area of approximately 35 acres. From the ponds that could be used more than 279,000 fingerling black bass, warmouth bass, crappie, bream, and channel catfish were collected and distributed. The production of channel catfish, which is one of the more difficult species of warm-water fishes to handle artificially, was very gratifying.

Minor repairs necessary to the maintenance and operation of the station were made at the Tishomingo (Okla.) hatchery. Five species of pondfishes were handled, comprising largemouth black bass, bluegill sunfish, green sunfish, crappie, and catfish. The local demand for panfish is much greater than for other species. An average of 17,000

fingerling fish per acre of water accounted for a total production of slightly less than 700,000 fish. Bream are propagated in conjunction with bass and crappie. The control of predatory animals and birds presents one of the major problems at this station.

New major construction projects were not undertaken at the Marion (Ala.) station during the year. Holding house No. 2, however, which was under construction at the close of last year, was completed and equipped with an electric pump for filling distribution receptacles, and a gasoline pumping unit was installed in holding house No. 1 to assist in areating the water in the holding tanks and to facilitate the filling of distribution pails. All buildings were wired for electric current. Adverse weather conditions during the height of the bass spawning season greatly reduced the production of that species. Although the total output was below last year's, a production of approximately 5,000 fingerlings per acre of water was obtained. The production of bream was not noticeably affected by the unfavorable weather. Breeding stocks of both largemouth black bass and bream were supplied to the units at Elkmont, Ala., Cohutta and Warm Springs, Ga., and Tupelo, Miss. As usual, the Alabama Department of Conservation and the Georgia Department of Natural Resources assisted in the transportation of fish for the stocking of waters in their respective areas. The cooperation of these departments kept the expense of distribution to a minimum, thereby enabling the station to expend its funds for fish production.

The Carbon Hill (Ala.) station was incomplete at the end of the year. Seven of the fourteen ponds originally planned have been finished and four more are approximately 50 percent completed. Two wells were drilled to supply water for the ponds and domestic use. This unit is being constructed largely under the auspices of W. P. A.

There was no construction or repairs to station buildings at Tupelo, Miss., during the year. The subzero weather experienced during the winter caused the loss of approximately 1,200 of the station's bream brood stock, and these fish were replaced with adult bream from the Marion (Ala.) hatchery. All ponds are stocked with both bass and bream and the results obtained from this type of propagation have been very satisfactory, as is proved by a production of 35,693 fingerling largemouth black bass and 15,836 fingerling bream per acre; a total output of 51,529 fingerlings per acre of water.

The Lyman (Miss.) station distributed a total of 332,990 fingerling bass and 840,500 fingerling bream for the stocking of Mississippi and Louisiana waters. The cost of production at this station is very low, due to an abundance of natural food. The fresh-water shrimp which were planted as forage in 1938 and 1939 are apparently increasing, even in the brood-stock holding pond. Nocturnal insects, attracted by lights which have been placed near the surface of the water, are a promising source of auxiliary food for fingerling bass. Shrimp heads, a local waste product, are secured free of cost and are proving very satisfactory as a pond fertilizer. Construction at this unit was largely limited to repairing and general conditioning of levees, roads, and fences. An all-weather road around the ponds was constructed by treating the main levee roads with oystershells. Giant bamboo and bamboo cane were planted to serve as windbreaks for the ponds, and black locust, kudzu, honeysuckle, and wisteria were planted at needed points for erosion control.

The Cohutta (Ga.) station produced five species of pondfishes this season; namely, largemouth and smallmouth black bass, Kentucky bass, bream, and catfish. A total of 65,800 fry and 181,055 fingerlings were distributed. As both bass and bream are stocked in the same ponds, no statistics are available for separate production. No new ponds were constructed at this station, but the bottoms of ponds Nos. 1, 2, 3, and 5 were graded to give the proper slope for drainage. The holding shed and the spring house were wired for electricity.

In view of the extensive construction work in progress at the Warm Springs (Ga.) unit, a number of the ponds could not be used. From those available, however, approximately 273,000 largemouth black bass and bream were produced, which were largely distributed by the Department of National Resources of Georgia. In addition to excavating a fish-exhibit pool of approximately one-third acre, and a rearing pond of the same size, extensive changes were made in the pond system. A number of the ponds were subgraded and the bottoms of two were completely reversed as to grade. New dikes were built and existing ones were raised and widened. Seventeen concrete outlets with necessary drain lines of terra cotta pipe were installed. A new fish-holding shed 29 ft. 6 in. by 25 ft. 6 in. was constructed. Cottage No. 2 was remodeled, and two toilets were installed in the office building. Considerable filling and landscaping around the station buildings was accomplished.

At the Lake Park (Ga.) hatchery the unusually warm weather in November and December caused the bream and crappie to continue spawning until December 15. As a result, the production was increased almost three-fold. The cost of production is very low, due to an abundance of natural food, and very little handling of brood stock or young. As has been the practice for a number of years, the State of Georgia distributed most of the fish produced. About 1,142,140 fish were distributed to applicants or planted in Georgia waters, and 99,360 were delivered for the stocking of Florida waters.

The Elk River (Ala.) hatchery, constructed by the T. V. A. primarily for the stocking of waters under its control, was taken under operating jurisdiction of the Bureau. Due to the necessity of treating the ponds with clay and bentonite to retard seepage, no fish were propagated. Brood stocks were collected for stocking the ponds when treatment is completed.

The hatchery at Norris, Tenn., was originally built for the purpose of propagating fish for stocking Norris Lake. However, production has increased to the point where Hiawassee and Chickamauga Lakes, of the T. V. A. system, also are being stocked. Because of the availability of C. C. labor, only one Bureau employee is stationed here. To preclude the introduction of foreign diseases or parasites into Norris Lake, all brood stock for the hatchery is collected locally. Crappie were propagated for the first time this year. The 500,000 pikeperch fry resulting from 580,000 eggs received from the Put in Pay (Ohio) station were planted in Hiawassee and Chickamauga Lakes.

The Louisville (Ky.) unit continued the practice of propagating five species of warm-water fish; smallmouth black bass, largemouth black bass, rock bass, crappie, and sunfish. In addition to these species, blackhead minnows and golden shiners were propagated as forage food for the fish. Due to adverse weather conditions during

the spawning season, the output of bass fry was far below normal. Enough fry were obtained, however, to stock the rearing ponds and assign several thousand to the State of Kentucky for its rearing units. The two ponds under construction at the close of the fiscal year 1939 were completed.

The Harrison Lake (Va.) unit propagated three species of pondfishes in addition to its shad operations; largemouth black bass, bream, and crappie, with normal production. Enough daphnia were produced to furnish an ample supply of food for the bass fry.

At the Marianna (Fla.) station the majority of the ponds were drained earlier than usual in order to treat them with bentonite in an endeavor to decrease the loss of water through seepage. Cold weather occurring during the bass spawning season caused an abnormal loss of eggs, thereby curtailing the production of bass. The output of bream and crappie was normal, since they did not spawn until after the cold weather. Two crops of bream are produced here each year and two crops of largemouth black bass are possible. This station produced 21,597 largemouth bass and 50,070 bream per acre. An abundance of daphnia and natural food was produced in the rearing ponds by fertilization with from 500 to 1,000 pounds stable manure per acre during the season.

In addition to the work necessary for the maintenance of the hatchery property, three new ponds of 2 acres each were constructed at the Natchitoches (La.) station, and excavation was begun on a fourth pond. Due to unusual fluctuations in water temperatures in the ponds at spawning time, the largemouth black bass hatch was only about 50 percent of normal. It also is probable that the crappie production was similarly curtailed, since they began spawning about the same time as the bass. Due to the brevity of the experiment and the cold weather during spawning season this spring, no definite conclusions can be reached on the attempt to rear gizzard shad as forage for the bass. Notwithstanding the adverse conditions, 725,870 fingerlings were distributed during the year for the stocking of Louisiana, Texas, and Arkansas waters.

Even though the Mammoth Spring (Ark.) station produced a record output of smallmouth black bass last year, the production for the current year shows a gain of approximately 10 percent for this species, and an average output of the other spiny-rayed fish handled. Minnows and crayfish constituted the chief food for the brood stock, and daphnia was cultured for the fry and small fingerlings. The conservation departments of Arkansas, Missouri, Illinois, and Idaho received smallmouth black bass fry from this unit. The Arkansas Game and Fish Commission aided materially with the distribution of fish within that State. The fuel house and garage floor were repaired; the fuel house, residence, and pump house were painted; and the tank house was reroofed.

Four species of pondfish were propagated at the Edenton (N. C.) unit. Sunfish stocked with the largemouth black bass furnished forage for the young bass and sufficient fingerlings to supply the local requirements. Although the crappie production was somewhat below last year's, the total number of pondfish was about 15 percent above the 1939 output. Daphnia were cultured as food for the small fish. In addition to pondfish, yellow perch, white perch, shad, striped bass, and herring were propagated. This work is discussed under the heading "Anadromous Species, Atlantic Coast."

The Valley City (N. Dak.) hatchery, which is under construction, was sufficiently complete to stock five species of warm-water fishes in the brood ponds. Due to adverse conditions, the production of largemouth bass fry was light. Bream and crappie were still spawning at the close of the fiscal year. Pike, pickerel, and pikeperch fry were secured from the State of North Dakota and placed in rearing ponds for fall distribution. The construction work is practically complete. A holding house 30 by 30 feet, a pump house 10 by 14 feet, and 9 pond-outlet kettles and gates were completed during the year in addition to grading, riprapping, and seeding dikes.

Owing to a shortage of water in the early fall of 1939, the Orangeburg (S. C.) hatchery lost many of its breeders and a large number of young fish. Consequently, the production for the fiscal year of 1940 was approximately 21 percent less than for 1939, although it was above the yearly average. The total output was 792,090 fish, which is a production of 29,067 per acre. Shad were not handled at the Jacksonboro (S. C.) shad hatchery this year because the eggs were not obtainable on a salvage basis.

The number of fish produced this year at the Hoffman (N. C.) station was only 60 percent of last year's production, due largely to the fact that this station has adopted the policy of distributing larger fish. This station has 23 one-acre ponds completed and four under construction. Two of the new ponds are complete except for the outlet boxes and the other two are approximately 80 percent excavated. Facilities for drainage of grounds and ponds were improved, and minor repairs were made to the buildings. The barn was razed and the lumber stored for future use. Pine straw was used to cover the bottoms of two nursery ponds to a depth of a few inches, wheat straw was used on another, and a fourth was covered with broomsedge sod. The ponds thus treated produced more fish of a uniform size than those that were fertilized with cottonseed meal alone.

UPPER MISSISSIPPI RIVER WILDLIFE AND FISH REFUGE

Owing to completion of the system of flood-control dams along the Mississippi River, and the 9-foot navigation channel, fish-rescue work has been reduced to a small fraction of its former importance. There is a continuing need for rescue work, however, as management of the storage pools causes certain areas to be flooded, and pools remain which will trap some fish. Only 4,333,535 fish were rescued this year. All species indigenous to the Mississippi River were represented in these collections, but catfish comprised one-third of the total. Rescue work was carried on at Marquette, Guttenberg, Bellevue, and Fairport, Iowa. No rescue work was done by the Genoa (Wis.) station or the Homer (Minn.) unit.

Three large ponds were in production at the Guttenberg station, which produced a total of 1,260,170 fingerling and adult fish. More than 1 million of these were catfish. In addition to the pondfishes, buffalofish and northern pike were incubated in the hatchery. High water delayed the construction work on some of the ponds at Guttenberg. However, three ponds were partially completed and can be placed in production in the near future.

The La Crosse (Wis.) station is the headquarters for all the upper Mississippi River fisheries and rescue work. In addition to these activities, trout and pondfishes are propagated and many cooperative

nurseries in Wisconsin, Minnesota, and Illinois are supervised. In Minnesota there was a total of 12 cooperative ponds with 8 sponsoring units, and in Wisconsin a total of 44 ponds, representing 29 separate agencies. A high percentage of fish delivered to each agency in the spring are planted each fall. Both the Northside station at La Crosse and the auxiliary unit at Lynxville were used during the spring to relieve congested conditions at the La Crosse hatchery. The hatchery pond at La Crosse produced 162,390 fingerling largemouth black bass (37,188 per acre).

Because of a cold wave following warm spawning weather, the year's production of largemouth black bass eggs in pond No. 1 (about 35 acres in area) at the Genoa (Wis.) station was practically a total loss. Consequently, only a few early deliveries of fingerlings were made. Fry produced in other ponds were transferred to pond No. 1 for rearing and subsequent distribution. Three additional ponds with a total area of approximately 12 acres were stocked with smallmouth black bass, one 4-acre pond was stocked with sunfish, and another pond with crappie. Three new ponds having an area of approximately four acres each were constructed during the year. They complete the system of ponds north of the Bad Axe River. Extensive changes were made in two older ponds.

The personnel of the Homer (Minn.) unit was engaged in general repair work for all stations in the central district. Portable equipment such as nets, seines, rowboats, small engines and motors, and standard forms for concrete and cement work were constructed or repaired. Both efficiency and economy result from such a practice when the work is sufficient to require full-time service of the mechanics, as is now the case.

Number and disposition of fish rescued, fiscal year 1940

Locality and species	Delivered to applicants	Restored to original waters	Total number of fish
All stations:			
Black bass	5,600	21,450	27,050
Crappie	7,490	866,425	873,915
Sunfish	71,915	999,500	1,071,415
Catfish		1,496,360	1,496,360
Yellow perch		2,200	2,200
Pike-pickeral		8,250	8,250
Buffalofish		356,600	356,600
White bass		27,745	27,745
Drum		5,000	5,000
Miscellaneous fishes		465,000	465,000
Total	85,005	4,248,530	4,333,535
Summary by stations:			
Marquette, Iowa	30,620	903,300	933,920
Guttenberg, Iowa	38,185	1,290,935	1,329,120
Bellevue, Iowa	16,200	1,650,850	1,667,050
Fairport, Iowa		403,445	403,445
Total	85,005	4,248,530	4,333,535

AQUARIUM

While no major changes in equipment or operations were effected in the Aquarium during the year, the periodical acquisition of new specimens stimulated a continuing public interest in the displays. As usual most of the exhibit fishes were obtained from the Bureau's

hatcheries, and a carload shipment was received from the Mississippi River during the late fall.

A new type of illuminated colored sign was installed on some of the tanks. Due to the frequent changing of exhibits it is necessary to develop some sort of sign which will be readily interchangeable. Shad eggs and trout eggs from local hatcheries, and salmon eggs from the West coast were shown under incubation in the miniature demonstration hatchery. An average of about 1,500 specimens, including the small fingerlings which are reared at the aquarium, were on display daily during the year. Shipments of rare golden trout, and of lake trout in the fingerling stage were received.

It may be pointed out that the Aquarium in the Department of Commerce Building is not the only public aquarium operated by the Bureau. At Woods Hole, Mass., and Boothbay Harbor, Maine, salt-water fish were shown during the summer months. At La Crosse and Lake Mills, Wis., Louisville, Ky., and Welaka, Fla., a considerable number of fresh-water species were exhibited. All fish hatcheries are in the nature of aquaria, since the public is enabled to view live fish at any period of the year, and the plans for some of the new hatchery developments include special tanks for display purposes.

DISTRIBUTION OPERATIONS

Requests for allotments of fish to restock waters were received from individuals and sportsmen's organizations in greater numbers this year than for several previous years—the total being 13,146. This number does not include applications received from the Forest Service, National Park Service, and other Federal agencies, which requests were given priority.

The trend is constantly toward the use of trucks for distribution work, especially for trips within a radius of approximately 300 miles of the hatchery. At the present time fish cars are used only for the longer hauls. During the year fish-delivery trucks traveled a total of 367,985 miles. This figure does not include travel by trucks owned by State conservation departments, national forests and parks, etc., which were used to assist in distributing the production of Federal hatcheries.

Fish-distribution cars, which were engaged in delivering fish to applicants and transferring fish between hatcheries, made 57 trips this year and carried an average of 260 pails per trip. The cars traveled 32,048 paid miles and 12,344 free miles. Detached messengers traveled 50,325 paid miles and 7,263 free miles in delivering fish to applicants. As usual, the Bureau received either free transportation or reduced rates from a number of the railroads.

Decentralizing the distribution service by establishing a field office at La Crosse, Wis., has greatly expedited distribution activities, especially in the Central States. As soon as funds become available, it is the expectation to decentralize the distribution service further by placing experienced employees at various central points. This will not only facilitate the handling of distribution, but will enable the Bureau to work in closer cooperation with the State conservation departments and at the same time reduce distribution costs.

Summary, by States, of the distribution of fish, fiscal year 1940

State and species	Number	State and species	Number
Alabama:		Iowa:	
Largemouth black bass.....	452, 315	Largemouth black bass.....	198, 415
Smallmouth black bass.....	125	Smallmouth black bass.....	5, 840
Crappie.....	3, 140	Brook trout.....	53, 800
Rainbow trout.....	9, 600	Buffalofish.....	148, 400
Rock bass.....	2, 935	Catfish.....	2, 485, 425
Sunfish.....	805, 585	Crappie.....	649, 480
Arizona: Largemouth black bass.....	50, 000	Drum.....	6, 600
Arkansas:		Loch Leven trout.....	5, 645
Largemouth black bass.....	142, 375	Miscellaneous fishes.....	11, 000
Smallmouth black bass.....	101, 125	Pike and pickerel.....	748, 915
Catfish.....	70	Rainbow trout.....	80, 790
Rainbow trout.....	2, 250	Rock bass.....	3, 000
Rock bass.....	21, 500	Sunfish.....	813, 375
Sunfish.....	148, 200	White bass.....	20, 745
California: Chinook Salmon.....	5, 565, 490	Yellow perch.....	2, 250
Colorado:		Kansas:	
Largemouth black bass.....	5, 710	Largemouth black bass.....	12, 800
Blackspotted trout.....	1, 139, 820	Catfish.....	945
Brook trout.....	1, 710, 280	Crappie.....	19, 075
Catfish.....	8, 400	Rainbow trout.....	2, 700
Crappie.....	5, 040	Sunfish.....	4, 225
Lake trout.....	21, 700	Kentucky:	
Loch Leven trout.....	90, 885	Largemouth black bass.....	38, 910
Rainbow trout.....	1, 078, 605	Smallmouth black bass.....	96, 785
Rock bass.....	8, 700	Crappie.....	2, 350
Steelhead trout.....	20, 580	Loch Leven trout.....	300
Sunfish.....	8, 400	Rock bass.....	12, 350
Connecticut:		Sunfish.....	24, 125
Smallmouth black bass.....	303, 000	Yellow perch.....	420
Brook trout.....	70, 060	Louisiana:	
Rainbow trout.....	1, 000	Largemouth black bass.....	132, 700
Delaware: Largemouth black bass.....	330	Catfish.....	520
Florida:		Crappie.....	675
Largemouth black bass.....	926, 495	Sunfish.....	477, 300
Smallmouth black bass.....	1, 250	Warmouth bass.....	11, 360
Catfish.....	600	Maine:	
Crappie.....	39, 300	Smallmouth black bass.....	70, 000
Sunfish.....	640, 285	Brook trout.....	284, 915
Georgia:		Flounder.....	612, 900, 000
Largemouth black bass.....	473, 080	Lake trout.....	7, 500
Smallmouth black bass.....	7, 675	Lobster.....	7, 532, 000
Brook trout.....	60, 740	Rainbow trout.....	100
Catfish.....	14, 420	Maryland:	
Crappie.....	361, 200	Largemouth black bass.....	6, 630
Kentucky bass.....	12, 140	Smallmouth black bass.....	1, 340
Rainbow trout.....	58, 025	Brook trout.....	3, 340
Sunfish.....	921, 615	Crappie.....	800
Idaho:		Loch Leven trout.....	9, 000
Largemouth black bass.....	400	Rainbow trout.....	40, 795
Smallmouth black bass.....	6, 000	Shad.....	27, 920, 000
Blackspotted trout.....	1, 028, 810	Sunfish.....	10, 825
Brook trout.....	572, 635	Yellow perch.....	4, 260, 000
Golden trout.....	11, 140	Massachusetts:	
Grayling.....	51, 000	Smallmouth black bass.....	105, 575
Landlocked sockeye salmon.....	650, 590	Brook trout.....	204, 020
Rainbow trout.....	1, 007, 915	Catfish.....	12, 440
Sunfish.....	125	Cod.....	191, 980, 105
Illinois:		Flatfish.....	63, 556, 285
Largemouth black bass.....	40, 650	Lobster.....	552, 000
Smallmouth black bass.....	60, 600	Loch Leven trout.....	280
Brook trout.....	1, 200	Mackerel.....	8, 277, 000
Buffalofish.....	324, 000	Pollock.....	174, 382, 505
Catfish.....	123, 900	Rainbow trout.....	27, 795
Crappie.....	286, 200	Michigan:	
Loch Leven trout.....	20, 900	Largemouth black bass.....	35, 965
Miscellaneous fishes.....	454, 000	Smallmouth black bass.....	20, 165
Sunfish.....	747, 150	Brook trout.....	408, 445
Indiana:		Crappie.....	400
Largemouth black bass.....	181, 130	Lake trout.....	1, 281, 500
Smallmouth black bass.....	21, 955	Loch Leven trout.....	2, 500
Brook trout.....	151, 700	Rainbow trout.....	86, 610
Catfish.....	5, 450	Rock bass.....	195
Crappie.....	2, 885	Steelhead trout.....	22, 200
Loch Leven trout.....	174, 600	Sunfish.....	80, 415
Rainbow trout.....	156, 015	Whitefish.....	1, 200, 000
Rock bass.....	92, 250	Yellow perch.....	2, 500
Sunfish.....	428, 100		
Yellow perch.....	53, 070		

Summary, by States, of the distribution of fish, fiscal year 1940—Continued

State and species	Number	State and species	Number
Minnesota:		New York—Continued.	
Largemouth black bass	168,875	Rainbow trout	110,720
Smallmouth black bass	7,200	Rock bass	2,000
Brook trout	740,250	Sunfish	2,800
Crappie	8,240	Whitefish	4,460,000
Lake herring	280,000	Yellow perch	1,800
Lake trout	376,000	North Carolina:	
Loch Leven trout	152,500	Largemouth black bass	677,890
Pikeperch	6,950,000	Smallmouth black bass	2,750
Pike and pickerel	200,000	Brook trout	177,765
Rainbow trout	96,025	Catfish	25
Sunfish	24,680	Crappie	10,765
Mississippi:		Glut herring	170,000
Lakemouth black bass	835,450	Loch Leven trout	9,910
Catfish	7,000	Pikeperch	225,000
Crappie	300	Rainbow trout	140,920
Sunfish	1,155,035	Shad	13,150,000
Missouri:		Striped bass	5,917,000
Largemouth black bass	196,545	Sunfish	404,925
Smallmouth black bass	209,700	Warmouth bass	13,000
Catfish	8,130	White perch	2,280,845
Crappie	45,505	Yellow perch	1,222,535
Rainbow trout	74,780	North Dakota:	
Rock bass	15,200	Largemouth black bass	1,150
Sunfish	87,620	Catfish	6,120
Montana:		Crappie	4,320
Largemouth black bass	6,550	Loch Leven trout	16,000
Blackspotted trout	4,033,065	Rainbow trout	4,000
Brook trout	835,395	Sunfish	1,300
Catfish	90,000	Ohio:	
Crappie	45,825	Largemouth black bass	70,010
Golden trout	8,715	Smallmouth black bass	740
Grayling	194,250	Brook trout	7,500
Loch Leven trout	1,404,480	Catfish	1,320
Rainbow trout	1,243,705	Loch Leven trout	23,000
Sunfish	6,935	Pikeperch	1,250,000
Nebraska:		Rainbow trout	76,100
Largemouth black bass	7,900	Rock bass	10,650
Brook trout	55,675	Sunfish	147,060
Catfish	24,400	Oklahoma:	
Crappie	12,020	Largemouth black bass	135,520
Loch Leven trout	12,000	Catfish	520
Rainbow trout	219,970	Crappie	11,050
Sunfish	29,475	Rainbow trout	375
Yellow perch	2,100	Sunfish	506,595
Nevada:		Oregon:	
Largemouth black bass	56,000	Brook trout	154,000
Blackspotted trout	57,000	Chinook salmon	1,738,080
Brook trout	25,000	Rainbow trout	641,135
Rainbow trout	199,225	Silver salmon	57,445
Sunfish	18,000	Steelhead trout	712,025
New Hampshire:		Pennsylvania:	
Smallmouth black bass	6,000	Largemouth black bass	10,520
Brook trout	289,360	Smallmouth black bass	7,320
Catfish	1,400	Brook trout	431,045
Rainbow trout	600	Catfish	7,890
New Jersey:		Loch Leven trout	398,150
Largemouth black bass	6,445	Rainbow trout	238,895
Smallmouth black bass	400	Sunfish	18,215
Catfish	300	Yellow perch	180
Crappie	240	Rhode Island: Flatfish	11,403,000
Sunfish	3,700	South Carolina:	
Yellow perch	470	Largemouth black bass	594,515
New Mexico:		Brook trout	49,945
Largemouth black bass	869,455	Catfish	23,400
Smallmouth black bass	52,950	Crappie	1,300
Blackspotted trout	189,000	Loch Leven trout	2,975
Catfish	26,750	Rainbow trout	47,835
Crappie	82,850	Sunfish	215,855
Rainbow trout	241,500	Warmouth bass	1,645
Sunfish	397,450	Yellow perch	2,880
New York:		South Dakota:	
Largemouth black bass	21,020	Largemouth black bass	6,925
Smallmouth black bass	212,175	Blackspotted trout	64,000
Brook trout	437,640	Brook trout	321,010
Catfish	1,800	Catfish	35,300
Crappie	1,590	Crappie	26,560
Flounder	73,664,000	Loch Leven trout	19,085
Lake herring	140,000	Rainbow trout	251,820
Lake trout	202,940	Sunfish	28,955
Loch Leven trout	202,335		

Summary, by States, of the distribution of fish, fiscal year 1940—Continued

State and species	Number	State and species	Number
Tennessee:		Virginia—Continued.	
Largemouth black bass	735, 605	Sunfish	244, 670
Smallmouth black bass	290	Yellow perch	267,660; 000
Brook trout	36, 020	Washington:	
Kentucky bass	26, 150	Largemouth black bass	6, 000
Loch Leven trout	2, 340	Blackspotted trout	845, 780
Miscellaneous fishes	2, 000	Brook trout	905, 250
Pikeperch	275, 000	Chinook salmon	31, 803, 275
Rainbow trout	743, 895	Chum salmon	4, 567, 200
Rock bass	19, 770	Crappie	7, 200
Sunfish	188, 425	Humpback salmon	467, 790
Texas:		Rainbow trout	950, 105
Largemouth black bass	1, 902, 570	Silver salmon	1, 436, 325
Catfish	16, 255	Sockeye salmon	2, 279, 125
Crappie	32, 110	Steelhead trout	1, 074, 535
Loch Leven trout	5, 225	West Virginia:	
Rio Grande perch	96, 310	Largemouth black bass	14, 755
Rock bass	5, 310	Smallmouth black bass	23, 805
Sunfish	1, 201, 515	Blackspotted trout	11, 590
Warmouth bass	11, 500	Brook trout	25, 120
Utah:		Catfish	1, 125
Largemouth black bass	1, 500	Crappie	80
Blackspotted trout	1, 066, 120	Loch Leven trout	35, 735
Brook trout	386, 025	Rainbow trout	163, 365
Chum salmon	120, 680	Sunfish	8, 910
Lake trout	19, 825	Wisconsin:	
Loch Leven trout	16, 845	Largemouth black bass	781, 260
Rainbow trout	486, 250	Smallmouth black bass	40, 800
Sunfish	21, 000	Brook trout	834, 440
Vermont:		Catfish	8, 015
Largemouth black bass	20, 300	Crappie	12, 200
Smallmouth black bass	50, 000	Loch Leven trout	288, 800
Brook trout	916, 525	Rainbow trout	238, 250
Landlocked salmon	15, 645	Sunfish	137, 900
Loch Leven trout	42, 140	Wyoming:	
Rainbow trout	8, 310	Largemouth black bass	7, 085
White perch	1, 000	Blackspotted trout	10, 092, 580
Virginia:		Brook trout	863, 790
Largemouth black bass	349, 840	Catfish	36, 000
Smallmouth black bass	51, 505	Crappie	2, 857, 990
Brook trout	200, 265	Grayling	4, 860
Crappie	14, 680	Lake trout	13, 700
Pikeperch	300, 000	Loch Leven trout	73, 600
Rainbow trout	293, 260	Rainbow trout	1, 131, 505
Rock bass	5, 550	Rock bass	5, 180
Shad	672, 500	Sunfish	13, 400
		Yellow perch	1, 245