BUREAU OF FISHERIES

U. S. Bureau of Commercial Fisheries

REPORT

OF THE

UNITED STATES COMMISSIONER OF FISHERIES

FOR THE FISCAL YEAR 1916

WITH

APPENDIXES

HUGH M. SMITH
Commissioner

WASHINGTON
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1917

National Oceanic and Atmospheric Administration

Report of the United States Commissioner of Fisheries

ERRATA NOTICE

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REPORT OF THE UNITED STATES COMMISSIONER OF FISHERIES FOR THE FISCAL YEAR ENDED JUNE 30, 1916

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REPORT

OF THE

COMMISSIONER OF FISHERIES.

DEPARTMENT OF COMMERCE,
BUREAU OF FISHERIES,
Washington, October 9, 1916.

SIR: There is submitted herewith a report giving an outline of the operations of the Bureau of Fisheries during the fiscal year ended June 30, 1916.

GENERAL REVIEW.

On February 9, 1916, the Bureau of Fisheries celebrated the forty-fifth anniversary of its establishment as a commission with purely investigatory functions. Public exercises were held in the auditorium of the National Museum, and the occasion was largely devoted to the dedication of a bronze memorial tablet to Spencer Fullerton Baird, the founder and first commissioner of the Bureau. The tablet was provided by the private subscriptions of persons now in the Bureau who were there under Prof. Baird; by persons who were officially associated with Prof. Baird in the fishery work but who are no longer connected with it; by a few who, while never in the regular fishery service, were closely connected with it in the days when Prof. Baird was Assistant Secretary and later Secretary of the Smithsonian Institution and Director of the National Museum as well as Commissioner of Fisheries; and by some persons who, in later years, have been officially engaged in some of the varied operations to which Prof. Baird gave impetus. The memorial contained a medallion portrait and the following inscription:

> SPENCER FULLERTON BAIRD
>
> 1823–1887
>
> FOUNDER AND ORGANIZER OF THE UNITED STATES BUREAU OF FISHERIES
>
> Commissioner of Fisheries 1871–1887
>
> He devoted his life to the public service and through the application of science to fish culture and the fisheries gave his country world-wide distinction
>
> His coworkers and followers in this field dedicate this tablet on the anniversary of the establishment of the Federal fishery service
>
> February 9, 1916

The meeting was presided over by the Commissioner of Fisheries; an address on "Personal Reminiscences" was delivered by Dr. William H. Dall, author of a notable life of Prof. Baird; Prof. Edwin Linton, a special investigator for the Bureau under Prof. Baird and subsequent commissioners, spoke on "The Man of Science and the Public: An Appreciation of Spencer Fullerton Baird," and presented the memorial tablet to the Department of Commerce on behalf of the donors; Vinal N. Edwards, the senior employee of the Bureau, who had been associated with Prof. Baird at Woods Hole since the very inception of the service, unveiled the tablet; and Hon. Edwin F. Sweet, Assistant Secretary of Commerce, in an able address, accepted the tablet on behalf of the Department. The tablet was subsequently set in a conspicuous place in the wall of the building of the Bureau of Fisheries.

The Bureau long ago passed the critical period of its existence and became one of the great Federal instrumentalities for public good. During the last year its already highly varied functions, to which Congress has added from time to time, have been extended; new achievements of permanent importance in behalf of the fisheries, fishermen, and fish consumers are to be recorded; increased appreciation by the general public of the value of the work is to be noted; and plans for still further usefulness have been perfected.

The executive staff at headquarters at the beginning of the fiscal year consisted of H. F. Moore, Deputy Commissioner; Irving H. Dunlap, assistant in charge of office; Robert S. Johnson, assistant in charge of fish culture; Robert E. Coker, assistant in charge of inquiry respecting food fishes and the fishing grounds; Alvin B. Alexander, assistant in charge of statistics and methods of the fisheries; and Ward T. Bower, chief agent of the Alaska service. The Bureau suffered a severe loss by the death, on March 17, 1916, of Mr. Johnson, who had been chief of the fish-cultural work since 1909 and an efficient and loyal employee in that branch of the service since 1881. He was succeeded by Henry O'Malley, who has been an employee in the division of fish culture since 1897 and field superintendent in charge of Pacific-coast operations since 1913. No other change among the administrative staff occurred during the year. To the foregoing officers, to superintendents and directors of stations and laboratories, to the captains of vessels, and cars, to the agents in charge of remote seal islands, and to the great body of subordinates of all capacities on land and sea through whom the real work of the Bureau is accomplished the Commissioner desires to express thanks and commendation for arduous duties faithfully performed, which made the fiscal year 1916 the most noteworthy in the history of the Federal fishery service.

THE PROPAGATION AND DISTRIBUTION OF FOOD FISHES.

GENERAL EXTENT AND IMPORTANCE.

Continued progress has been made in fish culture, and the fiscal year 1916 was in general the most successful in the Bureau's history. The distribution of fish and fish eggs shows an increase of 558,504,762 over the preceding year and reached the enormous total of 4,847,262,566. Large increases over the previous year were effected in the propagation of some species, while with others less success was attained. What is regarded as the most substantial gain, however, is the increase, amounting to 47 per cent, in the number of fingerlings produced and distributed. The policy of rearing larger numbers of young fish to advanced sizes was inaugurated a few years ago and has since been assiduously followed in various fields, to the gratification of those most familiar with fish-cultural methods and needs.

The following table shows by species the number of fish and fish eggs distributed during the fiscal year 1916 from the various stations of the Bureau:

SUMMARY, BY SPECIES, OF THE DISTRIBUTION OF FISH AND EGGS DURING THE FISCAL YEAR ENDED JUNE 30, 1916.

Species.	Eggs.	Fry.	Fingerlings, yearlings, and adults.	Total.
Catfish			2,545,777	2,545,777
Carp			4,336,832	4,336,832
Buffalofish			563,815	563,815
Shad	1,097,000	77,644,545		78,741,545
Alewife		200,000		200,000
Whitefish	74,180,000	816,975,000		391,155,000
Lake herring		76,000,000		76,000,000
Silver salmon	198,500	8,684,334	1,469,507	10,352,841
Chinook salmon	20,622,340	57,250,714	22,982,655	100,855,709
Blueback salmon	3,000,000	57,964,920	32,442,748	93,407,608
Humpback salmon		19,179,124	3,144,584	22,323,708
Dog salmon		21,500,944	1,000,000	22,500,944
Steelhead trout	1,079,000	870,000	3,811,058	5,760,058
Rainbow trout	1,489,900	243,800	2,831,747	4,565,447
Atlantic salmon		1,709,815		1,709,815
Landlocked salmon	486,000	357,968	105,777	949,745
Scotch sea trout			509	509
Blackspotted trout	1,427,000	1,370,310	2,481,228	5,278,538
Loch Leven trout			105,500	105,500
Lake trout	7,326,054	36,414,323	278,100	44,018,477
Brook trout	635,000	5,057,650	7,576,817	13,269,467
Grayling	3,500,000	1,868,000		5,368,000
Smelt	36,000,000	15,000,000		51,000,000
Mackerel		1,946,000		1,946,000
Butterfish		392,000		392,000
Crappie			3,122,332	3,122,332
Rock bass			165,149	165,149
Smallmouth black bass		762,710	65,169	827,879
Largemouth black bass		471,300	1,357,768	1,829,068
Sunfish		33,000	1,635,881	1,668,881
Pike and pickerel			43,436	43,436
Pike perch	222,160,000	214,533,280	3,460	436,696,740
Yellow perch	27,500,000	195,491,000	183,111	223,174,111
Striped bass		10,071,000		10,071,000
White perch	25,000,000	97,350,000		122,350,000
White bass			4,950	4,950
Cod		318,681,000		318,681,000
Pollock		1,107,460,000		1,107,460,000
Haddock		22,170,000		22,170,000
Flatfish		1,532,947,000		1,532,947,000
Lobster		128,700,000	3,525	128,703,525
Total	425,700,794	4,329,300,337	92,261,435	4,847,262,566

Food and game fishes were distributed in every State and Territory in the Union. The marine, Great Lakes, and anadromous species of the eastern and western coasts were practically all liberated in the waters from which the eggs were collected, and the trouts, basses, sunfishes, and other species of the interior were either consigned to inland public waters or contributed as brood stock to privately owned ponds. More than 10,000 individual applications for fish were received, and about the same number was acted on by the consignment of suitable species.

The distribution of the output of the hatcheries at the most suitable ages and in the most economical and effective manner is a highly important branch of fish culture. The regular field equipment and staff provided for this purpose are supplemented by the detail of station employees and the use of public and private carriers, and throughout the year a large part of the fish-cultural personnel was constantly engaged in making deliveries of fish to applicants. The six railway cars specially equipped for the safe transportation of live fish of all ages were in active service at all seasons. They were hauled 149,781 miles, and, in addition, the detached messengers traveled 645,721 miles, carrying their loads of living freight. The increase in the mileage over 1915 was about 25 per cent. The policy of the various railroads differs in the matter of the treatment of fish cars and messengers. Some lines charge full rates for cars with their crews and messengers with their cans, some give substantial reductions from regular fares, and some accord free passage and hauling. In 1916 about 10½ per cent of the travel by cars and 19 per cent of the travel by messengers were furnished gratis.

The first all-steel transportation car, authorized by Congress in the appropriation act for 1915, has been completed and placed in commission. An appropriation of $40,000 for two additional cars of the same type has been made, but the increase in the cost of labor and materials renders it impossible to secure fully equipped cars within the limits of the sum provided. At the coming session Congress will be asked to appropriate the additional amount required.

The unit cost of fish-cultural operations continues to decrease and in 1916 was reduced to $117.86 per million fish produced and planted. This is to be compared with $131.65 in 1915, $146.36 in 1910, and $239 in 1905.

HATCHERIES OPERATED.

The hatcheries fall naturally into five categories, and their output in 1916 may be classified and summarized as follows:

Marine species of the Atlantic coast	3,112,299,525
Migratory species of the Atlantic coast	[a] 442,472,788
Fishes of the Great Lakes	947,870,217
Migratory fishes of the Pacific coast	248,975,220
Fishes of the interior waters	95,644,816
Total	4,847,262,566

The only new permanent hatchery opened in 1916 was the one at Saratoga, Wyo., which has begun operations under favorable auspices and gives promise of great usefulness. This station and the one at Orangeburg, S. C., were not given the full amount of money necessary for entire completion, and Congress will, therefore, be asked to provide the additional sums required.

Under the general authority to establish field stations, operations have been so successful on the Quinault River in Washington and the Klamath River in California that the construction of permanent hatcheries in these localities is warranted.

There follows a list of the hatcheries maintained in 1916, with auxiliary and field stations thereunder, the period of operation, and the species handled. The principal stations, arranged in alphabetical

[a] Includes humpback salmon planted in Maine waters.

order, have a permanent personnel provided by law or are operated more or less independently, although the subsidiary establishments in some cases are fully equipped and quite as important as the head stations to which they are attached for convenience of administration. Some shifting of auxiliary points of operation occurs each year, and, as promising collecting locations are found, the field is expanded to such extent as the available appropriations will allow. There has been no increase in such funds for several years past, hence the extension of work has not been all that was desired or all that the needs of the various fields demand, and new work has been made possible only as the cost of production has decreased by reason of the greater experience and efficiency of the personnel.

FISH-CULTURAL STATIONS OPERATED DURING THE FISCAL YEAR 1916.

Designation.	Period of operation.	Species handled.
Afognak, Alaska	Entire year	Blueback and humpback salmons.
Uganik Bay, Alaska	June-October	Blueback salmon.
Seal Harbor, Alaska	do	Do.
Baird, Cal	Entire year	Brook and rainbow trouts and chinook salmon.
Battle Creek, Cal	December-April	Chinook salmon.
Hornbrook, Cal	October-May	Chinook and silver salmons.
Mill Creek, Cal	December-April	Chinook salmon.
Baker Lake, Wash	Entire year	Blueback and silver salmons.
Birdsview, Wash	do	Blueback, chinook, humpback, and silver salmons; blackspotted and steelhead trouts.
Brinnon, Wash	October-June	Dog and silver salmons and steelhead trout.
Darrington, Wash	October-April	Chinook, dog, humpback, and silver salmons.
Day Creek, Wash	September-June	Humpback and silver salmons.
Duckabush, Wash	do	Chinook, dog, humpback, and silver salmons, and steelhead trout.
Illabott Creek, Wash	do	Chinook, humpback, and silver salmons.
Quilcene, Wash	do	Chinook, dog, humpback, and silver salmons.
Sultan, Wash	do	Chinook, humpback, and silver salmons, and steelhead trout.
Battery, Md	April-May	Shad, white perch, and yellow perch.
Boothbay Harbor, Me	Entire year	Cod, flatfish, pollock, and lobster.
Portland, Me	July-October; May-June	Lobster.
Bozeman, Mont	Entire year	Blackspotted, brook, rainbow, and steelhead trouts, and grayling.
O'Dell Creek, Mont	March-May	Grayling.
Meadow Creek, Mont	do	Grayling and rainbow trout.
Yellowstone, Wyo	July-June	Blackspotted trout.
Clear Creek, Wyo	do	Do.
Columbine Creek, Wyo	do	Do.
Cub Creek, Wyo	do	Do.
Lake Camp, Wyo	do	Do.
Bryans Point, Md	March-May	Shad and yellow perch.
Cape Vincent, N. Y	Entire year	Brook, lake, and rainbow trouts; lake herring; landlocked salmon; pike perch; yellow perch; and whitefish.
Amherst Island, N. Y	October-November	Lake trout.
Charity Shoals, N. Y	do	Lake trout and whitefish.
Horseshoe Island, N. Y	do	Lake trout.
Ogdensburg, N. Y	April-May	Pike perch.
Old Forge, N. Y	November	Whitefish.
Pigeon Island, N. Y	October-November	Lake trout.
Pope Mills, N. Y	April	Pike perch.
Sodus Point, N. Y	November-December	Lake herring.
Stony Island, N. Y	November	Lake trout.
Three Mile Bay, N. Y	November-December	Lake herring and whitefish.
Central Station, Washington, D. C.	Entire year	Shad, pike perch, and yellow perch.
Clackamas, Oreg	do	Chinook salmon, and brook, rainbow, and steelhead trouts.
Applegate, Oreg	April-June	Chinook and silver salmons, and rainbow and steelhead trouts.
Big White Salmon, Wash	October-May	Chinook salmon.
Little White Salmon, Wash	do	Do.
Rogue River, Oreg	Entire year	Blackspotted and steelhead trouts and chinook and silver salmons.
Upper Clackamas, Oreg	do	Chinook salmon and steelhead trout.
Willamette, Oreg	July-June	Shad.

FISH-CULTURAL STATIONS OPERATED DURING THE FISCAL YEAR 1916—Continued.

Designation.	Period of operation.	Species handled.
Cold Springs, Ga.	Entire year	Black bass, catfish, sunfish, and warmouth bass.
Milltown, Ga.	April-June	Black bass.
Craig Brook, Me.	Entire year	Atlantic salmon, brook and Scotch sea trouts, and humpback salmon.
Upper Penobscot, Me.	April-May	Atlantic salmon.
Duluth, Minn.	Entire year	Brook, lake, and steelhead trouts, pike perch, and whitefish.
Grand Marais, Minn.	October-November	Lake trout.
Edenton, N. C.	Entire year	Black bass, rock bass, shad, sunfish, and white perch.
Weldon, N. C.	April-May	Striped bass.
Erwin, Tenn.	Entire year	Brook and rainbow trouts, large and small mouth black basses, rock bass, carp, and sunfish.
Gloucester, Mass.	do	Cod, flatfish, haddock, pollock, mackerel, and lobster.
Green Lake, Me.	do	Brook and lake trouts, humpback and landlocked salmons, and smelt.
Grand Lake Stream, Me.	do	Landlocked salmon.
Homer, Minn.	do	Black bass, buffalofish, carp, catfish, crappie, pike, pike perch, rock bass, sunfish, and yellow perch.
La Crosse, Wis.	do	Black bass, buffalofish, carp, catfish, crappie, pike, pike perch, sunfish, yellow perch, and brook and rainbow trouts.
Leadville, Colo.	do	Blackspotted, brook, lake, and rainbow trouts.
Antero Reservoir, Colo.	April-May	Rainbow trout.
Cheesman Lake, Colo.	do	Do.
Edith Lake, Colo.	October-November	Brook trout.
Engelbrechts Lake, Colo.	do	Do.
Hesselkus Lake, Colo.	do	Do.
Kelleys Lake, Colo.	do	Do.
Musgrove Lake, Colo.	do	Do.
Smiths Ponds, Colo.	do	Do.
Northfield Lake, Colo.	do	Do.
Turquoise Lake, Colo.	do	Do.
Woodland Park, Colo.	do	Do.
Louisville, Ky.	Entire year	Large and small mouth black basses, rock bass, sunfish, and rainbow trout.
Mammoth Spring, Ark.	do	Large and small mouth black basses, catfish, rock bass, and sunfish.
Friars Point, Miss.	July-December	Black bass, buffalofish, carp, catfish, crappie, and sunfish.
Manchester, Iowa.	Entire year	Brook and rainbow trouts, pike perch, rock bass, and sunfish.
Bellevue, Iowa.	August-December	Black bass, buffalofish, carp, catfish, crappie, pike, sunfish, white bass, and yellow perch.
North McGregor, Iowa.	do	Black bass, carp, catfish, buffalofish, crappie, pike, sunfish, and yellow perch.
Nashua, N. H.	Entire year	Brook and rainbow trouts, catfish, and smallmouth black bass.
Neosho, Mo.	do	Black bass, catfish, crappie, rainbow trout, rock bass, smallmouth black bass, sunfish, and yellow perch.
Northville, Mich.	do	Brook, lake, and rainbow trouts, grayling, and smallmouth black bass.
Alden, Mich.	November	Whitefish.
Alpena, Mich.	April-May	Lake trout and whitefish.
Antrim City, Mich.	November	Whitefish.
Bay City, Mich.	April	Pike perch.
Bay Port, Mich.	November	Whitefish.
Belle Isle, Mich.	October-November	Do.
Charity Island, Mich.	do	Do.
Charlevoix, Mich.	April, May, December	Lake trout and whitefish.
Detour, Mich.	October-November	Lake trout.
Detroit, Mich.	April, May, December	Pike perch and whitefish.
Fairport, Mich.	October-November	Lake trout.
Frankfort, Mich.	do	Do.
Grassy Island, Mich.	do	Lake trout and whitefish.
Isle Royal, Mich.	do	Do.
Kewaunaw Point, Mich.	do	Lake trout.
Manistique, Mich.	do	Do.
Marquette, Mich.	do	Lake trout and lake herring.
Monroe, Mich.	April and November	Pike perch and whitefish.
Munising, Mich.	October-November	Lake trout.
Munoscong, Mich.	April	Pike perch.
Naubinway, Mich.	November-December	Whitefish.
Ontonagon, Mich.	October-November	Lake trout.

FISH-CULTURAL STATIONS OPERATED DURING THE FISCAL YEAR 1916—Continued.

Designation.	Period of operation.	Species handled.
Northville, Mich—Continued.		
St. James, Mich	October-December	Lake trout and whitefish.
Sault Ste. Marie, Mich	do	Do.
Jacobsville, Mich	October-November	Lake trout.
Orangeburg, S. C	Entire year	Black bass and shad.
Put in Bay, Ohio	do	Pike perch, whitefish, and yellow perch.
Kellys Island, Ohio	November-December	Whitefish.
Middle Bass, Ohio	do	Do.
North Bass, Ohio	April and November	Pike perch and whitefish.
Port Clinton, Ohio	do	Do.
Toledo, Ohio	do	Do.
Quinault, Wash	Entire year	Blueback, chinook, and silver salmons.
Quincy, Ill	do	Black bass, carp, catfish, crappie, pike perch, sunfish, and yellow perch.
St. Johnsbury, Vt	do	Brook, lake, rainbow, and steelhead trouts, landlocked salmon, smallmouth black bass, and yellow perch.
Darling Pond, Vt	August-December	Brook trout.
Holden, Vt	Entire year	Brook, lake, rainbow, and steelhead trouts, and landlocked salmon.
Lake Mitchell, Vt	August-December	Brook trout.
Swanton, Vt	March-June	Pike perch and yellow perch.
San Marcos, Tex	Entire year	Black bass, crappie, rock bass, sunfish, and warmouth bass.
Saratoga, Wyo	do	Brook trout.
Spearfish, S. Dak	do	Blackspotted, brook, lake, Loch Leven, rainbow, and steelhead trouts.
Tupelo, Miss	do	Black bass, crappie, and sunfish.
White Sulphur Springs, W. Va	do	Brook and rainbow trouts, large and small mouth black basses.
Woods Hole, Mass	do	Cod and flatfish.
Menemsha, Mass	January-April	Flatfish.
Waquoit, Mass	do	Do.
Wickford, R. I	do	Do.
Wytheville, Va	Entire year	Brook and rainbow trouts, large and small mouth black basses, landlocked salmon, rock bass, and sunfish.
Yes Bay, Alaska	do	Blueback and humpback salmons.
Eagle Lake, Alaska	June	Blueback salmon.
Ketchikan, Alaska	September-October	Humpback salmon.

PACIFIC SALMON CULTURE.

The artificial propagation of the Pacific salmons in the three coast States and Alaska attained greater efficiency and magnitude in 1916 than in any previous year. Shortage in the egg-take at some points was more than compensated for by a high degree of success elsewhere, and the output, in round numbers, was 250,000,000 fish, compared with 225,000,000 in 1915. The most satisfactory feature of this increase was that it was made up largely of chinook and sockeye, or blueback, salmons, the most valuable of the five Pacific salmons. Humpback salmon also were produced in larger numbers, but the output of silver and dog salmons, owing to various local difficulties encountered during the spawning season, fell behind last year's record.

In pursuance of the recently adopted policy of increasing each season so far as possible the output of fingerling salmon, the rearing facilities at the Pacific stations were sufficiently enlarged during the year to permit of the production of 61,039,494 fingerling fish. This number represents about 24½ per cent of the total salmon output in 1916 and shows an increase of more than 100 per cent over the output of fingerling salmon the previous year.

The abnormal physical conditions resulting from the eruption of Mount Katmai in 1912 have now become so ameliorated that they are expected to cause no further difficulty in connection with the fish-cultural work at the Afognak station. However, the past season was remarkable because of an extended drouth, which at one time during the early winter became so acute that it was feared it would be necessary to plant all eggs and fry in the hatchery in order to save them. In July, 1915, when the run of blueback salmon appeared in Letnik Bay, the water in the river and lake near the station was so low that but comparatively few fish succeeded in ascending, and of those which did reach the lake a large proportion died in the shallow tributaries before ripening. The eggs of others hardened in the fish, and, altogether, considerable numbers of eggs were thus lost to the station. Notwithstanding these unfavorable conditions, the collections exceeded last year's take by a small margin and gave evidence of the zealous efforts of the hatchery force.

In addition to 6,353,000 blueback and 11,435,000 humpback eggs taken at the main station, 5,773,000 blueback and 3,523,800 humpback eggs were secured at the recently established field stations at Seal Bay and Uganik. This stock was enlarged during the early winter by the transfer from the Yes Bay station of 15,000,000 blueback eggs, which, notwithstanding the 15 days consumed in effecting the transfer, were found on arrival to be of very good quality. Besides the difficulty experienced with a short water supply, the winter was intensely severe, and the prevailing low water temperatures so retarded the incubation period that the last of the eggs were not hatched until May 29. Despite the unfavorable circumstances contended with, however, 24,513,700 blueback and 13,104,200 humpback salmon fry were hatched, and 11,169,440 of the bluebacks were carried through to the fingerling stage in good condition. All of the young humpbacks had to be liberated shortly after hatching in order to provide sufficient water for handling the fry of the more valuable species.

All the fish on hand at the Afognak station in the course of the year were free from fungus or disease with the exception of those derived from the Uganik field, a considerable number of which developed a white spot about midway of the umbilical sac near the notochord. The fry thus marked died at the end of the fifth or sixth day. The spot was discernible in the egg from 10 to 15 days before hatching, but could not be seen previous to that time with the unaided eye. So far as known, no trouble of this nature has ever before been experienced at the Afognak station.

The salmon season at the Yes Bay station was remarkable both for the unusually large number of eggs secured and for the peculiarity in the run of fish. As a rule, brood salmon enter the lake in the vicinity of the station from one to two months before they are ready to spawn, but this year close observation up to the beginning of the spawning season failed to reveal any large numbers, and it was feared that few eggs would be available. The first bluebacks were taken September 2, and the spawning season was well advanced before any material increase in the numbers of fish could be discerned. Daily collections of eggs were continued to September 29, by which date 72,000,000—representing the total capacity of the hatchery—had been taken, and, while large numbers of spawning fish were still accessible, the collections had to be discontinued.

As the incubation period advanced, the congested condition of the hatchery was relieved by the transfer of 15,000,000 eggs to the Afognak station and 3,000,000 to the Oregon State Fish Commission.

The remainder were carried through to the hatching stage with a loss of only 2 per cent. Because of inadequate hatchery room, it was impossible to carry all of the fry, and frequent plantings had to be made in order to prevent congestion in the troughs. The absorption of the yolk sac was completed in May and feeding began the last of that month. Spent blueback salmon, salted and preserved in barrels, were utilized as food for the young fish. A meat chopper for grinding this food was set up in the dynamo room and operated with power from the dynamo turbine. Last year the salted salmon was cooked, pressed, and grated, and a meal thus obtained, and while the fingerlings thrived on it at first, their growth appeared to be arrested later and heavy mortality ensued. Whether this was due to the condition of the food or to the high temperature of the water during the period of feeding could not be determined, but in 1916 the salted salmon was freshened and ground but not cooked and better results were attained.

The substation established the previous year on Ketchikan Creek for the collection of eggs of the humpback salmon was again opened for operations, but very early in the season protests against the work were made by the citizens of Ketchikan and it was decided to abandon it. At that time only 325,000 eggs had been taken, and as the expense of carrying them until hatched would have been considerable they were deposited in the gravel of the creek where collected. A search was then instituted for a new site, and it is believed a very good one has been found on Smeaton Bay about 6 miles from the Behm Canal, where experimental work will be continued next season.

In addition to the transfers of eggs already mentioned, the output from the Yes Bay station comprised 32,920,000 fry and 20,876,000 fingerlings, and at the close of the year 650,000 fingerlings were being retained for later distribution.

At the Baker Lake station, in Washington, the work of capturing a brood stock of blueback salmon was undertaken early in July, and by the close of the collecting period 9,127 fish in good condition had been secured and placed in the slough at the head of Baker Lake to ripen. Various repairs had just been made to this inclosure to insure the safety of the impounded fish, but, despite the precautions taken, a large number of them escaped in October during a period of continuous rainfall which raised the level of the lake fully 15 feet. It is estimated that the egg collections, which amounted to 3,111,000, were at least 7,000,000 short of what they would have been had the loss of fish not occurred. In addition to this work, eggs of the chinook salmon, silver salmon, and steelhead trout, aggregating 504,200, were taken and hatched and the fry were planted locally. The output of blueback-salmon fry from Baker Lake station numbered 1,875,000, and 732,379 were still on hand at the close of the year. In the course of the year a new hatchery and barn were constructed, various improvements were made to the cottage and mess house, and a fire-service pipe line was laid.

From the Birdsview station there were distributed early in the year 620,280 blackspotted and steelhead trout fry and also fingerling, chinooks, and blueback salmons aggregating nearly 344,000, all of which had been carried over from the previous fiscal year. The run of humpback salmon in streams in the vicinity of the Birdsview station began early in September, but owing to the low water it was very light as compared with former years. The total humpback-egg collections amounted to 1,550,000, all of which, with the exception of 30,000 forwarded for exhibit at San Francisco, were used in making up a shipment of 7,000,000 eggs destined for New England stations, the balance of the consignment being contributed by other Washington stations. In addition to the humpback collections, 149,000 chinook-salmon eggs were taken during the fall, 1,238,000 silver-salmon eggs during the fall and winter, and 3,212,000 steelhead-trout eggs in the spring, the last take being the largest for several years.

At the Illabot Creek substation, where the run of humpback and chinook salmon was interfered with by low water, egg collections of the former numbered 2,500,000 and of the latter nearly 4,000,000. Later on the chum eggs were lost, the water in the flume and hatching troughs freezing solidly during a spell of very cold weather, despite the efforts put forth to save them. Silver-salmon egg collections were disappointing here as elsewhere, only 44,000 being taken.

Egg collections at the Puget Sound stations amounted, in round numbers, to 39,000,000, of which about 25,000,000 were of the chum, or dog, salmon, over 3,500,000 of the humpback, 7,000,000 of the silver, a little over 500,000 of the chinook, and about 3,000,000 of the steelhead trout. Plantings of fry of the various species named aggregated nearly 34,000,000. The run of humpback salmon here, as elsewhere in Washington, was light, the lack of the usual abundance of fresh water in the sound basin apparently causing the main body of the run to seek more northerly streams.

At Duckabush the pond system was completed during the year and a battery of 32 eyeing troughs was installed. In connection with the work at Quilcene a convenient slough near the station was converted into a nursery pond with a capacity for 2,000,000 fry, and an eyeing plant, consisting of a battery of 24 troughs, was constructed in the close vicinity of the trap where the fish were taken, thus obviating the loss and expense heretofore involved in the transportation of the green eggs 2 miles to the hatching station.

In advance of the blueback season in the Quinault region a battery of 86 troughs was installed in a new building 40 by 77 feet in dimensions and supplied with water from a new flume, and by October 10, when the run of salmon made its appearance, racks and traps had been built in three creeks emptying into Quinault Lake and River and everything was in readiness for the collection of eggs, which began three days later. From that time on collections were made daily until December 18, on which date, the hatchery being filled, the racks were withdrawn and a considerable number of unspawned fish was set free.

Two kinds of apparatus were used to capture the fish, namely, upstream traps and seines, the latter being employed in deep holes in the creeks and in the upper part of the river. In some of the seine hauls as many as a thousand fish, nearly all of them ripe, were taken at a time. The run was said by the native Indians to be the largest ever known in that region. The 18,000,000 eggs constituting the season's take were transferred by station launch to the field hatchery, and, notwithstanding the intensely cold weather encountered during the winter—the ice formation on the hatchery floor being at one time 6 inches thick—they were of such excellent quality as to produce 91 per cent of fry. A consignment of 50,000 blueback-salmon eggs from the Yes Bay collections was transferred to this station during the fall with the view of utilizing the young fish hatched therefrom in marking experiments.

From the entire stock on hand 16,580,946 vigorous fry were produced, most of which, owing to lack of rearing facilities, had to be liberated before the absorption of the yolk sac. Incidental to the work with this species, small numbers of eggs of the chinook and silver salmons were taken, hatched, and distributed, the output of fry from both lots amounting to 135,924.

Coming now to the Oregon field, it may be noted that for the first time in some years all natural conditions on the Clackamas River were favorable for chinook-salmon work, and during the spawning season, which extended from September 23 to November 17, eggs in excess of 10,000,000 were collected, the take being nearly two and a half times larger than in the previous year. Two millions of these were transferred to the upper Clackamas hatchery with the view of rearing the resulting fry and planting them in the headwaters of that river. Of those hatched at Clackamas station, 2,500,000 were planted on the absorption of the food sac and the remaining 1,500,000 were fed until April and then liberated, both lots being returned to the spawning grounds from which the eggs were secured. As at the other Pacific stations, the principal food used was the flesh of salted salmon, 8 tons of which had been prepared in advance.

Fishing operations on the upper Clackamas were almost impracticable, owing to the absence of slack water at the foot of the fishway dam, and while there was a fair run of salmon in sight only 24,000 eggs were secured.

The collection of chinook eggs on tributaries of the Columbia River amounted to nearly 50,000,000, over two-thirds of them being taken on the Little White Salmon River. As the station on that stream is equipped for handling only about 25,000,000 eggs, the surplus of 9,000,000 was utilized in fully stocking the hatchery on the Big White Salmon, where collections of 13,200,000 eggs had been made. The eggs at both points were hatched with normal losses, and the combined output aggregated 43,822,000 fish, of which 6,670,665 were fingerlings.

Nearly 6,000,000 chinook eggs were taken at the Rogue River station, and 1,000,000 of these were supplied to the Oregon State Fish Commission. From the remainder there was an output of 1,952,000 fry and 1,550,037 fingerling fish. Steelhead-trout eggs to the number of 405,700 were collected from this river during the spring, and more would have been secured had not the high water permitted many of the impounded fish to escape. Of the cutthroat trout, which ran with the steelheads, a few fish were secured that yielded 23,000 eggs.

On the tributary stream at Applegate Creek 601,000 chinook and 782,500 silver-salmon eggs were obtained and handled with the usual mortality, and during the spring 4,148,000 steelhead eggs were taken. In the operations with this latter species very successful use was made of a section of irrigation ditch for impounding partly ripe fish, permission having first been obtained from the owners of the property. In connection with the work at this point a small number of

Lake Tahoe trout fry belonging to the Oregon State Fish Commission were held, fed, and at length liberated in Crater Creek.

The hatching of shad on a minor scale has been continued in the Columbia basin. During the early part of the fiscal year 317,445 eggs on hand July 1 were hatched and the fry were liberated on the spawning grounds in the Willamette River. Near the close of the year shad-egg collections were again made, and by the last of June nearly 3,000,000 fry had been hatched and planted.

The chinook-egg collections in the California field were about 7,000,000 behind those of the previous year, the shortage being due partly to failure to obtain eggs on the McCloud River and partly to unfavorable water stages during the spawning season at both the Mill Creek and the Battle Creek stations. The streams on which these stations are located were so low during the first part of the season that the fish could not ascend, and the heavy rains occurring later resulted in floods which damaged the racks and put an end to the work by allowing all fish held below them to escape.

At the Baird station shortage of funds made it impossible to install the racks in the McCloud River at the usual time during the spring, and before their completion in July the major portion of the run of salmon had passed upstream. The egg collections at the two auxiliary stations referred to aggregated only 26,747,000, but the shortage as compared with last year was largely overcome by the unexpected success attained at the Hornbrook substation, where 16,460,000 chinook eggs were secured from the Klamath River besides eggs of the silver salmon to the number of 2,823,000. While the facilities at Hornbrook had only recently been enlarged, the hatching capacity of the station is still far too small to permit of the handling of such numbers. It was, therefore, arranged to have the State fishery authorities develop the surplus eggs at the Sisson hatchery and return the fry by means of the State fish car for liberation on the spawning grounds in the Klamath River. All of the silver-salmon eggs were hatched at the point of collection and the fry were returned to the river without feeding.

The salmon output from the Battle Creek and Mill Creek stations consisted of 9,505,000 fry and 12,373,224 fingerlings. Attempts were made in April to collect eggs of the rainbow trout in Cottonwood Creek, a tributary of the Klamath, but for some unknown reason the usual run of fish in this stream failed to make its appearance and only 26,640 eggs were obtained. These were transferred to the Baird station to be hatched, and the fry were utilized in supplying California applicants.

PROPAGATION OF MIGRATORY FISHES OF ATLANTIC STREAMS.

This branch of the fish-cultural work is addressed to the shad, Atlantic salmon, striped bass, white perch, and yellow perch.

Contrary to the experience of recent years, the shad season on the Potomac River was comparatively successful from the viewpoint of artificial propagation as well as in financial returns to the commercial fishermen, whose catch was estimated to be fully 50 per cent greater than in any previous year since 1896. The fish appeared on the spawning grounds in plentiful numbers shortly after the middle of April, but for about 15 days thereafter the water temperatures were too low for the ripening of the eggs. During the latter half of the season, however, favorable conditions prevailed and 63,815,000 eggs were secured. These were hatched at the station, with the exception of 2,076,000 shipped on assignments, and the resulting fry—58,232,700 in number—were widely distributed on the natural spawning grounds in the Potomac River.

The satisfactory outcome of the shad season on this river, in strong contrast with the failures in recent years, is to be attributed, in part, to the restrictions imposed by the War Department on the pound-net fishermen operating in Chesapeake Bay and at the mouths of the tributary rivers. Definite lanes for navigation have been kept open, and the migrating schools have thus had a clearer passage than heretofore to their spawning grounds in the upper part of the stream. The large run in 1916 may be attributed also to the favorable conditions for spawning four years before, when extensive egg collections were made.

In advance of the shad season on the Potomac, 16,013 adult yellow perch were collected from the fishermen's nets and placed in live cars. Here they began spawning at once and between March 29 and April 7 produced 152,235,000 eggs. Of these, 3,640,000 were used for exhibition purposes at Central Station, Washington, D. C., and from the remainder 137,101,000 excellent fry were hatched, all of which were planted in fine condition in tributary streams of the Potomac River, extending from Broad Creek, Md., to Occoquan Creek, Va., this territory comprising the principal breeding ground of the species.

The shad operations on the Susquehanna River were attended by the usual discouraging results. On this river a specially destructive fishing device—the anchored gill net—is in extensive use at the present time, to the almost total exclusion of the drift net, from which eggs of good quality have always been derived. In practice the anchored net is allowed to remain in position throughout the night, and on being lifted in the morning nearly all the shad with ripe eggs are found in a mutilated condition, having been preyed upon by eels.

The spring's work on the Susquehanna included the collecting of 67,512,000 yellow-perch eggs, 153,700,000 white-perch eggs, and 6,583,000 shad eggs. Eggs of the first-named species were obtained between April 3 and April 10, and the station output comprised 25,500,000 eggs shipped on assignment, besides 33,400,000 fry. The white-perch season extended from April 15 to the end of that month. Of the eggs secured, 25,000,000 were supplied to applicants and the remainder produced 96,500,000 fry. The first shad eggs were taken April 19, and while the fishing season was long drawn out, extending far into June, eggs came into the hatchery in such small lots that it was deemed advisable on May 13 to discontinue this work, and the station was closed shortly afterwards.

In Albemarle Sound slightly over 16,000,000 shad eggs constituted the season's collections, making it one of the poorest experienced since the establishment of the Bureau's station in that region. While the unfavorable showing was due in some measure to the cold northerly winds which prevailed throughout the spawning period, it is yearly becoming more evident that the Bureau's efforts to maintain the shad fisheries of Albemarle Sound are not appreciated by all those who are deriving most of the benefit therefrom. The gill-net fishermen, to whose cooperation the Bureau is indebted for the successful shad work in recent years, are gradually being driven off the spawning grounds by the encroachments of the pound-net fishermen, who apparently take no interest in the work of artificial shad propagation. The records of the Edenton station show that the number of fishermen—principally gillers—furnishing eggs to the hatchery increased from 31 in 1910 to 67 in 1913, in which year the largest egg collections in the station's history were made. Since that time the operations of the gillers have rapidly declined, and only 17 were left to furnish eggs for the Bureau's work in 1916. The output of fry from the eggs obtained numbered 9,765,000.

Plans were made early in the spring at the Edenton station to undertake the hatching of the white perch, but the efforts to obtain eggs resulted in practical failure, only 1,200,000 being secured. The reason advanced for this poor outcome is the irregularity and uncertainty of the ripening of the fish, a feature which, from all accounts, has always existed in the Albemarle Sound region. The collection of these eggs began in March and extended well into April, and the output of fry was 850,000.

With the view of prosecuting striped-bass work on a more efficient and extensive basis than heretofore, a time lease was secured on a building on the west bank of the Roanoke River, which was fitted up in advance of the spawning season. The opening of the spawning season was delayed by heavy rains in April, but, aside from the shortening of the season by its late beginning, natural conditions were quite favorable and the season proved to be very successful, 13,325,000 eggs being taken and 10,071,000 fry hatched therefrom.

The shad work was extended during the year by the establishment and operation of two auxiliaries of the Orangeburg station on the Edisto River, S. C., and by the opening of an experimental field station on the Cape Fear River in North Carolina.

The spawning season on the Edisto was very short, and just at its height the work was stopped by the State warden, owing to some doubt on his part as to the legality of the fishing methods inaugurated in connection therewith. Before this difficulty could be cleared up and fishing resumed most of the run of shad had passed up the river. But for this interference considerable collections of eggs would, doubtless, have been made, as fish in spawning condition were fairly plentiful. The outcome was that 605,000 eggs were collected for the plant at Jacksonboro and 347,000 for the Branchville auxiliary. The output of fry from these two points amounted to 772,000, which were returned to the Edisto River in the immediate vicinity of the stations.

The shad work on the Cape Fear River was undertaken largely at the request of the State authorities and Members of Congress, in order that the fishermen of that section of the State might receive some recognition for having been brought—very tardily, it must be said—under the provisions of the protective fishery laws that for years had applied to other parts of the State. The steamer *Fish Hawk*, equipped as a floating hatchery, was sent to the river, and a temporary hatching plant was set up at a convenient point on the river bank above Wilmington.

The run of shad on the Cape Fear proved to be small, and of the shad taken at the various fisheries only one individual with ripe eggs was found by the spawn takers detailed for the work. The material results of this experiment were, therefore, wholly negative, but the experience gained will doubtless be helpful in connection with any future operations which may be considered for that field.

Atlantic salmon operations on the usual scale were conducted at the Craig Brook, Me., station. In June of the previous year a brood stock of 725 fish had been purchased and transferred to the station inclosure until spawning time in October, when 1,953,400 eggs were yielded. Early in the winter consignments of eggs to the number of 1,770,400 were transferred to the subhatchery near the headwaters of the Penobscot River for development, and all of the fry hatched—1,709,815—were liberated in the east branch of that river during May and June, 1916. The fish from which the eggs were derived were liberated immediately after spawning at the head of tidewater in Orland River.

In the spring of 1916 the run of Atlantic salmon in the Penobscot was reported to be the largest since 1912, and no difficulty was experienced in securing 1,031 adults to serve as a brood stock for the coming season, the number exceeding by several hundred the brood stock of the two previous seasons. The sentiment of the local fishermen has undergone an entire change, and they are now anxious to cooperate with the Bureau, whereas in past years many of them have been in doubt as to the value of its work with this species.

FISH CULTURE IN THE GREAT LAKES.

While the weather conditions prevailing at the Great Lakes stations during the spawning season of the commercial fishes were not uniformly unfavorable, they seriously handicapped the work in some of the more important fields and caused a reduction of about one-fifth in the collections of lake-trout and whitefish eggs as compared with the previous year. The results of the pike-perch operations were more satisfactory, but the effects of an abnormally cold, late spring are clearly shown by the material shortages in eggs taken and fry planted.

Beginning October 1 arrangements were made for the usual collections of lake-trout eggs in Lake Superior waters, field stations for the purpose being opened at Isle Royale, Marquette, Munising, Ontonagon, Jacobsville, and Keystone, on the Michigan shore, and at Grand Marais, in Minnesota. From these various points 23,070,000 eggs of excellent quality were secured and also 2,668,000 whitefish eggs, all of which were forwarded to the Duluth hatchery for development.

Of the lake-trout eggs 3,509,724 were shipped in the eyed stage to State and private hatcheries, all of the consignments reaching their destinations in excellent condition. The remainder were hatched and 14,390,000 fry were distributed during March and April. A small number of lake-trout fry were held and fed to the fingerling stage. This stock when distributed in early June numbered 211,000.

The small collection of whitefish eggs was supplemented by the transfer of 25,000,000 green eggs to Duluth from the Lake Erie field in December, and from the total stock of that species handled 18,575,000 fine healthy fry were produced and planted in suitable parts of Lake Superior. In April 17,750,000 pike-perch eggs were transferred to Duluth from collecting points in Lake Huron. These eggs were of exceptionally poor quality and the losses sustained during incubation were far above normal. However, owing to their slow development in intensely cold water, the 3,800,000 fry hatched were of good quality. This stock was utilized in filling applications submitted from North Dakota, Michigan, and Minnesota, the distribution occurring in late May and early June.

In addition to operations with the commercial species, the Duluth station had an output of 376,000 brook trout and 44,500 steelheads, the eggs of the former having been purchased from commercial fish culturists, while those of the latter were transferred from one of the Pacific stations.

In the lake-trout fields covered by the Michigan stations the spawning season opened October 18, a few days in advance of former years, and closed 10 days earlier than usual, shortening the egg-collecting period about one-third as compared with 1914. Owing partly to this fact and partly to unfavorable weather the catch of fish was reduced to almost 50 per cent of a normal take. The prevailing high winds frequently prevented the lifting of the fishermen's nets for periods of five to seven days in succession. As a consequence many of the eggs were of very poor quality, and of the 43,544,000 taken at all points 17,461,800, or 41 per cent, were lost before the eye-spots developed. When sufficiently advanced for shipment, 9,674,200 were forwarded to other Great Lakes stations of the Bureau and to State hatcheries in Wisconsin and Michigan. The output of fry from the balance numbered 16,408,000, all of which were returned to the spawning grounds in Lakes Michigan and Huron, with the exception of 2,000,000. This lot was deposited in Whitefish Bay, an arm of Lake Superior.

The first whitefish eggs for stocking the Michigan stations were taken October 11 at the Charity Island fishery, in Saginaw Bay, and the last on December 20 at Northport, Lake Michigan. In addition to the two points mentioned field stations were maintained at Naubinway, St. James, Antrim City, and Traverse City, and an experimental collecting point was opened at Alden, on Torch Lake, to determine the feasibility of taking whitefish from inland waters in sufficient quantities to warrant the expense. From the knowledge thus gained it is believed the work in this direction can be advantageously extended through next year.

Collections were made as usual in the Detroit River at the Belle Isle fishery, and the old Grassy Island fishery was operated again for the first time since the dredging of the river channel. The results of the work at the latter point demonstrated conclusively that it has been permanently destroyed as a whitefish spawning ground.

As in the lake-trout work, extremely rough weather was encountered during the major portion of the whitefish spawning season, obstructing fishing operations to such an extent that the catch was hardly half that of an average year. Especially poor results were attained at the Charity Island fishery, where the field is so exposed that the nets were either blown out entirely or the high winds made it impossible to lift them for days at a time. In round numbers, the Detroit River fisheries yielded 25,000,000 eggs, the one at Charity Island 18,500,000, and those in upper Lake Michigan 72,500,000.

The supply was further augmented by the transfer of nearly 26,000,000 green eggs to Detroit from the Monroe Piers fishery, in Lake Erie, making a total stock of 141,880,000, of which 116,120,000 were developed to the eyed stage, the losses up to that time amounting to slightly over 18 per cent. When sufficiently advanced for shipment, 90,000,000 eggs were forwarded to the Charlevoix, Alpena, and Sault Ste. Marie subhatcheries, which are in the immediate vicinity of the spawning grounds in the upper lake; 6,120,000 were used to fill applications; and from the remainder 18,500,000 of fry were hatched and planted in the Detroit River.

Pike-perch operations during the spring in Michigan fields were prosecuted under such unfavorable conditions that up to the end of April, when large quantities of ice still covered the most prolific spawning grounds, it was feared that the season would be a total failure. The prospects improved, however, with the disappearance of the ice early in May, and the egg collections at the close of the season amounted to 166,800,000, the majority of which were taken in Saginaw Bay and in Munoscong Bay in the St. Marys River. Permission to operate in the latter field was granted by the Michigan fishery authorities as an experiment, and, as over 70,000,000 eggs were taken, it is hoped the work will be continued in that territory.

While in the green state 18,750,000 pike-perch eggs were transferred to the Duluth station and 12,600,000 to the substation at Sault Ste. Marie, the latter shipment being designed to test the practicability of hatching there the pike-perch fry required for applicants in the upper peninsula of Michigan. The water supply proved too cold, however, and all of the eggs perished. Of the 135,450,000 eggs laid down in the Detroit hatchery, only 44,235,000 survived to the eyed stage, about 32½ per cent of the original number. The fry hatched therefrom were utilized in filling various applications and in stocking public waters where egg collections had been made.

The whitefish spawning season in Lake Erie was attended by several peculiar features. Although the water temperatures of the lake were below the average during the greater part of the summer, no whitefish whatever appeared on the spawning grounds until after the middle of November, and egg collections for the Put in Bay station were possible only from November 18 to December 7, making it one of the shortest spawning seasons on record.

As a rule, when whitefish seek the head of Lake Erie at the approach of the spawning season they congregate upon the reefs and shoals for the deposition of their eggs. In this instance, however, all but a very few remained in the deeper waters. This departure from the usual habit is probably accounted for by the prevailing heavy west winds, which had a tendency to blow the water away from the west end of the lake, making it very shallow and rough on the usual spawning grounds. At Monroe Piers, which in recent years has been one of the best whitefish fields operated by the Bureau, fish were so scarce that only a very few partly ripe ones were available for penning. From penned fish and from collections made directly from the fishermen only 40,720,000 eggs were secured, as against a three-year average of 170,000,000 in the same field.

Taking the work as a whole, however, and making allowance for the short spawning season, the results were quite satisfactory, as, with the exception of Monroe Piers, eggs were fairly plentiful in all the fields operated, though their quality was not quite equal to last year's. Collections of eggs from all sources aggregated 351,260,000, of which 135,260,000 were shipped direct from the field in the green state to fill the applications of various State fish commissions and to supply deficiencies in the stock at other Great Lakes hatcheries of the Bureau, leaving 215,021,000 for development at the home station. From this stock 175,500,000 healthy, vigorous fry were produced, all of which were liberated in April on the various spawning grounds in Lake Erie.

The weather conditions on Lake Erie early in April were unfavorable for pike-perch work, as the ice was blown by the prevailing winds to the upper end of the lake and held there until it had practically all melted, preventing the manipulation of the fishermen's nets, retarding the run of fish, and delaying the spawning season some time beyond its usual opening. Eggs were not received in noteworthy quantities until April 17, and even after spawning began there seemed to be no regular run of fish at any point except in the vicinity of Port Clinton, Ohio. At all of the other fisheries the collections fell far short of an average season. The total take of eggs amounted to 445,775,000, about 66,000,000 less than in the previous year. Assignments of green and eyed eggs aggregating 180,000,000 were furnished to various Federal, State, and private hatcheries, and from the remaining stock 68,300,000 fry were produced and distributed practically without loss, the percentage of hatch being only 32½.

Lake-trout eggs for the Cape Vincent station were obtained from fishermen operating at Amherst, Wolfe, and Pigeon Islands, Canada, and from those working near the Galloo and Stony Islands and at Charity Shoals, N. Y. From these various sources over a million eggs were secured, but, owing to interference with the work by several severe storms, some of them were held in the field too long for successful development and only 717,000 good eggs reached the hatchery. These produced 363,186 fry, which were planted on the spawning grounds in Lake Ontario, together with 5,190,000, resulting from a shipment of eggs transferred to Cape Vincent from another lake.

Whitefish eggs for the Cape Vincent hatchery were secured from commercial dealers operating at the various fisheries on Lake Ontario, and collections in cooperation with the State fisheries authorities were undertaken at Old Forge and Lake Saranac, N. Y. From these various sources 10,862,000 were obtained, of which 3,800,000 were of the small Stanley whitefish, derived from Lake Saranac. This stock being insufficient to fill the requirements of the region, eggs to the number of 15,000,000 were forwarded in the green state from the Lake Erie fields. The output of fry from both lots, amounting to 12,900,000, indicates a very low percentage of hatch, due in large measure to the inferior quality of the western eggs. In conjunction with the whitefish collections, 106,875,000 lake herring, or cisco, eggs were purchased from the commercial fishermen of Lake Ontario and hatched, yielding a total of 76,000,000 fry for distribution on the local spawning grounds.

During the spring months the collection of pike-perch eggs for stocking the Cape Vincent station was undertaken in cooperation with State officials at Ogdensburg, N. Y. From this source 70,250,000 eggs were obtained as the Bureau's share, and, after being sufficiently hardened in a small temporary battery at Ogdensburg, they were forwarded to the Cape Vincent station for development. The stock was further supplemented by 55,000,000 green eggs from the Swanton field, and from the two lots about 50,000,000 were hatched and distributed in the public waters of the region.

As in the Great Lakes, the pike-perch spawning grounds in Lake Champlain were covered with ice at the time the spawning of that species occurs during a normal season. However, large numbers of fully matured fish later ascended the Missisquoi River, and from the nets of the commercial fishermen there were secured eggs sufficient to stock the Swanton hatchery.

The arrangements that have been in force on Lake Champlain for the past three years were again put into effect, three crews being operated, and all ripe female fish available were purchased of the fishermen and taken direct to the spawning station and stripped. Egg collections extended from April 17 to the end of the month, the number secured amounting to 374,075,000, of which 84,125,000 green and eyed eggs were utilized in filling applications and in stocking various Federal hatcheries.

The water supply for the Swanton station is furnished by the village water company and is of excellent quality, but the quantity available for the work is at times uncertain. It having become apparent early in the season that the supply would be insufficient for the conduct of the hatching operations in the usual manner, steps were taken to install an electrically driven pump, and by this means the outflow from the fry tanks was run back to the upper supply trough and used over and over, a small quantity of fresh water being constantly added and a like amount of used water discarded. As far as could be observed, no ill effects to fry or eggs resulted from this arrangement.

The incubation period was retarded by the cold, inclement weather prevailing through May, but, hatching having once begun, all the fry came out about the same time, necessitating very rapid and constant work in making shipments to applicants and to public waters.

For the purpose of effecting a wider distribution of pike perch in the southern sections of Lake Champlain than is possible when shipped from Swanton a cooperative arrangement was entered into with the Vermont fishery authorities whereby the Bureau agreed to construct and operate a portable hatchery at Burlington, Vt., the State to bear the expense of the undertaking. The plant, consisting of a 100-jar battery, a supply tank, and 2 collecting tanks, was gotten in shape and transferred in sections by the station launch from Swanton to Burlington, where it was set up on the dock of the Champlain Transportation Co. and covered with a canvas shelter. By means of pumps, driven by an electric motor, the water supply for the hatchery was conveyed from the lake to the supply tank installed on one of the dock buildings and from there conducted by gravity to the upper trough of the battery. About 30,000,000 eyed eggs, transferred from Swanton station, were successfully hatched in this outfit, and, as the water supply was of lower temperature than at Swanton, the hatching period was retarded sufficiently to make it possible to distribute the product after the fry at Swanton had been disposed of. The Bureau is indebted to the Champlain Transportation Co. and to various owners of private motor boats, who rendered valuable assistance in effecting a wide distribution of the fry in the open waters of the lake.

OPERATIONS OF THE INLAND HATCHERIES.

It is possible to record another successful year's work at the numerous interior stations where trouts and basses are cultivated. These fishes bring the Bureau's activities in practical touch with very large numbers of farmers, anglers, and other individuals usually interested in the stocking of minor lakes, ponds, and streams. The recognition of the value of fish culture on the farm and of the possibility of maintaining a fish pond on practically every farm in the country is becoming more widespread as the Bureau's efforts to this end are more generally made known. Many daily newspapers and several monthly home journals with very large circulation have ably seconded the Bureau's propaganda, and as a result of all the publicity there has been a demand for thousands of copies of "Fish ponds on farms," a document prepared for the special purpose of giving practical instructions for making and maintaining private fish ponds. Already many hundreds of people in all parts of the country have acted on the information thus acquired, have obtained supplies of suitable fishes from the Bureau, and have added pond culture to their agricultural pursuits.

The aggregate output of pond fishes in 1916 was not equal to that in 1915, but with the increased production of certain species at certain stations and the larger average sizes of the fishes distributed the general results have been far more satisfactory than in any preceding year.

The only material falling off in the operations of the trout stations occurred in Yellowstone Park, where the important work addressed to the blackspotted trout was curtailed by peculiar physical conditions that affected spawning. In the summer of 1915 the water stages in Yellowstone Lake and tributary streams were from 2 to 3 feet below normal, and while thousands of spawning fish made their appearance in the lake only a small proportion entered the streams in which traps for their capture had been installed. As a result the egg collections were less than half those of the preceding year. In the spring of 1916, at the time when the spawning of the blackspotted trout usually begins, floods and washouts were prevalent in the waters of the park, owing to the melting of the heavy masses of snow in the mountains, and, while the prospects indicated a successful collecting season later on, no eggs whatever had been taken up to the close of the fiscal year.

The Madison Valley, in Montana, where Federal fish-cultural operations were inaugurated several years ago, is proving a prolific field, now that the Bureau has the hearty cooperation of the Montana authorities in the enforcement of the State law prohibiting public fishing during the close season. Heretofore the Bureau has been compelled to submit to a large amount of illegal fishing in connection with its rainbow-trout operations in this field, the nuisance assuming such proportions in the spring of 1915 as to practically nullify its efforts with that species. Steps were, therefore, taken in advance of the recent spawning season to secure the aid of the State wardens, and under the efficient protection thus afforded wild rainbow-trout eggs in excess of 1,700,000 were taken. A notable collection of grayling eggs also was made in streams in Madison Valley, the season's aggregate amounting to nearly 6,500,000.

Brook-trout field operations in connection with the Leadville station were prosecuted as usual and resulted in a normal take of eggs. The newly exploited field near Creede, Colo., promises to yield large returns in brook-trout eggs at small cost, but the prospects for future rainbow-trout development are not encouraging, as the spawning season of that species in the Rocky Mountain States is usually coincident with very unfavorable climatic conditions. Efforts were made during the past spring by the superintendent of the new station at Saratoga, Wyo., to establish rainbow-trout collecting stations, but without any marked degree of success. There is a growing demand for the rainbow trout in the Rocky Mountain region, and the Bureau's hatcheries are doing their utmost to meet it.

A large percentage of the trout produced at the Leadville, Spearfish, and Bozeman hatcheries has in late years been distributed in waters of the national forests. A program for the systematic stocking of such streams and lakes has been agreed on with the Department of the Interior, and the Bureau is following it out to the full extent of its facilities.

The trout hatcheries of the Mississippi Valley and the North Atlantic States supplied the usual numbers for distribution, and, owing to improved water supplies, the heavy losses sustained by some stations in 1915 were not repeated. Considerable improvement was shown in the condition of the stock of certain stations, and at St. Johnsbury the epidemic of former years assumed a very mild form. Owing to this fact, the output of brook trout at that station was larger by one-fourth than in the preceding year. The Craig Brook, Me., hatchery made notable progress in trout culture, its distributions comprising 936,410 fingerlings, against 173,408 fry in 1915. More important than the increased numbers was the success attained in rearing large fingerling fish, which have been greatly needed for stocking the waters of Maine and adjacent States.

The operations with landlocked salmon at the Green Lake hatchery and its auxiliary at Grand Lake Stream resulted in a gain of 38 per cent over the egg collections of the previous year. The perpetuation of the landlocked salmon is a very important feature of the Bureau's work. This species has been widely sought by the sportsmen of far distant States, but, owing to the limited supply, it has been deemed best to confine the distribution to those waters of New England where the natural conditions approach most closely to those of its natural habitat. It is hoped to extend the field for egg collections, and with that end in view several thousand fry are being reared at the Craig Brook station for the purpose of stocking a lake in the vicinity, where the natural conditions seem to be entirely favorable.

The Mammoth Spring, Ark., output was curtailed by reason of a flood sweeping through the pond system in August, 1915, and carrying out many fingerling fish that were being held for fall distribution and also a large part of the brood stock. Later additions to the breeding fish proved inferior to those lost, and several seasons will probably be required to bring the station back to its former efficiency.

The Tupelo, Miss., station produced practically the same numbers of pond fishes as in 1915. This hatchery has made marked progress during the past few years and now ranks third in the production of bass. The outlook appears to justify the recommendation that the pond system be completed in accordance with the original plans.

The Cold Spring, Ga., hatchery doubled its black-bass output of the preceding year. The gain is attributed to new brood stock and to the location of a new and valuable collecting field at Milltown, Ga. With nominal expenditures for fixed equipment at Milltown, the superintendent predicts that the output another year can be increased by 400 per cent.

The Orangeburg, S. C., station has proved wonderfully successful in black-bass propagation, distributing during the spring months 135,000 fingerlings, and at the end of the fiscal year many thousands remained in the ponds for fall assignment. This is the first season's fish-cultural operations at the Orangeburg station, and the results portend conspicuous efficiency for the future.

Pond-cultural operations at the combination trout and bass stations were practically a duplication of former years. At St. Johnsbury, Vt., the superintendent has taken up the collection of smallmouth black-bass fry from Crystal and Tarleton Lakes, transplanting them in the station ponds to be held until they are of fingerling size. The collections are from lakes that the State officials desire to reserve for trout and salmon, and liberal plants of the latter are made in return for the bass fry collected. While the output is relatively small as compared with that of the exclusively pond stations, the availability of bass for special distribution in New England is of such importance that the output is of great value and comes near to satisfying the demand for that species in that region.

Besides the commercial fishes before mentioned, the Northville, Mich., station hatched and distributed 771,000 brook-trout fry, 190,000 rainbow-trout fry and fingerlings, and a few thousand grayling fry. The eggs of the first named were purchased and the others were transferred from stations of the Bureau. It also produced in the station ponds during the year 326,125 fry and fingerling smallmouth black bass.

One of the most successful features of pond culture has been the noteworthy production of the smallmouth black bass at Northville. At this station 600,000 fry were hatched; of these 288,000 were immediately shipped and the remainder held for rearing. At the close of the year 38,125 had been distributed, and it is estimated that 3 carloads remained in the ponds for later shipment. With this stock the Bureau will be able to quite thoroughly supply all old applications for this species in Michigan, Wisconsin, Minnesota, and Ohio. Such favorable conditions for smallmouth black-bass propagation as are apparent at Northville will be taken advantage of and the facilities improved in order that the output may be further enhanced. This species is very difficult to propagate under average conditions, and as the demands for it are annually increasing every opportunity will be taken advantage of to meet it.

MARINE FISH-CULTURAL WORK.

The output of all species propagated at the marine stations was materially larger than in the preceding year, with the exception of the lobster. The work at these stations was conducted along the usual lines and on the whole was successful, though it was hampered to some extent by unfavorable climatic and other uncontrollable conditions.

During the summer and fall of 1915 berried lobsters to the number of 17,808 were purchased and placed in the Boothbay Harbor pound, to be carried through the winter. When removed in April this stock was found not to have stood confinement well, the loss amounting to 4,898 individuals, or 29 per cent of the original number, while among the survivors barren and scantily egged ones were plentiful. Only 123,929,000 eggs were realized, an average of less than 10,000 per lobster, which is a very low average. The poor results may in part be attributed to an abnormally warm fall and winter. No ice formed on the pound until the middle of February, and as a consequence the lobsters failed to burrow in the mud and remain quiet, as they usually do, and losses of eggs were caused by their continual crawling over the bottom of the inclosure. The high temperature also forced the development of the eggs and caused the hatching of large numbers in the pound, this being evidenced by the appearance of many of the lobsters. A contributing cause of loss was the impossibility of securing suitable food at all times. A compensating feature of the year's work was that the quality of the fry produced and distributed was most excellent.

Additions to the supply of lobster eggs for this station were made by the purchase of 6,510,000, resulting from 289 berried lobsters which had been collected by the Maine Department of Sea and Shore Fisheries during the winter and held in live cars; also by collections from freshly caught lobsters during the spring months. The latter numbered 476, and from them 13,164,000 eggs were obtained, an average of 28,000 per lobster.

In February a search was instituted for cod eggs, and a little later for haddock eggs also, regular trips being made to the fishing grounds by the station steamer and a force of spawn takers whenever the weather permitted. Very few fish of either species were taken, however, and there was an entire absence of haddock in spawning condition. As a result of the spring's work 11,203,000 cod eggs were taken, a very small return for the effort expended.

During March and April 5,450 brood flatfish, taken in fyke nets in the vicinity of the station, were placed in retaining tanks in the hatchery. Part of these fish were allowed to spawn naturally, while the others were overhauled daily and the mature eggs taken and fertilized. Altogether 618,308,000 eggs were obtained, from which 583,707,000 fry were hatched and distributed. This egg yield not only represents the largest number ever obtained at Boothbay Harbor station, but the losses during incubation were smaller than heretofore and the fry hatched were strong and of excellent quality.

The surplus pollock eggs accumulating at the Gloucester station from time to time during the winter were transferred by means of the steamer *Gannet* to the Boothbay Harbor station, four trips being made for the purpose. As on previous occasions, the eggs did not stand transportation well; and, though various methods were employed in making the shipments, all were equally unsuccessful, only 48,892,000 of the original 126,080,000 carried reaching the station in good order.

During the first two months of the fiscal year the employees of the Gloucester station made small collections of eggs of the mackerel and butterfish. The mackerel eggs proved very poor and only an insignificant number of fry were hatched, but the butterfish eggs yielded a large percentage of fry of good quality. Again in June, 1916, a few million mackerel eggs were collected, and these were in course of incubation at the end of the fiscal year.

Pollock work at the Gloucester station was taken up November 1, the crew of the *Grampus* and several temporary spawn takers being assigned to make egg collections from gill-net fishermen operating in the vicinity of Cape Ann. Up to the middle of December the supply of eggs was merely normal, but during the last half of the month and all during January the daily receipts were heavy, often exceeding 75,000,000, and on one occasion 129,000,000 were secured. These enormous daily collections several times filled the hatchery to overflowing and left a large surplus stock to be otherwise disposed of. The spawning season extended from November 1 to February 17, and the aggregate collections amounted to 1,713,730,000, of which 126,000,000 were sent to Boothbay Harbor station for incubation and 335,620,000, for want of hatching facilities, were planted in the open sea off Gloucester. The eggs incubated at the station produced 752,040,000 fry.

Commercial fishermen began operating for cod in fields adjacent to the Gloucester station in January, but no ripe eggs were secured until February 10. The bulk of the season's collections, which were materially larger than in the past two years, was obtained in March and the first week in April. In the second week of April, when ripe fish were still plentiful, the spawning season was brought to a sudden close by heavy spring freshets, which caused the surface water all along the shore, and from 15 to 20 miles out, to become quite fresh. The total number of eggs obtained was 145,630,000, from which there was a hatch of 94,550,000 fry.

From fyke nets operated near the outer harbor at Gloucester in late winter a sufficient number of gravid flatfish were obtained to yield 219,610,000 eggs, and from them 200,680,000 fry were hatched.

The haddock fishing season began several weeks later than usual, causing an unusually short egg-collecting period. Between April 12 and May 5, 36,720,000 eggs were secured from the gill-net fisheries off Cape Ann, which number produced 22,170,000 fry for distribution.

The scarcity of egg-bearing lobsters within the reach of the Gloucester station and the unfavorable conditions attending the collection of brood lobsters and their eggs have had the effect of practically suspending lobster hatching at this point. In the fall of 1915 an experimental lot of 21 egg-bearing lobsters was purchased and placed in a live car to be carried through the winter. When removed therefrom about the middle of May, only 16 specimens were alive. These yielded 210,000 eggs, which, with 320,000 additional eggs purchased during the spring, represented the entire supply of the hatchery.

In view of the small results attained at the Woods Hole station in recent years in collecting cod eggs from the fishermen operating in Cape Cod Bay, it was decided to discontinue the operations there and rely solely upon brood cod obtained from commercial fishermen. Arrangements were accordingly made to prosecute this work on an extended scale, and the spawning inclosure provided for the purpose was stocked during November with 3,100 brood fish, a larger number by 700 than had heretofore been held therein. The fish were of exceptionally fine quality and the mortality was negligible. Eggs were obtained from the inclosure between December 1 and February 16, the spawning season beginning about the usual time but closing fully a month earlier than in 1915. Of the total collection of eggs, amounting to 286,056,000, only 265, 877,000 could be handled with the available hatching facilities. The remainder were therefore transferred to the Gloucester station. The incubation of the eggs proceeded favorably except for occasional periods of roily water, at which times some losses were sustained, owing to the inability to keep the hatching boxes working properly. The final results were 192,275,000 fry, which were liberated in local waters.

The first brood flatfish of the season at Woods Hole were purchased from commercial fishermen on January 12, but, having been taken from deep water, their eggs were not sufficiently developed to mature satisfactorily in confinement. The fish were therefore released later in the season to provide room for more advanced stock. Brood flatfish were secured as heretofore from the grounds at Waquoit and Wickford and from the newly established field at Menemsha Pond, 12 miles distant from the Woods Hole station. Between January 18 and the end of March, 1,099,622,000 eggs were secured, and had there been facilities for handling them it is believed several billions of eggs might have been obtained from the fish in sight at Menemsha Pond. The fry hatched numbered 748,560,000, the percentage of loss in incubation being larger than last year, owing to the difficulty experienced at times with roily water.

RESCUE OF FISHES FROM OVERFLOWED LANDS.

The usual work of rescuing food fishes from the overflowed lands along the Mississippi and Illinois Rivers, by seining crews sent out from the regular stations and by special field parties, was conducted at Homer, Minn.; La Crosse, Wis.; North McGregor, Iowa; Bellevue, Iowa; Friar Point, Miss.; and Meredosia, Ill. Water stages on the upper river were so high during summer that no work could be accomplished until August 25. The total collections were larger than for many years, 11,682,064 valuable fishes being rescued. Of this number, 1,179,862 were delivered by cars and messengers to applicants or for planting in distant public and private waters; the remainder (10,502,202) were returned to the Mississippi River.

A most conspicuous public service was rendered in March and April by the rescue of some 5,000,000 large fingerling and adult fish, buffalo-fish and carp predominating. These were taken from an overflowed area 11,000 acres in extent, across the Illinois River from the Bureau's station at Meredosia, Ill. The preceding year fish dealers in that vicinity had impounded several thousand adult fish in a large lake back of the levees protecting the district. Subsequent rains inundated the entire area, scattering the breeding fish far and wide during the spawning season; and as the water receded their offspring, being unable to escape to the river, became congested in unbelievable numbers in drainage ditches and depressions of the land. Their total loss would have been inevitable had it not been for the prompt action of the Bureau in conducting rescue operations so long as funds were available. The majority of the stranded fish were thus saved, and their return to the Illinois River must serve to add materially to the resources of that stream in years to come. It is the desire of the Bureau to secure adequate funds for increasing this work throughout the Mississippi Valley, as the present operations are wholly incommensurate with the field to be covered. Buffalo-fishes, carp, and catfishes, the mainstay of the commercial fisheries there, are noticeably decreasing, although sufficient young of these species are each year perishing on the overflowed lands to maintain the present fisheries and increase the future supply if proper measures for their salvage are taken.

ACCLIMATIZATION.

The transfer of humpback-salmon eggs from the Pacific coast to the Maine hatcheries was repeated in the fall of 1915, and in the spring of 1916 the third plant of the species was made in the waters of that State, which were at one time replete with the Atlantic salmon. The young available for distribution, numbering 6,225,808 and ranging from $2\frac{1}{2}$ to 6 inches in length, were deposited in previously selected streams under very favorable conditions.

The success of this interesting experiment in acclimatization seems assured. There was a remarkable return of mature fish in the summer and fall of 1915, the outcome of plants made in the spring of 1914. Many fish weighing over 5 pounds were taken or seen in the Penobscot River, and 20 were captured alive by agents of the Bureau near Bangor and held in an effort to obtain ripe eggs. From two of these fish 3,000 eggs were taken on September 6 and, after fertilization, sent to Craig Brook, where incubation was completed with normal results. Accounts of the appearance of this new fish in various minor rivers have come in, and in the Dennys River there was a noteworthy run which began as early as August 15 and continued as late as September 24. The local fishermen caught and ate large numbers, and during the week of September 20 an employee of the Green Lake hatchery took 15 fish (8 males and 7 females) which had passed through the fishways in dams in Dennys River and were dropping downstream in a spent condition. At the same time both live and dead fish were observed below the dams.

Another carload lot of Atlantic lobsters from Maine was sent to the Pacific coast on November 15, 1915. The shipment, consisting of 5,423 adults about equally apportioned as to sex, reached its destination on November 20 in much better condition than any previous lot. At the railroad terminus (Anacortes, Wash.) the lobsters were placed in four floating live cars that had been prepared for them, and there allowed to feed and to recuperate overnight. The following morning they were towed in the crates to the San Juan Islands, in Puget Sound, and liberated in Bellingham Channel, off Guemes Island. The number of strong, healthy lobsters planted was 3,325, or over 61 per cent of the original consignment.

During the fall of 1915 a shipment of large crabs from Puget Sound to the New England coast was made. Owing partly to a wreck and partly to difficulties in handling, only a small number survived the journey. These were liberated in good condition off the coast of Maine.

Limited consignments of fish, lobsters, and fish eggs to foreign countries and insular possessions were made during the year. Fifty thousand rainbow-trout eggs were sent to Portugal, 200 adult lobsters to Japan, and 600 black bass, 1,500 sunfish, and 1,500 catfish to Porto Rico.

COOPERATION WITH THE STATES.

The Bureau has been glad to continue its usual cooperative relations with State fishery authorities, and has furnished on request large numbers of eggs of various species for development in State fish hatcheries and also considerable numbers of young fish for planting under State supervision. A list of the States to which such assistance was rendered, and the allotment of fish or eggs in each case, are shown by the following table:

ALLOTMENTS OF FISH AND EGGS TO STATE FISH COMMISSIONS, FISCAL YEAR 1916.

State and species.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
Alabama: Black bass			1,000
California: Chinook salmon	19,622,340		
Colorado:			
Blackspotted trout	160,000		
Brook trout			1,500
Delaware:			
Black bass			375
Shad		400,000	
Illinois:			
Black bass			5,040
Brook trout	25,000		300
Carp			249,000
Catfish			62,900
Crappie			35,390
Pickerel			560
Pike perch	20,000,000		
Rainbow trout	50,000		9,750
Sunfish			6,240
Yellow perch			1,600
Indiana: Pike perch	15,000,000		
Iowa: Pike perch	25,000,000		
Kentucky:			
Pike perch		9,600,000	
Rainbow trout			16,000
Smallmouth black bass		7,500	
Maine:			
Brook trout	100,000		
Lake trout	50,000		
Landlocked salmon	300,000		
Maryland: Brook trout	50,000		
Massachusetts:			
Pike perch	25,000,000		
Shad	1,097,000		
Yellow perch	15,000,000		
Michigan:			
Lake trout	3,000,000		
Landlocked salmon	25,000		
Pike perch	26,235,000		
Smelt	10,000,000		
Minnesota:			
Lake trout	200,000		
Landlocked salmon	25,000		
Steelhead trout	250,000		
Montana:			
Blackspotted trout	200,000		
Brook trout	50,000		
Catfish			940
Grayling	2,300,000		
Pickerel			565
Rainbow trout	320,000		
Sunfish			625
Yellow perch			475
Nebraska: Pike perch	1,500,000		
New Hampshire:			
Brook trout	50,000		
Lake trout	100,000		
Landlocked salmon	25,000		
Rainbow trout	100,000		
Steelhead trout	93,000		

ALLOTMENTS OF FISH AND EGGS TO STATE FISH COMMISSIONS, FISCAL YEAR 1916—Continued.

State and species.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
New Jersey:			
Landlocked salmon	10,000		
Rainbow trout	50,000		
Smallmouth black bass			159
Steelhead trout	93,000		
Yellow perch	10,000,000		
New York: Landlocked salmon	25,000		
North Dakota:			
Pike perch	6,000,000		
Steelhead trout	93,000		
Ohio:			
Pike perch	68,425,000		
Whitefish	68,640,000		
Oregon:			
Blackspotted trout	200,000		
Blueback salmon	3,000,000		
Chinook salmon	1,000,000		
Silver salmon	196,000		
Steelhead trout		500,000	
Pennsylvania:			
Lake trout	100,000		
Pike perch	3,000,000		
South Dakota:			
Brook trout			50,000
Loch Leven trout			30,000
Pike perch	25,000,000		
Utah:			
Brook trout	100,000		6,000
Lake trout	50,000		
Vermont:			
Catfish			150
Lake trout	201,054		
Landlocked salmon	50,000		
Smelt	15,000,000		
Steelhead trout	150,000		
Washington:			
Brook trout	50,000		
Blackspotted trout	432,000		
Rainbow trout	100,000		
Wisconsin:			
Lake trout	3,500,000		
Whitefish	5,000,000		
Wyoming:			
Blackspotted trout	200,000		
Brook trout	50,000		
Grayling	400,000		
Lake trout	25,000		
Rainbow trout	100,000		
Steelhead trout	200,000		
Total	377,367,394	10,507,500	478,569

FISHES PLANTED IN CONNECTION WITH FISH-CULTURAL EXPERIMENTAL WORK.

The fisheries biological station at Fairport, Iowa, engages not only in mussel propagation, but in experiments relating to the propagation and rearing of useful fishes. The experiments are conducted not for the purpose of distribution, but for the acquisition of knowledge of practical value in fish culture. Nevertheless, large numbers of fish are produced, and the surplus is liberated in the public waters, usually in the vicinity of Fairport, and in connection with operations of mussel propagation. The following table shows the number of each species distributed and the stage in which planted. These figures are not included in the report of regular distributions elsewhere referred to.

FISHES DISTRIBUTED AND STAGE IN WHICH PLANTED.

Species.	Fry.	Finger-ling.	Adult.	Total.
Largemouth black bass		5,332		5,332
Smallmouth black bass	4,500	719		5,219
Sunfish		54,723	419	55,142
Crappie		5,335	4	5,339
Buffalofish	9,911,250	24,350		9,935,600
Catfish		2,657	144	2,801
Missouri sucker	83,000			83,000
Total	9,998,750	93,116	567	10,092,433

ARTIFICIAL PROPAGATION OF FRESH-WATER MUSSELS.

The propagation of fresh-water mussels is pursued in connection with the operations of the fisheries biological station at Fairport, Iowa, chiefly through field parties at various places in the Mississippi Basin. The object of this work is the increase of the mussels whose shells are utilized in the extensive pearl-button industry.

During the year the inoculation of fishes with the larval mussels, which is the only known method of propagation, was actively continued, and increased efficiency is to be noted. Owing to exceptionally high and prolonged flood stages of the central rivers, it was impossible at times to accomplish the best results, and the number of larval mussels planted was, therefore, slightly less than in the preceding year, being 331,451,490, compared with over 344,000,000 in 1915. These belonged to seven species of commercial mussels, as shown in the following table. The actual cost of production was 1.55 cents per thousand, but if allowance is made for overhead charges the cost per thousand was 2.35 cents, against 2.7 cents in 1915. In connection with this work, 34,772 adult and 265,462 fingerling fish were rescued from landlocked ponds in the overflowed lands and returned to public waters. The total number of fish handled was 424,550.

MUSSEL PROPAGATION, FISCAL YEAR 1916: POINTS OF DEPOSIT AND SPECIES OF GLOCHIDIA USED FOR INFECTION.

Species	Mississippi River.		Wabash River: Vincennes, Ind.	Black River: Black Rock, Ark., and south.	White River: Newport, Ark., and vicinity.	Total.
	Fairport, Iowa.	Lake Pepin, Minn.				
Black sand-shell (*Lampsilis recta*)	11,288,300					11,288,300
Butterfly (*Plagiola securis*)	415,800				411,800	827,600
Lake Pepin mucket (*Lampsilis luteola*)	20,990	151,175,000				151,195,990
Mucket (*Lampsilis ligamentina*)	73,043,500		3,553,500	26,711,100	63,928,300	167,236,400
Blue-point (*Quadrula plicata*)	147,000					147,000
Pocketbook (*Lampsilis ventricosa*)	447,000					447,000
Yellow sand-shell (*Lampsilis anodontoides*)	309,200					309,200
Total	85,671,790	151,175,000	3,553,500	26,711,100	64,340,100	331,451,490

MARINE AND FRESH-WATER INVESTIGATIONS, SURVEYS, AND EXPERIMENTS.

STUDIES OF MARINE FISHES.

Notwithstanding the long existence of great marine fisheries and the common assumption of their inexhaustibility, the development of modern fisheries has been such as to call for the artificial propagation of certain species and to create a demand for knowledge of the life histories, the habits, and the migrations of the important fishes. This knowledge is desired in order that we may determine with what impunity the fishing methods may be continually increased in extent and thoroughness, or what measures of protection may be appropriate, and so that we may properly appraise the value and the possibilities of cultural operations as applied to marine species. The problem must be approached through a complex but systematic plan of study, and final results are not obtainable in a short time. Nevertheless, the continued collecting of fishes at various places and in the different seasons, the persistent application of the methods of modern science to the details of structure that may be characteristic of different localities or ages or seasons or that may be indicative of migrations or other phenomena of life, and the careful consideration of the conditions and results of commercial fisheries will bring us finally to the attainment of a degree of precise knowledge that a few years ago we could not have anticipated.

The investigation of the sea herring, which, as the basis of the herring and sardine industries, is one of the most important fishes of the North Atlantic coast, has been continued in connection with the oceanographic work of the schooner *Grampus*. The analysis of the data gathered has been pushed as rapidly as possible and it is expected that the results will be ready for publication within a short time.

The most important commercial fish of the South Atlantic and Gulf seaboard is the mullet. Careful studies pursued through temporary services in connection with the Beaufort laboratory have laid a definite and necessary basis for more comprehensive inquiries when it may be possible to carry them out. It is expected that a detailed report of the result of the studies can be published after the conclusion of one more season's work.

An investigation of the habits and possible races of flounders has also been undertaken on the coast of New England, but as the study is only in its incipiency and the investigator has not yet been able to devote to it his entire time it is not now possible to report a definite degree of progress.

For several years the Bureau has directed attention to the condition of the tuna fishery on the coast of southern California, which, with the canning industry based upon it, has shown such marked development in the last few years. The fishery and canning industries are subject to unfortunate vicissitudes because of the irregular appearance of the tuna in the waters accessible by the present methods of fishery. Nothing of a definite nature has been known as to the habits of the tuna, the causes that govern their appearance and disappearance, the parts of the ocean generally frequented by them, or the localities resorted to for purposes of breeding. For nearly two years the Bureau has attempted to gain such information as was obtainable through investigations conducted from shore or by the use of small boats. It was realized that the proper method of attack was through investigations extending over a large area of the ocean and conducted through the instrumentality of a seagoing vessel. This was fortunately made possible in February, 1916, when Congress through an urgent deficiency bill provided an appropriation which enabled the Bureau to detail the steamer *Albatross* for special service in the tuna investigation. The first cruise was promptly begun, and on May 10 the vessel arrived at San Diego after spending three weeks in cruising along the coast of Lower California and several hundred miles farther south and west, as far as Los Coronados Islands. Other cruises followed this one, and the investigation was in progress as the fiscal year closed. From the middle of April to the middle of May there were no tuna along the Lower California peninsula from San Diego to Socorro Island and westward to Guadalupe Island. Two of the best practical tuna fishermen of San Diego accompanied the vessel on this cruise. In the latter part of May tuna were encountered off Lower California near San Geronimo Island, and near the San Benito Islands; none were found on a cruise extending west of San Diego 150 miles. During the month of June tuna were present off San Diego and San Pedro, although they were not taken in commercial quantities, this being attributed to the coldness of the surface water. The investigation has been somewhat hampered by the continued prevalence of rough weather, but will be continued and prosecuted as actively as possible during the next fiscal year.

The importance of a knowledge of the larval development of fishes was cited in the last annual report. Such studies have been continued both at the Woods Hole laboratory and in connection with the investigations in Chesapeake Bay. At the Woods Hole laboratory substantial information was gained regarding 12 species, 6 of which are of direct commercial importance, namely, the tautog, cunner, scup, sea robin, whiting, butterfish, anchovy, menhaden, glut herring, silverside, three-spined stickleback, and four-spined stickleback. For years the Bureau has endeavored to gain information regarding the breeding habits of the menhaden. With the knowledge gathered during the present fiscal year, the Bureau is now in better position to follow up the life history of the menhaden.

Near the close of the fiscal year and in connection with the Chesapeake Bay investigations, additional data were obtained regarding the eggs and larvæ of the anchovy, hog choker, goosefish, and gray trout (squeteague). Experiments with hatching of butterfish were attended with success.

SHELLFISH INVESTIGATIONS.

The oyster, as the most important food resource of our waters, has continued to command such attention as it was possible for the Bureau to bestow. Owing to the fact that oyster culture, where it is now practiced, has reached a relatively advanced stage of development and, where not practiced, is hindered by peculiar economic conditions, the problems of the industry are comparatively complex and difficult of solution. Until the close of the fiscal year 1916 the Bureau had not been in position to give the continued and effective attention to the oyster that it deserved. Recent action by Congress has to a large extent remedied this deficiency and more effective service to the oyster fishery may be expected in the future. This has been brought about by the establishment of several new positions carrying salaries that will attract and retain competent assistants.

Meantime the Bureau has sought to attack such problems of oyster culture as were adapted to its means and facilities. Encouraging progress has been made in studies of the propagation of oysters, the nutrition of oysters, and the occurrence of phenomena of "greening" and "green gill." In the study of "green gill" the results have been of unusual interest and value. While no method of controlling the "green gill" has been determined, it seems well established that the green color is due to the presence of a particular diatom, one of the minute floating plants that form a large element of the food supply of oysters. This particular species of diatom is known as *Navicula ostrearia*, and is identical with the form which is abundant in the region of Marennes, France, and which gives to the oysters of that region the peculiar color and flavor which are so highly esteemed. It is not yet ascertained what are the causes of the peculiar abundance of this form in certain years and in certain localities, but when it is known to the public that the occurrence of "green gill" merely means that the oysters have attained a condition that is so highly esteemed in the markets of Europe much should be done to dispel the present prejudice which occasionally causes great financial loss to our planters. Instead of being dreaded or a cause of pecuniary loss, the "green gill" may be welcomed as giving the opportunity to supply a superior article at perhaps a premium in price. These statements do not apply to the oysters which are marked by greening of the entire body owing to the presence of certain mineral salts in the water. This is a distinct condition not easily confused with the well-known "green gill."

The problems of oyster culture on the Pacific coast, where an industry of great possibilities is contending against peculiar natural difficulties, have received recognition, although not as yet in a manner commensurate with the actual needs. Some support has been given to investigations being pursued in Puget Sound, and the progress attained has been such as to justify the Bureau at the close of the fiscal year in arranging to extend a substantially increased measure of financial aid.

The remarkable growth of the blue-crab fishery during recent years has made protective action seem imperative, and the Bureau has been repeatedly importuned for counsel as to the propriety and effectiveness of specific measures proposed and for information regarding the habits and life history of the crab. Since the blue crab is migratory, passing at different stages of its life cycle from the waters of one State into those of another and going from the bays to the ocean and back, the Federal Government is the only agency which can properly and effectively complete the necessary investigations. The result of careful attention to the matter has been to perfect before the close of the year an arrangement under which competent services are secured for attacking the study in a thorough manner.

PROGRESS OF DIAMOND-BACK TERRAPIN CULTURE.

The success which has previously been attained in the experiments in terrapin culture has been continued in the past year in even more marked degree. It is timely to summarize some of the more important results at the Beaufort laboratory.

(1) Perhaps the most interesting development of the year is the fact that the three oldest broods of terrapin that were hatched in the experimental pounds and grown in captivity have produced eggs. The two oldest broods, one of which had been winter-fed during the first season while the other had been permitted to hibernate, began laying in 1915 and the eggs hatched successfully. The terrapin of the hatch of 1911 laid eggs in 1916, before the close of the fiscal year. These significant inferences may be made: (*a*) That terrapin born and reared in confinement develop in a normal way and will reproduce their kind; (*b*) that the reproductive cycle may be completed in six years, even though the terrapin hibernate as in nature; (*c*) that by preventing hibernation and forcing growth through the first winter by feeding in a heated house the maturity as well as the growth of the terrapin may be advanced by one year, so that a new generation is started in five years rather than in six.

(2) The adult breeding stock of terrapin has from year to year steadily increased in productivity, and there is ground for belief that the adult breeders have not yet reached the maximum capacity for reproduction. The following figures show the number of young produced by adult breeders during each of the past four years and also the average number per female yielded by the original stock of breeders:

Year.	Number of young from all adult breeders.	Average number per female of original breeding stock.
1912	1,326	12.81
1913	1,506	14.52
1914	1,690	15.23
1915	2,128	21.43

Those terrapin which have been longest in captivity produced in 1915 an average of 21.43 young for each female.

(3) The value of winter feeding during the first season is well established by the increased rate of growth, the shortening of the time required to attain reproductive maturity, and the very low rate of mortality. The death rate has never been so low as during the winter of 1915–16. Among 700 terrapin fed on fresh food the loss was about 6½ per cent, while among those fed on salted food the loss was about 8⅓ per cent. The death rate in hibernating stock was 13 per cent. The cost of food for winter feeding at Beaufort varies from 3 to 15 cents per 1,000 young terrapin per day, according as salt fish, fresh fish, or oysters are used. Assuming 10 cents as an average daily expenditure per 1,000 terrapin, the cost of food for 1 terrapin for a period of 5 months in the first winter would be 1½ cents.

(4) The death rate among terrapin after the first season is so small as to be nearly negligible. It is found to be about 1 per cent in the second year, diminishing with age to one-half per cent and less. The principal mortality occurs in the first season, and is then found to be chiefly among the "runts," which should probably be culled out in ordinary practice. While the death rate has been as high as 20 to 25 per cent during the first season, it has now been reduced, partly through improved methods of sanitation, to less than 10 per cent. The losses are remarkably low when it is considered that deaths occur principally when terrapin are very young and before they have become a source of expense, and that the productivity of the terrapin is such that even a loss of 30 per cent at this stage could readily be compensated for by increasing the numbers hatched and saved for rearing. So far as regards disease and death rate the rearing of terrapin is a matter of much less difficulty than the raising of poultry.

(5) The history of our experiments during many years gives strong grounds for belief that domestication of terrapin is accompanied by increasing productivity and diminishing disease and mortality. Our experience indicates the advisability of retaining a select brood stock for a rather indefinite period, instead of adopting new breeders from year to year, as might be done in stock raising. Some of the breeders have been in captivity for about 14 years.

It may be noted that the experiments in terrapin culture have not the nature of small laboratory tests but are carried out upon such a scale as to be comparable to commercial operations. It is possible also to check our results against those obtainable in a large local commercial venture which has adopted methods based upon those followed in the Bureau's work. From this it appears that the various results gained in the Bureau's experimental work are not to be taken as exceptional, but that they are, in a general way, typical of what may be expected in cultural operations conducted according to sound principles and with the exercise of proper care.

There are now about 3,000 terrapins under observation and classified in more than 25 experiments which are being directed to obtain definite answers to practical questions that yet demand attention and justify the continuance of the investigations. Among these are: What is the proper proportion to maintain between males and females, and what are the best conditions for prolificness in eggs and for successful hatching? What are the possibilities of improving rate of growth by selection, and what are the opportunities for promoting economy through proper culling or other methods? These are only some of the practical questions which warrant further investigations.

SURVEYS OF FISHING GROUNDS.

Some further work has been done in extending the known limits of the blackfish grounds off the coast of North Carolina. The Bureau maintains a buoy on the principal grounds, which is of service to fishermen both in locating this particular ground and as a bearing from which to find other grounds. The fishery is not developed in proportion to the evident possibilities, owing partly to the lack of suitable boats and partly to the unwillingness of local fishermen to engage in operations at any distance from the shore. One or two crews have, however, taken advantage of the opportunities and the fishery was regularly followed through the winter and spring of 1915-16 with results that were very satisfactory to the fishermen and the vessel owners.

The survey of halibut grounds lying off the coasts of Oregon and Washington was continued by the steamer *Albatross* during the first three months of the fiscal year. The first trip of the *Albatross* was to grounds off the coast of Washington from Grays Harbor to Flattery Banks, but the abundance of ground and blue sharks rendered the location unpromising for the establishment of a fishery at that time. Two especially favorable halibut bottoms were discovered, one 31 miles west of Grays Harbor and the other 37 miles S. by W. from the Umatilla Lightship.

The second trip covered the same region by lines of sounding intended to determine the possible existence of offshore banks rising from the deep water. One such bank was located as apparently the top of a submerged mountain, rising 6,000 feet from the floor of the ocean. The depth ranged from 525 to over 830 fathoms. The bank is not shoal enough for fishing, but it suggests the possible existence of other banks that might be of greater practical importance. The location of the bank is about 278 miles from Cape Flattery Light, the latter bearing N. 66° E.

A third trip covered the region off the Columbia River and south therefrom as far as Cape Meares. Good halibut bottom was found S. 71° W. of Columbia River Lightship, 17 miles out. South along the 100-fathom curve to Cascade Head good bottom was noted for nearly the entire distance in 110 to 120 fathoms. A patch of suitable bottom was located 22 miles northwest of Cape Meares Light in 94 fathoms. The largest ground discovered by the *Albatross* on this trip lies between Tillamook Head and Cape Falcon, 28 to 30 miles from the coast. The bottom is of coarse and fine gravel, black sand, and granular shale, and an abundance of life was noted at the surface of the water. Important hydrographic observations were made and reported to the Coast and Geodetic Survey and to the Navy Department. A report of the halibut survey, with charts, will soon be published.

OCEANOGRAPHIC STUDIES.

If we were interested to know the capacity of certain lands for the support of particular kinds of animals; if we wished to ascertain the causes of the natural movements of such animals; or if we were to determine upon a proper policy of handling our stock in governance of their capture, or in endeavors to increase their numbers by cultural methods, we could not neglect to consider the character of the land in its various parts, its yield in vegetation small and large.

Similar inquiries, roughly speaking, when applied to the ocean constitute the science of oceanography. However it may appear to the eye, the ocean is not one great homogeneous body of water, but is marked by a diversity such as we are familiar with upon the land. Variations in depth, in saltness, in temperature, or in richness of animal and plant life are always encounterable, whether we proceed from the shores to the open sea, from the surface to the bottom, from east to west or north to south, from any one geographic region to another. There are variations from year to year, even from season to season; there exist veritable deserts where abundant fish might starve from want of food, contrasted with zones of plenty. There are currents and counter currents and blendings of different waters. In one geographic locality, waters flowing from tropical regions and laden with characteristic animals and plants may overlie waters emanating from arctic domains and carrying their peculiar types of living things. If we do not have knowledge of such conditions, we can not determine whether a condition of extreme paucity of fish life such as was conspicuous on our eastern shores in the summer of 1916 is an indication of exhaustion of the fisheries or is an inevitable consequence of observable oceanographic abnormalities that can not be affected by man's operations; we will not be able to understand what general movements of fishes or variations in local abundance of fishes are attributable to unwise human operations and what are properly to be expected as a reflection of normal phenomena of nature.

Oceanographic studies are not new in this or other countries; and extensive data have been gained by the Bureau at various times during many years, but within the past few years the Bureau has planned for better coordination of such studies as could be conducted within its means. Operations have been pursued intensively in restricted regions, so that a completed exploration might be made and relations established with a degree of definiteness that would make it possible to deduce some practical conclusions.

The investigation of waters off the Atlantic coast, primarily in the Gulf of Maine and southward to the Grand Banks, has been continued in connection with studies of the life history and habits of the herring and other fishes. The schooner *Grampus* was detailed to this work with an assistant from the office in active charge of the observations, while the investigation was under the fortunate direction of a skilled oceanographer whose services were available to the Bureau. The results gained during preceding years have been made public from time to time and a final report may be expected within a short while.

Near as the Chesapeake Bay is to the center of administration and important as its fisheries are, we have been without systematic and detailed knowledge of the physical and biological features of its waters and of the effect of such conditions upon the constant movements and varying abundance of important fishes. Beginning in October, 1915, the steamer *Fish Hawk* was detailed to a general investigation of the Chesapeake Bay under the direction of a well-equipped assistant. At intervals of a month or six weeks there have been cruises over the bay, while observations of various sorts were made and material collected for later careful study. The investigation was by no means confined to technically oceanographic subjects, but a number of useful inquiries were embraced in the general scope of work and many valuable services rendered. The existence of resources in hydroids, or "sea moss," the basis of a possible new industry was demonstrated; the spawning habits and the life histories of fishes were studied; experiments were made with the propagation of certain species; crab fishermen were induced to experiment successfully with use of pickled dogfish and shark meat as bait, and a probable use established for a fishery product that had hitherto been wasted. The United States National Museum, upon invitation from this Bureau, also took advantage of an unusual opportunity to add to its natural history collections. The survey must be extended into the next fiscal year before it can reach a stage of completion.

Each important vessel, where engaged in other primary investigations, has taken advantage of the opportunities for recording hydrographic observations as far as consistent with the economical prosecution of its immediate objects. Thus data of some value have been reported by the steamer *Albatross* while pursuing special studies of the western coast and by the steamer *Fish Hawk* while working off the coast of North Carolina.

STUDIES OF ANADROMOUS FISHES.

Among the most highly esteemed of our food fishes are those that spend the greater part of their lives in the ocean, but at one stage enter the rivers for the purpose of reproduction. Such are the salmons, the striped bass, the shad, and the sturgeons. Crowding as they do at one particular season into certain restricted channels, namely, the river courses of our coastal slopes, they become the more readily an easy prey to man's pursuit. Unless the greatest foresight and restraint are exercised in the fishery, and the methods of artificial propagation are resorted to, such fishes are certainly doomed to rapid diminution, if not complete disappearance. The absolute abundance of anadromous fishes is too easily overestimated. Take all the shad which even in past times entered our rivers and strew them widely over both land and water of the coastal plain, and their "abundance" would be lost to view; or, as may indeed be done in nature, scatter them over the continental slope beneath the ocean waters and they become one of the rarer fishes of the sea. There is little reason to wonder that a shad is so seldom taken in the ocean fishery followed off the greater portion of our coast. It would have to be an extraordinary condition, such as abundant food, perhaps, that would bring shad together in a particular region of the sea, that would permit an ocean fishery for shad to be carried on. Such, indeed, appears to be the case of certain regions off the northeastern coast where "sea-run shad" become a feature of the local markets. What is the origin of such shad? Are they a distinct race, or are these the shad that were bred in southern rivers? The extent and directions of migration of the fish are questions of vital interest. To what extent are the runs of one river affected by fishing operations in another? In what degree does artificial propagation in one stream yield returns of value to another? These are all kindred questions or aspects of one general problem for each anadromous species.

Notwithstanding the attention which has been devoted to the shad during so many years, the paucity of explicit knowledge is keenly felt. Early in the fiscal year the Bureau instituted a comprehensive investigation of the shad, hoping that the application of newer methods of investigation may afford the key by which the mysteries may be unlocked. Beginning with the St. Johns River in Florida in January, the investigator has worked up the coast, visiting the principal shad streams as nearly as possible at the time when the fish are arriving from the sea. By the close of the fiscal year he had reached New England, where studies were being made both of the native shad of Maine and the sea shad of the waters north of Cape Cod. Many questions have received attention, although the primary purposes have been to determine if shad of different rivers or of different brood regions present distinguishable racial differences and to obtain information as to the extent of the coastwise movements of the fish. Many data have been accumulated and many specimens secured, all of which must form the basis of subsequent detailed studies before exact conclusions can be drawn.

Associated with the shad and herring and having similar habits is the glut herring, a species of considerable abundance but one which until recently found only a limited market in the localities in which taken. The past few years have witnessed a marked increase in value and diminution in numbers. During the past season experiments were made by an assistant in cooperation with fish culturists to ascertain the best methods of handling and hatching the eggs, and the results have indicated that the artificial propagation of the species on a large scale is feasible.

The detailed study of the life history of the salmon of the Sacramento and Columbia Rivers has been continued and the field work is practically concluded. With the study of accumulated data and the preparation of the report during the ensuing fiscal year, it is expected that conclusions will be reached that will guide our fish-cultural operations to a stage of greater efficiency. In the direction of these studies the investigator has had not only the benefit of the most expert counsel but the sympathy and suggestions of practical fish culturists.

INVESTIGATIONS RELATING TO FRESH-WATER FISHES.

The field of fresh-water fish investigations has been too little touched, although the immediate opportunities of domestic fish culture are probably greatest among fresh-water forms. No one assumes that the great complex of streams and abundant lakes and ponds are productive to their maximum capacity, but rarely is due care taken to conserve in practicable ways the conditions in them favorable to the growth and propagation of fish. This phase of the general problem of fish production is not yet adequately realized nor are the principles satisfactorily developed.

That the streams, lakes, and ponds should be stocked and restocked with fish is an ever growing demand which indicates the widespread interest in such fisheries, whether they serve as a means of recreation or as a source of food. The stocking and restocking of waters is, however, not usually the principal desideratum. In specific instances the actual condition to be relieved may be due to an overabundant stock. Just as agriculture has long since passed the stage where increased production is sought primarily through the planting of more seed in a given area, so it is incumbent to give proper attention to promoting a favorable condition for the growth of fish, looking intelligently to the maintenance of suitable condition of physical environment, abundance of food, proper association of species, and a correct proportioning of numbers and variety of fishes to the biological capacity of the water.

The fishery problems of fresh water are undoubtedly simpler than those of the seas, but they are certainly less directly approachable than the problems of agriculture which have met their solutions. It is not surprising, therefore, that, throughout the country in matters of fish culture, there is as yet too little serious endeavor to find real causes or to apply appropriate remedies. Year by year the Bureau is devoting more careful and fitting attention to the problems of fresh-water fisheries, and some of its principal activities in this field may be referred to.

The problem of fish culture, at least as referring to pond fishes, is primarily one of food supply. Our knowledge of the food of fishes is as yet seriously inadequate. The food taken by fishes varies with the species, with size and age of the fish, with the season of the year, and with the abundance of the various kinds of food materials present in different bodies of water. A few observations in one locality or at one season of the year afford no criterion for the conclusions that we may seek to draw, for an appraisal of the possibilities of fish production in any body of water, for an understanding of the variations in the sizes attained by a given species of fish in different bodies of water, and for the direction of our efforts to promote an abundent and reasonably constant supply of food under all conditions subject to control.

One of the investigations of the food of fishes that has been pursued comprises an examination of a number of perch taken from each of two lakes in Wisconsin during each week in the year. At the same time collateral studies have been made of the food of many of the important fishes, their habits and interrelations. Some of the results have been submitted for publication, while other reports are in preparation. The accumulation of such data is not of theoretical interest; it is indispensable to a purpose, for it must lead eventually to intelligent conclusions as to the highest possibilities in rearing fishes and the methods of realizing such possibilities.

At the Fairport station several special fish-food studies are being actively pursued. In connection with the experiments in rearing buffalofishes, examinations are systematically made to determine the food taken at all sizes and all stages. Investigation of the food of all small fishes in the experimental ponds are being conducted in connection with parallel studies of the available foods in the ponds. Systematic studies are being made of the aquatic insect life. Experiments are also being directed at the problem of promoting an abundant growth of food organisms by methods of fertilizing the water or otherwise.

The investigation of the habits and movements of fishes in the Mississippi River with especial reference to the obstruction of the river by the dam at Keokuk has been continued throughout the fiscal year. Only tentative conclusions have as yet been reached, but the progress of the investigation has been such that it may be hoped to present a full report within another year.

Within the year there has been completed a report embodying the results of an earlier investigation of the Rangeley Lakes of Maine. These have for many years been among the more widely known for their game fishes, and the investigation was undertaken to gain information that might serve not only as a guide to fish-cultural development of these particular waters but as a basis for the adoption of a proper policy with regard to other lakes. The report comprises an unusual body of information regarding the habits and relations of many important food and game fishes.

There is in progress and now drawing to a conclusion an investigation of the habits of the common smelt, a fish which is of no little economic importance, partly as an object of fishery itself and more significantly as a source of food for the larger food and game fishes.

It is generally known that many species of fish are destructive to the larvæ of mosquitoes, but, where public health is involved, it becomes of high importance to know definitely what fish are most effective in mosquito extermination and under what conditions is their efficiency greatest. In many cases, where the usual treatments of waters are impracticable because of expense or other sacrifice involved, it is convenient to rely upon the agency of small fish, provided there can be assurance that the result sought will be fully accomplished. It is possible that in particular cases partial failure to eliminate all mosquito larvæ can be turned into complete success through the introduction of other kinds of fishes that will be adapted to the particular condition of the pond or through measures taken to so change those conditions that the fish will have a better chance to obtain their prey. It is necessary then to study the comparative efficiency of the different species of fish and to ascertain how the efficiency of the more suitable species is affected by the various conditions of depth, vegetation, and débris.

At the beginning of the fiscal year the Bureau issued an economic circular giving an account of the various species of fish that play an important part in mosquito extermination and at the same time it entered into cooperation with the Bureau of Entomology for a careful investigation directed to the ends just stated. The inquiry will be continued through the next fiscal year.

In addition to its functions in mussel culture, and without hindrance to them, the Fairport station is being utilized effectively in fish-cultural experimental work. Some of these experiments are being conducted with the game fishes that are favorite objects of cultural efforts. The purpose of these experiments is primarily to ascertain the conditions under which the fish may be reared to a market size in greatest numbers.

During the spring of 1915 unusual success was attained in the hatching of the eggs of the buffalofish after artificial fertilization. A number of the fry were placed in a new station pond to be kept under observation. Notwithstanding the raw state of the pond and other unfavorable conditions, more than 25 per cent of the fish, or about 45,000, were found to have survived when the pond was drawn in the fall, and some had attained a length of over 6 inches. A good many of the fingerlings were liberated and others were retained for further growth. A proportion of loss was experienced during the winter season, but the experiments are still in progress. Not all has been obtained that would be desired, but, as the first attempt at rearing buffalofish in capitivity, the success is such as to recommend the continued experimentation with a form that is well known as a commercial food fish of large size and of diminishing abundance.

Quite interesting results have been attained too with the channel catfish (*Ictalurus punctatus*), a form that has hitherto baffled all attempts at propagation. Just at the close of the fiscal year the first successful attempt at propagation was in progress, but the further history of the experiment is a matter for a later report.

The Bureau is continually called upon for advice in the solution of problems confronting those who are either engaging in fish culture as a private venture or who are interested in developing the possibilities of certain public waters. A station such as that at Fairport, where the hatching and rearing of fishes to a size suitable for the table can go hand in hand with systematic scientific observation and experiment, renders a long needed and invaluable service in providing an experience supplemental to that gained in practical fish-cultural work.

During the year the Bureau conducted a survey of the Bonneville System of Utah with reference primarily to its fishery resources and incidentally to the problems of fish protection in irrigation ditches. This system comprises Utah Lake and Provo, Beaver, Bear, Logan, and other rivers. Interesting and unexpected discoveries were made of several new species of whitefish that appear to be indigenous to the system, and all of which are good food fish. Utah Lake is famous for its suckers and carp, tons of which are sometimes shipped to eastern markets, some going even to New York. Generally speaking, however, the fish of the Bonneville System are not plentiful enough to be of great commercial value except locally. With the development of power plants and the growth of agriculture, they are certain to become less numerous, unless due care is taken to conserve the fish supply as far as may be done consistently with the pursuit of other objects of greater economic importance.

SERVICE OF THE BIOLOGICAL LABORATORIES.

The seaside laboratories, which opened for the summer season just before the close of the last fiscal year, were in active operation until about the middle of September, 1915. Various investigations were pursued chiefly through the employment of the temporary services of specialists in several lines.

The Woods Hole, Mass., laboratory is intended to serve as a nucleus for investigations of more direct reference to the New England and Middle Atlantic fisheries as well as for more technical investigations of general application. In some respects this establishment is better adapted for technical studies than any other laboratory of the Bureau, and it is hoped to improve the facilities for biophysical and biochemical studies that form essential phases of certain fishery investigations. The lack of a permanent scientific staff for this station causes its scientific operations to be confined largely to the summer season, when temporary professional services are most readily available. The principal topics of investigation during the past season may be cited. There have been studies of oysters, elsewhere referred to, which related chiefly to nutrition, greening, and propagation. The studies of nutrition had especial reference to the discovery of methods of fattening that might not be open to the objections properly raised against some of the common practices. The investigation of greening, directed at a condition which has served as a serious blight on oyster culture in certain localities, and of "green gill," an entirely distinct phenomenon, was also associated with this laboratory. Studies of the larval development of fishes have been followed with results narrated elsewhere.

Other subjects of investigation were the parasites of fishes and the effect of such parasites upon the vitality of the individuals; the effect upon fishes of certain mineral salts which may be present either as a normal constituent of some spring waters or as a consequence of pollution; the metabolism of fishes and oxygen utilization, subjects which have a bearing upon the propagation and rearing of fishes; the bacteriology of fishes; the biology and the utilization of sea mussels; and the possibilities of utilization of other waste fishes. As usual the facilities of the laboratory were extended to a few independent investigators whose studies were pursued without expense to the Bureau.

The Beaufort, N. C., laboratory is a center for investigations that look to the better development of the fisheries of the South Atlantic coast. Allusion has been made to the study of the mullet and to the survey of fishing grounds which has revealed opportunities for offshore winter operation and contributed to the development of a fishery that is as yet unduly limited. The successful experiments in terrapin culture are also more fully described elsewhere. Special attention is being devoted to the breeding habits of fishes, the larval development of fishes, and, as opportunity offers, to the possibilities of propagation of certain sea fishes which support important fisheries in the South Atlantic States. Interesting observations were made and a report was prepared dealing with the habits of certain species of small fish that are denizens of brackish and fresh waters and that are serviceable in the extermination of mosquito larvæ and hence in the maintenance of public health.

Efficient study of the food of fishes and of the movements of fishes, as directed by the search for food, or the avoidance of enemies, demands an exact knowledge of the forms of animal and plant life which may be encountered in the local waters or which may be found in the stomachs of the fishes. Careful systematic studies of certain groups of animal and plant life have therefore been in progress for some time. During the past fiscal year there was completed for publication a valuable report on the sharks and rays of the Beaufort region; and another comprehensive report dealing with the decapod crustacea, a group that includes the crabs and other forms of most direct economic usefulness, has also been completed and submitted for publication. Systematic studies of certain groups of fish parasites have been completed. A report of the algæ of the region is nearing completion, while the diatoms and protozoa, among the lowest forms of minute plant and animal life, as well as the higher fishes, are now subjects of investigation.

In the assurance that the development of commercial fisheries will soon demand more strongly the conservation of important shellfish, serious attention is being given to the life history of the quahaug or hard clam and the principal crustacean forms.

The Beaufort laboratory has also been found a favorable place for the prosecution of certain special problems that have not a particular regional significance. At this place there are pursued investigations of the toxicity of certain chemicals to marine borers and of the protection of wood against these disastrous pests, in which studies the Bureau has enjoyed the cooperation of the forest products laboratory of the Forest Service and the sympathetic interest of railway companies and other commercial bodies.

The enlargement of the island upon which the laboratory is located, in consequence of the deposition of material dredged by the War Department from nearby channels; the recent additions to the building authorized by Congress; and the grading and sodding of large portions of the island have added greatly to the appearance and to the stability of the property. The station would be of much greater practical service to the fishing industries of the coast were it enabled, through the provision of an adequate permanent staff, to carry on more extensive permanent experimental work. Investigations temporarily pursued serve a useful purpose in laying the basis for practical work, but it is usually only through continuous experimentation that the inevitable difficulties of new practical work are discovered and successfully overcome, as must finally be done to pave the way to substantial benefits. The terrapin experiments offer a concrete example of a businesslike mode of procedure in fishery experiment work, while other opportunities are awaiting with perhaps greater possibilities.

The Key West, Fla., laboratory becomes nearer to realization with the developments of the past fiscal year, during which the Government has assumed title to the site and Congress has provided the necessary additional appropriation for its construction. The preliminary sketch plans were completed and at the close of the year the final plans were in course of preparation. Bids are expected to be sought by advertisement at no distant date. The laboratory site is properly chosen near a base of supplies accessible by water and rail and the seat of important commercial fisheries. Situated as it is, entirely remote from the influence of fresh-water rivers and on the thoroughfare from gulf to ocean, the conditions should be eminently suitable for work with marine forms. It is hoped to employ the most substantial method of construction, not only because the peculiar conditions of the geographic location demand it but because it is regarded as sound business policy to provide against the continued necessity for repairs and unnecessary operating costs.

When this laboratory is in operation and provided with a staff of trained investigators, the service rendered by the Bureau to the fisheries of the Gulf and extreme South Atlantic coasts will be of more palpable benefit. Some of the evident opportunities are to be found in the study of the artificial propagation of the green turtle, the investigation of such useful forms as the spiny lobster and the stone crab, the fostering of the struggling industry of sponge culture, and the study of the important food fishes of the Gulf of Mexico and Straits of Florida.

The Fairport, Iowa, station, having a permanent scientific staff, is in active operation during the entire year. During the summer season its staff is temporarily augmented in order that particular problems arising from the regular investigations at this station or related to the other activities of the Bureau may be attacked by specialists in particular lines of study. As at the marine laboratories, the facilities of the station are extended to approved independent investigators, who, as table occupants, pursue their researches without cost to the Government.

The propagation of mussels, the fish-cultural experiment work, the investigations of the food of fishes, and certain studies of conditions in the Mississippi River, as elsewhere referred to, are among the subjects under consideration at Fairport during the year. One of the investigations pursued at this laboratory was of particular interest in establishing the fact that mussels may absorb nutritive substances in solution in the water not only through the alimentary tract but directly through the surface cells. Other studies in progress relate to the propagation of species of mussels not yet susceptible to practical cultural methods, the relations of fishes and mussels in nature, the possibilities of rearing mussels without parasitism, the food of mussels, the copepod parasites of fishes, and the constitution of the blood of fishes.

The equipment of the station in ponds and other facilities for the efficient prosecution of its work has been materially increased during the year. A bulletin descriptive of the equipment and functions of the Fairport station has just been published.

MISCELLANEOUS INVESTIGATIONS.

The Bureau has taken advantage of an opportunity to utilize the services of a specialist traveling abroad to secure information regarding recent significant developments in foreign pearl fisheries and expects to have a report available within the next year.

The imperative necessity for seeking new sources of potash for use in agricultural and commercial enterprises has led to the sudden development of an industry of kelp harvesting, especially in the region of San Diego, Cal. Simultaneously there arose questions as to the possible effect of the cutting of kelp upon the fisheries. Just before the close of the fiscal year it had been arranged to begin a study of the kelp fields and the method of harvesting with the view of securing definite information as to the relations of fish and shellfish to the kelp groves as they might be affected by the operations of harvesting.

For two or three years the Bureau has been searching for suitable supplies of hydroids, or the "sea moss" of commerce, which had previously been imported from Europe in considerable quantities. The dyed product is used for decorative and millinery purposes, and the importations for the only year for which statistics are available (1909) amounted to more than 300,000 pounds, valued at $47,558. In connection with the survey of the Chesapeake Bay, considerable quantities were located at depths of 18 to 30 fathoms, and experiments were made to devise efficient methods of collecting. An experienced manufacturer accompanied the investigator on one of the cruises and pronounced the material of excellent quality. Further observations must be made to determine the seasons when the moss may be found in greatest abundance and highest quality.

One of the most serious handicaps upon the halibut fishery of the northwest coast is the occurrence of "mushy" halibut, which is especially characteristic of certain grounds and which begins to be noted in early summer, increasing in prevalence until the unmarketable fish form so large a proportion of the catch as to compel the abandonment of the fishery or the removal to other and less accessible grounds for the remainder of the season. Through the study of material supplied to a specialist in the employ of the Bureau, it has been ascertained that the "mushy" condition is caused by a minute protozoan parasite which multiplies abundantly and brings about a degeneration of the muscle tissue. As soon as it is possible to do so, the Bureau will undertake a more extensive investigation in the field in order to learn the distribution of the parasite, the conditions that bring about its occasional increase in abundance, and any possible method of remedy or control.

The cooperative work with the State Geological and Natural History Survey of Wisconsin in an inquiry into the biological and physical conditions of life in inclosed waters has been continued. Progress has been made upon the reports of investigations of Lake Champlain and those of the lakes of Washington and Idaho.

In response to a widespread interest in the subject of frog culture, evidenced by the daily receipt of inquiries for information and advice in the matter, there is in preparation a report dealing with the natural history of frogs. Field studies are also being conducted.

An interesting test was made in connection with an experiment in rearing fresh-water mussels at the Fairport station. While the commercial mussels are native to rivers and not to still waters, some fishes which had been infected with the glochidia of mussels in the way ordinarily followed in practical operations were subsequently retained in floating crates and others were placed in station ponds. After two seasons of growth it was found possible to cut and finish buttons from the shells of these artificially propagated mussels. The rate of growth was much more rapid than had been expected. It is not assumed that mussels can be reared commercially in such waters, but the experiment is of interest and value as throwing light upon the nature of the results to be expected from the practical operation in public waters.

While the Federal Government exercises no jurisdiction over the pollutions of waters as affecting fisheries, the Bureau can render a very practical service in the investigation of reported cases of pollution where the importance of the stream and the alleged extent of the damage done is such as to warrant its taking cognizance of the matter. In some instances the reports are found to be without due foundation, while the agencies complained of are exercising all proper care. A report of the actual facts based upon a careful and unprejudiced examination of conditions serves to allay suspicions and prevent the further existence of dissatisfaction. In other cases the conditions are observed to be as alleged, but abatement is effected through a clear and convincing presentation of the facts to the offending parties, coupled with suggestions as to practical remedies and an appeal for cooperation. Again, there may be encountered those who are carelessly permitting industrial wastes to render a stream uninhabitable for the more desirable fishes and who are not amenable to reasonable suggestions. In such cases the findings of the Bureau can still serve a useful purpose in directing public attention to a wanton abuse and in reinforcing those who may be interested to seek relief by process of law. The Bureau has within the year conducted a number of investigations of this kind and the reports have been placed as promptly as possible in the hands of the parties interested.

COMMERCIAL FISHERIES.

Investigations completed by the Bureau during the year, in addition to the work of local agents in collecting data for important vessel fisheries on the Atlantic and Pacific coasts, included canvasses of the fresh-water mussel fishery of the Mississippi River and its western tributaries from Kansas northward; the fisheries of Lakes Pepin and Cooper in the Mississippi River, the former between Minnesota and Wisconsin, and the latter at Keokuk, Iowa; the crab industry of Maryland and Virginia; the shad and alewife industry of Chesapeake Bay and tributaries; the coastal fisheries of New York and New Jersey, exclusive of shellfish, for 1915; and the shad fishery of the Hudson River for 1915 and 1916. The inquiries relating to the fresh-water mussel fishery in the region referred to, and those relating to the shad and alewife industry, were begun the latter part of the preceding fiscal year.

FRESH-WATER MUSSEL FISHERY.

The general canvass of the fresh-water mussel fishery, which has been in progress for several years, was completed during the past year. The streams covered were the Mississippi River and its western tributaries from Kansas northward, except the Neosho River in Kansas, which was included in the work of a previous year; and the data collected were for the calendar year 1914. A special bulletin giving the results of the canvass was issued and distributed. The number of persons engaged in the mussel fishery in these streams in 1914 was 1,873, and the investment in boats, fishing apparatus, and shore and accessory property amounted to $132,267. The products included 8,539 tons of shells, valued at $148,960, and pearls found in the mussels to the value of $62,902, a total of $211,862. All the shells were used in the manufacture of pearl buttons. The principal fishing apparatus used in taking mussels is the crowfoot bar, the catch with this appliance in this region amounting to 6,524 tons of shells, valued at $120,859. The remainder of the catch was taken with forks, rakes, diggers, tongs, scoops, or basket rakes, and by hand while wading.

Mississippi River.—The most important of these streams is the Mississippi River, the products of which amounted to 6,626 tons of shells, valued at $125,948, and $50,562 worth of pearls, a total of $176,510 in value. This shows a decline of about 58 per cent in quantity and 61 per cent in value of the output of shells and pearls since 1903, the last previous year for which data are available. In view of the fact that the mussel fishery has been prosecuted in the Mississippi River for nearly 25 years, the decline in the output is not so surprising. Nearly 94 per cent of the river's catch in 1914 was taken with crowfoot bars, and of the remainder 2 per cent were taken with forks, 2 per cent with rakes, and 2 per cent with diggers and tongs. Fishing with crowfoot bars is more vigorously prosecuted in Lake Pepin than in any other portion of the river. In many cases two rowboats or scows are connected by a bar or pole 10 to 15 feet long, a gasoline boat pushing against the middle of the bar being used as the propelling power. The two small boats are provided with 4 crowfoot bars, 3 of which are being fished while the fourth is having the mussels removed from it. Usually two men, but occasionally only one man, handle such an outfit.

Mussel fishing on this river in 1914 was followed from Pine Bend, about 20 miles below St. Paul, Minn., to the mouth of the Missouri River, near Alton, Ill., the fishing ending abruptly at that point. A few shells have been taken as far up the river as Bemidji, Minn., but no sale of them has ever been made. Probably the most productive portion of the river in 1914 was in the vicinity of Frontenac, Minn., where, within a few miles, the 45 men engaged caught 645 tons of shells, valued at $10,570, and $2,100 worth of pearls and slugs. The beds near Maiden Rock, Wis., were also quite profitable, the output of 36 men amounting to 390 tons, valued at $6,630, and $2,100 worth of pearls. Lake Pepin as a whole produced 1,932 tons of shells, valued at $31,486, and $11,820 worth of pearls. It is said that there were at least 1,000 men fishing for mussels in Lake Pepin in 1911, the catch amounting to about 4,000 tons, compared with an output of less than 2,000 tons in 1914 taken by 281 fishermen.

In 1900, when the first mussel fishing was done at Red Wing, Minn., there were said to have been 75 boats at work on the beds there, compared with 8 boats in 1914. The first mussel fishing at New Albin, Iowa, was in 1899, when there were at least 20 men working on the beds, which yielded an average day's catch per man of several thousand pounds, compared with 150 to 200 pounds now. In the early days of the fishery very few shells other than niggerheads were saved. As recently as 1910 as many as 70 or 80 men worked on the mussel beds opposite New Boston, Ill., while in 1914 only 15 men were engaged and small catches were made. There were 15 or 18 mussel fishermen out of Quincy, Ill., in 1900, while in 1915 there were none, this being due both to overfishing and to the building of dams and dikes by the Government to preserve the channel of the river. Similar changes have taken place at Canton, Mo., where a button factory is located, but the shell supply is obtained from various parts of the Mississippi Valley. The mussel beds in the vicinity of Prairie du Chien a few years ago were the most prolific by far of any in the entire river, but in 1914 the catch of 100 men in that vicinity amounted to only 385 tons, valued at $6,872, and $5,500 worth of pearls and slugs.

A great decline has taken place also in the beds near Muscatine, Iowa, where the industry was first established in 1891. The near exhaustion of the beds in this vicinity has caused many of the local fishermen to seek unworked mussel streams in various parts of the country.

The catch of the Mississippi River as a whole was divided among the different species approximately as follows: Niggerheads, 25 per cent; three-ridges (including blue-points), 23 per cent; wartybacks, 13 per cent; muckets, 13 per cent; pig-toes, 6 per cent; washboards, 6 per cent; pocketbooks, 3 per cent; yellow sand-shells, 2 per cent; Missouri niggerheads, 2 per cent; pistol-grips, 2 per cent; and monkey-faces, 1 per cent. The remaining 4 per cent consist of black sand-shells, ladyfingers, bullheads, and a few other unimportant species.

Cedar River.—The catch of this river was apportioned among the different forms of apparatus as follows: 54 per cent with forks, 22 per cent with hands while wading, 18 per cent with crowfoot bars, and the remainder with rakes. Muckets predominated in the catch, with a percentage of 57. The remainder was divided as follows: Three-ridges and blue-points, 18 per cent; pocketbooks, 10 per cent; warty-backs, 3 per cent; pigtoes, 1 per cent; and a few each of pistol-grips, black sandshells, butterflies, maple-leaves, and other unimportant species.

A few pearls and slugs were taken from this river as far up as Osage, Iowa, in 1914, but Charles City, Iowa, and vicinity was the upper limit of shell fishing. The most productive beds were in the vicinity of Cedar Rapids. This was also the lowest point on the river where shells were taken. The catch of 15 men in that locality amounted to 130 tons, valued at $2,020, and $975 worth of pearls and slugs.

The first mussel shells were taken for market from this river in 1905 near Vinton, where a button factory was established about that time and operated for several years.

Des Moines River.—More than 75 per cent of the river's output is taken between Ottumwa, Iowa, and about 15 miles below that city. Forty-five tons of shells were taken from the east fork of the river as far north as between Bert and Bancroft, this being the first year in which work was done on that branch of the river. The lowest point at which shells were taken was near Keosauqua, Iowa, an output of 17 tons being shown for that vicinity. The prevailing species were three-ridges (including blue-points), warty-backs, muckets, and pigtoes, with percentages of 45, 18, 15, and 13, respectively. The remainder was made up of pistol-grips, maple-leaves, monkey-faces, lady-fingers, pocketbooks, etc. About 63 per cent of the catch was made with forks, 29 per cent with hands while wading, and the remainder with rakes. The first record of any shells being taken from this river was near Keosauqua in 1910.

James River.—This river, said to be the longest unnavigable river in the United States, supported mussel fisheries from Riverside, S. Dak., to within a few miles of its mouth—Yankton, S. Dak. The most prolific beds were between Milltown and Olivet, S. Dak., and those located a few miles above and below Yankton. The total output of the river in 1914 amounted to 260 tons, valued at $3,498, and $700 worth of pearls and slugs. Twenty-seven persons were engaged in the fishery and had an investment of $1,460, including apparatus, boats, and shore property. About 90 per cent of the catch was taken with scoops, or basket rakes, and the remainder with forks and by hand. The output was composed of 85 per cent three-ridges (including blue-points), 10 per cent fat muckets, and the remainder maple-leaves, pocketbooks, and heel-splitters. The first record of any mussel fishing being done in the James River was in 1912. Pearls, however, were taken several years previously.

Osage and Marais des Cygnes Rivers.—The Osage and Marais des Cygnes Rivers are treated as one, the latter being the name given to that portion of the river flowing through Kansas. Forty men, with an investment of $1,261, were engaged in shelling on this river from near Trading Post, Kans., as far down as Warsaw, Mo. The total output in 1914 amounted to 204 tons of shells, with a value of $2,111, and $380 worth of pearls. About 37 per cent of the catch was made with forks, 26 per cent with hands while wading, 22 per cent with crowfoot bars, and the remainder with diggers and tongs. The output was apportioned among the different species as follows: Three-ridges (including blue-points), 43 per cent; washboards, 17 per cent; pig-toes, 15 per cent; muckets, 12 per cent; and a few each of warty-backs, monkey-faces, lady-fingers, pistol-grips, maple-leaves, and butterflies. The most prolific beds were those between Warsaw and 55 miles above that town, 22 men working on these beds obtaining 110 tons, with a value of $1,540, and $100 worth of pearls.

Wapsipinicon River.—Mussel fishing on this river in 1914 extended from Independence as far down as Anamosa, Iowa. The total output was 132 tons, valued at $1,797, together with $765 worth of pearls and slugs. The 37 persons engaged had an investment, in apparatus, boats, and shore property, of $811. More than 50 per cent of the catch was made with forks, the remainder being taken by hand while wading, and with crowfoot bars, and rakes. The catch was divided among the different species as follows: 71 per cent muckets, 15 per cent blue-points and three-ridges, 10 per cent pocketbooks, and the remainder warty-backs, squaw-foots, pig-toes, and heel-splitters. The first mussel fishing on this river of which there is any record was in 1908.

Iowa River.—The total output of this river in 1914 was 93 tons of shells, valued at $1,038, and $2,975 worth of pearls and slugs. The 86 persons engaged had an investment of $345 in apparatus, $500 in boats, and $300 in shore property. More than one-half of the shells were taken with hands while wading, about 25 per cent with forks, and the remainder with crowfoot bars and rakes. The shells were apportioned among the various species as follows: 42 per cent muckets, 30 per cent pocketbooks, 20 per cent three-ridges (including blue-points), and the remainder divided among warty-backs, squaw-foots, pistol-grips, black sand-shells, maple-leaves, pig-toes, lady-fingers, heel-splitters, and butterflies. Pearls were found as far up the river as Popejoy, but the upper limit of mussel fishing was near Eldora, from which place it was followed at intervals as far down the river as North Liberty. The first mussels for commercial use were taken from this river in 1908.

Minnesota River.—Mussels were taken at intervals along this river in 1914 from Montevideo, Minn., to within a short distance of its mouth, the total output amounting to 118 tons of shells, valued at $1,254, and $455 worth of pearls. The 13 men engaged had $120 invested in apparatus, $280 in boats, and $145 in shore property. The most important catch was made in the vicinity of New Ulm, Minn. The entire output of the river was taken with crowfoot bars, and was composed of 56 per cent three-ridges (including blue-points), 27 per cent muckets, 6 per cent washboards, 5 per cent warty-backs, and a few each of niggerheads, pig-toes, and pistol-grips. The first commercial fishing in the Minnesota River was done near its mouth in 1905 by a few fishermen from the Mississippi River, who remained only a short time. Work was followed up more steadily from 1909.

Meramec River.—Mussel shells were taken from the Meramec River in 1914 at various localities between St. Clair and Valley Park, Mo., the total output amounting to 90 tons, valued at $830, and $465 worth of pearls and slugs. The 30 fishermen engaged had an investment of $280 in apparatus, boats, and shore property. Nearly nine-tenths of the mussels were taken by hand and the remainder with crowfoot bars. Muckets composed about 43 per cent, three-ridges

26 per cent, washboards 8 per cent, and warty-backs and pistol-grips, or buckhorns, 7 per cent each of the catch, the balance being made up of pig-toes, niggerheads, maple-leaves, and monkey-faces. The first commercial fishing on this river was in 1910.

Blue River.—Some mussel fishing was done on this river near Beatrice, Nebr., in 1914, a total catch of 55 tons of shells, valued at $770, being reported.

South Skunk River.—The 5 fishermen on this river caught 43 tons of mussel shells, valued at $602, and $310 worth of pearls and slugs from the South Skunk River near Oskaloosa, Iowa, in 1914. Some shells were taken from the Skunk River proper in 1913, but none in 1914.

Shell Rock River.—Mussels were taken from this river between Marble Rock and Shell Rock, Iowa, the total output, however, being only 32 tons, valued at $354, and $210 worth of pearls and slugs. Only 6 men were engaged on the entire stream in 1914. One-half of the catch was made with forks, and the remainder with hands, crow-foot bars, and rakes. The different species were found in the following proportions: Pocketbooks, 47 per cent; muckets, 43 per cent; blue-points, or three-ridges, 8 per cent; and a few squaw-foots. No shelling was done on the river previous to 1908.

Cottonwood and Bourbeuse Rivers.—The two remaining streams in the region canvassed were the Cottonwood and Bourbeuse Rivers. Shells were taken on the former river at Cottonwood Falls, Kans., and on the latter near St. Clair, Mo., the combined catch of the two rivers amounting to 65 tons, valued at $430, and $60 worth of pearls and slugs.

Statistics of the mussel fishery.—Complete statistics for all of the mussel-bearing streams of the Mississippi Valley show a total of 10,331 persons engaged in the fishery, an investment of $540,608, and a catch of 51,571 tons of shells, valued at $825,776, together with $376,284 worth of pearls and slugs; the total value of the products amounting to $1,202,060. Statistics of the mussel fishery of the Mississippi River and its western tributaries from Kansas northward for 1914, and of the entire Mississippi Valley in three sections for 1912, 1913, and 1914, respectively, are given in the following tables:

FRESH-WATER MUSSEL FISHERY OF THE MISSISSIPPI RIVER AND ITS WESTERN TRIBUTARIES FROM KANSAS NORTHWARD IN 1914.[a]

Items.	Blue River, Nebr., and Cottonwood River, Kans.		Cedar River, Iowa.		Des Moines River, Iowa.		Iowa River, Iowa.		James River, S. Dak.		Meramec and Bourbeuse Rivers, Mo.	
	No.	*Value.*	*No.*	*Value.*	*No.*	*Value.*	*No.*	*Value.*	*No.*	*Value.*	*No.*	*Value.*
Persons engaged:												
Fishermen	7		80		31		86		27		32	
Shoresmen			10									
Total	7		90		31		86		27		32	
Fishermen, classified by methods used:												
Crowfoot bars			25				20				4	
Forks			77		31		85		2			
Rakes			6		3		40					
Diggers or dredgers												
Tongs												
Scoops, or basket rakes									25			
Waders	7		60		30		86		2		32	
Total, exclusive of duplication	7		80		31		86		27		32	
Boats:												
Rowboats	7	$55	74	$660	31	$295	82	$500	13	$245	28	$130
Gasoline boats			3	265					9	995		
House-boats												
Total	7	55	77	925	31	295	82	500	22	1,240	28	130
Apparatus:												
Crowfoot bars.........pairs			25	365			20	200			2	20
Forks			77	103	31	44	85	115	2	3		
Rakes			6	6	3	2	40	30				
Diggers or dredgers												
Tongs												
Scoops, or basket rakes									15	67		
Total				474		46		345		70		20
Shore and accessory property		10		565		375		300		220		150
Total investment		65		1,964		716		1,145		1,530		300
Products:												
Shells—												
With crowfoot bars..tons			87	994			10	110			10	90
With forks..........do			261	3,316	211	2,777	23	256	20	240		
With rakes..........do			20	285	25	325	10	110				
With diggers or dredgers, tons												
With tongs..........tons												
With scoops, or basket rakes..........tons									232	3,162		
With hands..........do	110	1,120	117	1,331	100	1,300	50	562	8	96	90	820
Total	110	1,120	485	5,926	336	4,402	93	1,038	260	3,498	100	910
Pearls		100		3,665		2,305		2,975		700		475
Total value of products		1,220		9,591		6,707		4,013		4,198		1,385

[a] Not including the Neosho River, shown in another table.

FRESH-WATER MUSSEL FISHERY OF THE MISSISSIPPI RIVER AND ITS WESTERN TRIBUTARIES FROM KANSAS NORTHWARD IN 1914[a]—Continued.

Items.	Minnesota River, Minn.		Mississippi River.		Osage and Marais des Cygnes Rivers, Mo. and Kans.		Shell Rock and South Skunk Rivers, Iowa.		Wapsipinicon River, Iowa.		Total.	
	No.	*Value.*	*No.*	*Value.*	*No.*	*Value.*	*No.*	*Value.*	*No.*	*Value.*	*No.*	*Value.*
Persons engaged:												
Fishermen	13		1,383		39		11		35		1,744	
Shoresmen			115		1		1		2		129	
Total	13		1,498		40		12		37		1,873	
Fishermen, classified by methods used:												
Crowfoot bars	13		1,364		8		3		15		1,452	
Forks			48		25		10		35		313	
Rakes			33				5		2		89	
Diggers or dredgers			9		2						11	
Tongs			14		10						24	
Scoops, or basket rakes											25	
Waders					17		5		29		268	
Total, exclusive of duplication	13		1,383		39		11		35		1,744	
Boats:												
Rowboats	9	$95	734	$12,360	32	$205	10	$80	35	$235	1,055	$14,860
Gasoline boats	3	185	731	72,755	2	650			1	100	749	74,950
House-boats			55	6,595							55	6,595
Total	12	280	1,520	91,710	34	855	10	80	36	335	1,859	96,405
Apparatus:												
Crowfoot bars....pairs	10	120	1,405	16,816	8	80	3	39	15	200	1,488	17,840
Forks			48	103	25	31	10	13	35	44	313	456
Rakes			23	51			5	4	2	2	79	95
Diggers or dredgers			32	164	2	10					34	174
Tongs			14	70							14	70
Scoops, or basket rakes											15	67
Total		120		17,204		121		56		246		18,702
Shore and accessory property		145		14,795		285		85		230		17,160
Total investment		545		123,709		1,261		221		811		132,267
Products:												
Shells—												
With crowfoot bars, tons	118	1,254	6,216	117,238	45	630	13	168	25	375	6,524	120,859
With forks.....tons			149	3,308	75	730	41	526	72	985	852	12,138
With rakes.....do			132	3,049			11	150	8	100	206	4,019
With diggers or dredgers.....tons			85	1,393	20	280					105	1,673
With tongs.....do			44	960	10	140					54	1,100
With scoops, or basket rakes.....tons											232	3,162
With hands.....do					54	331	10	112	27	337	566	6,009
Total	118	1,254	6,626	125,948	204	2,111	75	956	132	1,797	8,539	148,960
Pearls		455		50,562		380		520		765		2,902
Total value of products		1,709		176,510		2,491		1,476		2,562		211,862

[a] Not including the Neosho River, shown in another table.

Fresh-water Mussel Fishery of the Mississippi Valley.

Items.	Streams tributary to Gulf of Mexico from Ohio River southward in 1912.[a]		Streams tributary to Great Lakes and Ohio and Mississippi Rivers north of the Ohio and east of the Mississippi River in 1913.[b]		Mississippi River and its western tributaries from Kansas northward in 1914.[c]		Total.[d]	
	No.	*Value.*	*No.*	*Value.*	*No.*	*Value.*	*No.*	*Value.*
Persons engaged:								
Fishermen	4,665		3,337		1,744		9,746	
Transporters	91						91	
Shoresmen	110		255		129		494	
Total	[e]4,866		[f]3,592		[g]1,873		10,331	
Fishermen, classified by methods used:								
Crowfoot bars	2,793		2,216		1,452		6,461	
Forks	364		1,116		313		1,793	
Tongs	1,232		513		24		1,769	
Diggers			140		11		151	
Dredgers	43		63				106	
Rakes	21		93		89		203	
Scoops, or basket rakes					25		25	
Miscellaneous apparatus			13				13	
Waders	1,051		944		268		2,263	
Total, exclusive of duplication	4,665		3,337		1,744		9,746	
Boats and vessels:								
Rowboats and barges	4,276	$26,631	2,199	$16,712	1,055	$14,860	7,530	$58,203
Gasoline boats	446	59,545	1,031	87,320	749	74,950	2,226	221,815
House-boats	579	46,990	115	14,610	55	6,595	749	68,195
Vessels transporting	25	56,265					25	56,265
Total	5,326	189,431	3,345	118,642	1,859	96,405	10,530	404,478
Apparatus:								
Crowfoot bars.......pairs	2,795	31,896	2,212	24,395	1,488	17,840	6,495	74,131
Forks	364	427	1,103	1,441	313	456	1,780	2,324
Tongs	1,245	7,321	513	2,796	14	70	1,772	10,187
Diggers			102	658	34	174	136	832
Dredges	19	1,500	36	63			55	1,563
Rakes	21	58	85	119	79	95	185	272
Scoops, or basket rakes					15	67	15	67
Miscellaneous apparatus				9				9
Total		41,202		29,481		18,702		89,385
Shore and accessory property		10,853		18,732		17,160		46,745
Total investment		241,486		166,855		132,267		540,608
Products:								
Shells—								
With crowfoot bars.tons	14,531	210,521	15,258	245,477	6,524	120,859	36,313	576,857
With forks.........do	1,277	15,283	3,292	55,757	852	12,138	5,421	83,178
With tongs.........do	3,201	55,568	790	13,559	54	1,100	4,045	70,227
With diggers.......do			1,733	28,200	105	1,673	1,838	29,873
With dredges.......do	303	5,091	225	4,500			528	9,591
With rakes.........do	24	379	161	2,856	206	4,019	391	7,254
With scoops, or basket rakes............tons					232	3,162	232	3,162
With miscellaneous apparatus..........tons			34	453			34	453
With hands.......do	379	7,764	1,824	31,408	566	6,009	2,769	45,181
Total	19,715	294,606	23,317	382,210	8,539	148,960	51,571	825,776
Pearls		149,121		164,261		62,902		376,284
Total value of products		443,727		546,471		211,862		1,202,060

[a] From Statistical Bulletin 305. This includes Neosho River, Kans.
[b] From Statistical Bulletin 314. This does not include tributaries of the Ohio River in Ohio, data for which were shown in Statistical Bulletin 305.
[c] From Statistical Bulletin 343. This does not include the Neosho River, Kans., data for which were shown in Statistical Bulletin 305.
[d] Obtained by combining statistics for the three sections of the Mississippi Valley for 1912, 1913, and 1914, respectively.
[e] Includes 56 women.
[f] Includes 253 women.
[g] Includes 118 women.

FISHERIES OF LAKE PEPIN AND LAKE COOPER.

Lake Pepin.—Lake Pepin, an expansion of the Mississippi River between Minnesota and Wisconsin, is nearly 25 miles long and 3 miles wide at its greatest breadth. It supports quite extensive fisheries. Pepin, Wis., is the most important town in the extent of its fisheries along the lake. Maiden Rock, Wis., also supports important fisheries.

In 1914 there were 137 fishermen engaged in the industry, their total investment amounting to $43,599. The investment included 28 gasoline boats, worth $7,625; 53 rowboats, valued at $1,300; 1 houseboat, valued at $100; 295 fyke nets, valued at $24,995; 14 seines, valued at $3,340; 664 anchored gill nets, valued at $4,421; 8 trap nets, with a value of $480; $3 worth of lines, and $1,335 worth of shore and accessory property. The total output of the lake amounted to 758,670 pounds of fish, with a value to the fishermen of $33,719. Buffalofish, German carp, fresh-water drum, and catfish made up 94 per cent of the value of the entire catch. The most important apparatus used was the fyke net, known locally as hoop net. The catch therewith amounted to 337,446 pounds of fish, valued at $18,973. The leading species included in the catch were buffalofish, fresh-water drum, German carp, suckers, and quillbacks, or white carp. Seines ranked next in importance with a catch of 291,216 pounds of fish, having a value of $8,219. German carp and buffalofish were the two leading species taken, the value of the two being more than three-fourths that of the entire seine catch. The catch by anchored gill nets amounted to 126,198 pounds, valued at $6,432. As in the case of seines, the principal species taken were the buffalofish and German carp. Trap nets and lines were also used, but the combined catch of the two amounted to only 3,810 pounds, with a value of $95.

The fishery conditions on Lake Pepin have improved very much within the past 15 years by the opening up of the New York market during the winter season. Previously there was only a local demand for the fish. A considerable portion of the winter fishing is done through the ice. Comparatively few fish are handled during warm weather, as the demand is then very light. There is a close season along the lake in both Minnesota and Wisconsin from April 15 to June 15.

Lake Cooper.—Lake Cooper, which is merely a widening of the Mississippi River formed by back water from the dam at Keokuk, Iowa, has a length of about 50 miles.

There was a total of 105 men engaged in the fisheries of this lake during 1914. These men had an investment of $16,190, and caught 661,135 pounds of fish, valued at $23,300. Buffalofish, German carp, and catfish contributed 94 per cent of the value of the total catch. The most important form of apparatus used was the fyke net, known locally as bait net. The catch by this form of net amounted to 488,005 pounds, valued at $16,210. The remainder of the catch was taken with lines and trammel nets. The most important species taken both in fyke nets and trammel nets were German carp and buffalofish. Catfish and German carp constituted the principal species taken on lines.

The form of fyke net in general use on Lake Cooper is much smaller than those used on Lake Pepin, having neither leader, wings, nor heart, as have most of those on the latter lake. The Lake Cooper fyke nets have from 4 to 7 hoops, 2½ feet in diameter. There was one set in the lake opposite Sandusky, Iowa, in 1914, however, which had 9 hoops, the largest being 11 and the smallest 7 feet in diameter. The total length of this net was 57 feet.

FISHERIES OF LAKE PEPIN AND LAKE COOPER (MISSISSIPPI RIVER) IN 1914.

Items.	Lake Pepin.		Lake Cooper.	
	Number.	*Value.*	*Number.*	*Value.*
Persons engaged:				
Fishermen	135		105	
Shoresmen	2			
Total	137		105	
Boats, apparatus, and other property:				
Gasoline boats	28	$7,625	36	$3,870
Rowboats	53	1,300	84	1,250
House-boats	1	100	10	1,075
Fyke nets	295	24,995	1,378	5,693
Seines	14	3,340		
Anchored gill nets	664	4,421		
Trammel nets			14	304
Trap nets	8	480		
Trot and hand lines		3		153
Shore and accessory property		1,335		3,845
Total		43,599		16,190
Products by apparatus:				
With seines—				
Buffalofish ... pounds	43,550	2,354		
Catfish ... do	11,785	738		
Fresh-water drum ... do	42,150	400		
German carp ... do	137,920	3,967		
Mooneye, fresh ... do	3,000	25		
Mooneye, smoked ... do	365	16		
Quillback, or white carp ... do	45,775	459		
Spoonbill cat, or paddlefish ... do	2,205	138		
Sturgeon, lake ... do	616	73		
Suckers ... do	3,850	49		
Total	291,216	8,219		
With fyke nets—				
Buffalofish ... pounds	173,450	14,068	232,585	8,615
Catfish ... do	10,975	743	18,415	1,258
Crappie ... do			50	3
Dogfish ... do	1,531	16		
Fresh-water drum ... do	85,000	1,964	21,455	642
German carp ... do	30,547	1,228	209,715	5,456
Mooneye, fresh ... do	6,300	63		
Mooneye, smoked ... do	1,100	54		
Quillback, or white carp ... do	13,305	378		
Spoonbill cat, or paddlefish ... do	340	19		
Sturgeon, lake ... do	405	50	1,095	69
Suckers ... do	14,490	390	4,640	164
Sunfish ... do			50	3
Total	337,446	18,973	488,005	16,210
With anchored gill nets—				
Buffalofish ... pounds	44,250	3,306		
Catfish ... do	3,760	244		
Fresh-water drum ... do	1,235	21		
German carp ... do	69,050	2,428		
Quillback, or white carp ... do	1,525	27		
Spoonbill cat, or paddlefish ... do	6,332	400		
Sturgeon, lake ... do	46	6		
Total	126,198	6,432		
With trammel nets—				
Black bass ... pounds			15	1
Buffalofish ... do			15,230	543
Catfish ... do			1,055	69
Crappie ... do			20	1
Fresh-water drum ... do			3,065	108
German carp ... do			61,885	1,408
Sturgeon, lake ... do			675	40
Total			81,945	2,170

FISHERIES OF LAKE PEPIN AND LAKE COOPER (MISSISSIPPI RIVER) IN 1914—Con.

Items.	Lake Pepin.		Lake Cooper.	
	Number.	*Value.*	*Number.*	*Value.*
Products by apparatus—Continued.				
With trap nets—				
Catfish .... pounds..	235	$15	....	....
Fresh-water drum .... do....	3,400	65	....	....
Total	3,635	80	....	....
With trot and hand lines—				
Buffalofish .... pounds..	....	....	2,085	$94
Catfish .... do....	75	5	52,065	3,528
Eels .... do....	....	....	3,800	250
Fresh-water drum .... do....	....	....	2,340	77
German carp .... do....	....	....	30,765	959
Pike .... do....	50	5	....	....
Sturgeon, lake .... do....	....	....	130	12
Sunfish .... do....	50	5	....	....
Total	175	15	91,185	4,920
Grand total	758,670	33,719	661,135	23,300
Product by species:				
Black bass .... pounds..	....	....	15	1
Buffalofish .... do....	261,250	19,728	249,900	9,252
Catfish .... do....	26,830	1,745	71,535	4,855
Crappie .... do....	....	....	70	4
Dogfish .... do....	1,534	16	....	....
Eels .... do....	....	....	3,800	250
Fresh-water drum .... do....	131,785	2,450	26,860	827
German carp .... do....	237,517	7,623	302,365	7,823
Mooneye, fresh .... do....	9,300	88	....	....
Mooneye, smoked .... do....	1,465	70	....	....
Pike .... do....	50	5	....	....
Quillback, or white carp .... do....	60,605	864	....	....
Spoonbill cat, or paddlefish .... do....	8,877	557	....	....
Sturgeon, lake .... do....	1,067	129	1,900	121
Suckers .... do....	18,340	439	4,640	164
Sunfish .... do....	50	5	50	3
Total	758,670	33,719	661,135	23,300

CRAB INDUSTRY OF MARYLAND AND VIRGINIA.

The blue crab is one of the most valuable fishery resources of Chesapeake Bay. In no other body of water is this species so abundant and important. The increasing magnitude of the fishery has occasioned much concern among those solicitous for its future welfare, and there has been much discussion of the necessity for restrictive measures in Maryland and Virginia. The Bureau desired to give the States full and reliable data on which to base any needed action; and accordingly it placed its agents in the field on November 15, 1915, and on December 21, 1915, was able to issue a printed bulletin containing detailed statistics of the industry for the calendar year 1915. This bulletin, which was very favorably received because of its timely appearance and valuable contents, was distributed to State legislators and fishery officials, to crab fishermen, dealers, and canners, and to all other interested persons.

In Maryland the growth of the hard-crab industry has been quite marked during the past few years, owing to the increasing number of firms engaged in shipping crab meat. The soft-crab fishery has scarcely more than held its own. The crab industry of this State in 1915 gave employment to 7,312 persons, of whom 4,053 were engaged in the shore or boat fisheries, 41 on fishing and transporting vessels, and 3,218 in the wholesale trade and canning industry. The investment in vessels, boats, fishing apparatus, and shore and accessory property was $485,627. The wages paid in the wholesale and canning trades amounted to $191,840. The catch aggregated 90,281,646 crabs in number, or 30,093,882 pounds, valued at $664,651. This includes 22,491,675 pounds of hard crabs, valued at $335,375, and 7,602,207 pounds of soft crabs, valued at $329,276. The hard crabs were taken chiefly with trot lines, and smaller quantities with scrapes and scoop nets. The greater part of the catch of soft crabs was taken with scrapes and scoop nets, and the remainder with trot lines and seines.

Crisfield still remains the center of both soft and hard crab industries, about three-fourths of the entire crab catch of the State being handled and shipped from that place in a live condition or as crab meat. Many soft crabs are also brought here for shipment in the early spring from the western shore of Virginia. In 1915 there were 47 firms in Crisfield and immediate vicinity handling soft crabs only, 17 firms handling hard crabs only, 2 firms handling both soft and hard crabs, and 1 firm which canned soft crabs. Several of the soft-crab firms had branch houses at various localities throughout Somerset and Dorchester Counties, Md., and Accomac County, Va., their products being brought to Crisfield for shipment. Most of the crabs caught on the western shore of Maryland are also brought by gasoline boats to Crisfield for shipment. With the exception of a few shipped by steamer for consumption in Baltimore, practically all of the soft crabs are sent by express from Crisfield.

Somerset County leads all other counties in the production of crabs, the value of its output to the fishermen in 1915 amounting to $365,498, as compared with $130,136 for Dorchester, $106,480 for Talbot, $18,695 for Queen Anne, $14,210 for Anne Arundel, $12,385 for Kent, $4,900 for Calvert, $3,425 for St. Mary, $1,850 for Wicomico, $1,670 for Charles, and $1,000 for Baltimore. The value of the hard-crab industry far exceeds that of the soft-crab industry in all of the above counties except Somerset, where the conditions are reversed. All of the soft crabs except a few used for canning at Crisfield are shipped alive, while most of the hard crabs are utilized in the extraction of the meat, which is packed and shipped in tin buckets. There were only 3 firms in the State canning crabs in 1915, 2 of these handling hard and 1 soft crabs; the combined output of these firms was 179,976 cans, including a few glass jars, having a value of $33,759.

The crab industry of Virginia employed 2,978 persons and $367,150 in invested capital. The catch amounted to 60,748,158 crabs in number, or 20,249,386 pounds, valued at $317,156; of these, 18,765,148 pounds, valued at $242,754, were hard crabs, and the remainder, 1,484,238 pounds, valued at $74,402, were soft crabs. The most important apparatus used for crabs in Virginia is the trot line, which took 14,042,861 pounds, valued at $135,817; dredges are next, with a catch of 4,196,000 pounds, valued at $94,928; the remaining hard crabs were taken by means of scrapes and scoop nets. Scoop nets constitute the most important apparatus used in the soft-crab fishery, the catch with these amounted to 867,797 pounds, valued at $47,362; scrapes are next in importance with 616,441 pounds, valued at $27,040.

Considering the relative importance of this industry by counties, Elizabeth City County ranks first with 5,040,840 pounds, valued at $78,533; Accomac County is next with 4,352,612 pounds, valued at $96,130. The former county has an excess of 688,228 pounds over the latter, but the value is $17,597 less. This is explained by the fact that Accomac County has quite an important soft-crab fishery, while Elizabeth City County has only hard crabs. The third in importance is York County, with 2,204,800 pounds, valued at $27,504; the fourth is Mathews County, with 1,997,760 pounds, valued at $18,221; the fifth is Norfolk County, with 1,959,000 pounds, valued at $21,772; the sixth is Northampton County, with 1,050,264 pounds, valued at $24,587. The remaining counties have less than 1,000,000 pounds each. Accomac County leads in the production of soft crabs, the catch this year being 1,150,996 pounds, valued at $50,645. Northumberland County leads the western-shore counties in the production of soft crabs, the catch amounting to 166,390 pounds, valued at $12,564; Lancaster County, the next in point ol importance, shows a catch amounting to 78,720 pounds, valued at $5,928. Great Wicomico River region in the former county, and Corrotoman River, a branch of Rappahannock River, in the latter county, are regarded as quite productive and remunerative soft-crab waters, rendered more remunerative, probably, because of the fact that the soft crabs appear here earlier than on the eastern shore, in the Tangier Sound region, and the Crisfield dealers send boats over in the early spring for the catch.

Crab fishing usually starts in Northumberland and Lancaster Counties about the 15th or 20th of April, while the soft-crab season about Crisfield does not begin until about the middle of May. The catch, as well as the demand, diminishes about the early part of June, and many of the fishermen then seek other employment, although the Crisfield boats continue the trips practically throughout the season. These boats also call at other points on the western shore to make crab collections. Trot-line fishing is carried on with more or less importance in every county along both the eastern and western shores, but at many points on the latter side the fishermen lack good shipping facilities, the only outlet being to Baltimore by steamer, and crabs thus shipped from some places one morning do not reach their destination until the following morning. Many of the York County fishermen go to the lower part of the bay, where they consider the fishing grounds to be more productive, and sell their catch to Hampton. Some little trot-line fishing is carried on by Princess Anne County fishermen living about Lynnhaven Inlet. They start in Lynnhaven River in early spring, before the crabs begin moving about, and get good prices for their early catch, but when the Hampton fishermen begin fishing the price usually drops, and as the Lynnhaven fishermen are handicapped for want of convenient market they have about all abandoned crab fishing by early June. Hampton is, by far, the most important locality in the State for the crab industry, 33 of the 56 vessels hailing from this region. There are 15 wholesale dealers here, 2 of whom handle canned crab meat. These dealers take practically the entire catch of the dredge boats in addition to the trot-line catch of this (Elizabeth City) and other counties.

Crabs are canned only during the summer months, and the crabs used for this purpose are consequently taken by trot lines. The line fishing begins as soon as the water becomes warm enough to cause the crabs to move from the mud in which they have been bedded for the winter for protection from the cold, usually some time in April or early May, and continues through the summer until the cold forces the crabs to again seek the mud bottom. In some sections, however, the line fishing slackens during the extremely hot summer months, this being especially true of those places where the shipping facilities are not favorable. The dredging season usually opens some time during November, usually about the middle of the month, as soon as the crabs have bedded, and extends throughout the winter until the water warms sufficiently to start the crabs from their winter beds. Dredging is mostly done in the lower part of the bay, and sometimes outside the capes when the sea is not too rough. The entire winter catch is picked and sold as fresh meat. Crab meat weighs 5 pounds to the gallon, and an average of 7 crabs will yield 1 pound of meat.

A table showing the details of the industry in Maryland and Virginia follows. There are given also comparative statistics of the catch for a number of years, beginning with 1880. The output in 1915 was the largest for any year for which data are available, and the value then was 50 per cent more than in 1908, the last previous year for which the Bureau had collected complete returns. The information at hand, however, points to a catch in 1915 much short of that a few years before, and the climax of the fishery seems to have been reached about 1912.

CRAB INDUSTRY OF MARYLAND AND VIRGINIA, 1915.

Items.	Maryland.		Virginia.		Total.	
	Number.	*Value.*	*Number.*	*Value.*	*Number.*	*Value.*
Persons engaged:						
On vessels fishing	33		189		222	
On vessels transporting	8				8	
In shore or boat fisheries	4,053		1,922		5,975	
Shoresmen	3,218		867		4,085	
Total	7,312		2,978		10,290	
Vessels, boats, apparatus, and other property:						
Vessels fishing	16	$5,450	56	$139,100	72	$144,550
Net tonnage	94		497		591	
Vessels transporting	4	4,200			4	4,200
Net tonnage	26				26	
Gasoline boats	1,304	181,475	283	61,160	1,587	242,635
Sail and row boats	3,053	119,245	1,693	28,774	4,746	148,019
Apparatus vessel fisheries:						
Dredges			182	4,511	182	4,511
Scrapes	71	183	18	54	99	237
Apparatus shore fisheries:						
Dredges			30	720	30	720
Scrapes	2,484	7,452	250	710	2,734	8,162
Scoop nets	1,770	874	641	317	2,411	1,191
Trot lines	1,525	8,741	1,139	7,449	2,664	16,190
Seines	29	111			29	111
Shore and accessory property		157,896		124,355		282,251
Total		485,627		367,150		852,777
Products:						
Vessel fisheries—						
With dredges—Hard crabs, pounds			3,596,400	81,246	3,596,400	81,246
With scrapes—						
Hard crabs ... pounds	26,962	577	11,804	265	38,766	842
Soft crabs ... do	85,772	3,875	52,332	2,355	138,104	6,230
Total	112,734	4,452	3,660,536	83,866	3,773,270	88,318

CRAB INDUSTRY OF MARYLAND AND VIRGINIA, 1915—Continued.

Items.	Maryland.		Virginia.		Total.	
	Number.	*Value.*	*Number.*	*Value.*	*Number.*	*Value.*
Products—Continued.						
Shore fisheries—						
With dredges—Hard crabs, pounds			599,600	$13,682	599,600	$13,682
With scrapes—						
Hard crabs..........pounds..	1,444,435	$25,190	219,086	5,063	1,663,521	30,253
Soft crabs..........do....	3,601,394	152,626	564,109	24,685	4,165,503	177,311
With scoop nets—						
Hard crabs..........do....	1,100,422	20,908	295,397	6,681	1,395,819	27,589
Soft crabs..........do....	3,530,898	157,024	867,797	47,362	4,398,695	204,386
With trot lines—						
Hard crabs..........do....	19,919,856	288,700	14,042,861	135,817	33,962,717	424,517
Soft crabs..........do....	364,877	14,266			364,877	14,266
With seines—Soft crabs...do....	19,266	1,485			19,266	1,485
Total	29,081,148	660,199	16,588,850	233,290	46,569,998	893,489
Grand total	[a]30,093,882	664,651	[b]20,249,386	317,156	[c]50,343,268	981,807
Wholesale and canning trade:						
Wages		191,840		67,012		258,852
Barrels, boxes, cans, and packing materials used		104,529		38,553		143,082
Crabs canned..........cans..					478,104	91,465

[a] 90,281,646 in number. [b] 60,748,158 in number. [c] 151,029,804 in number.

COMPARATIVE STATISTICS OF THE CRAB PRODUCT OF MARYLAND AND VIRGINIA FOR VARIOUS YEARS FROM 1880 TO 1915.

Years.	Maryland.					
	Crabs, hard.		Crabs, soft.		Total.	
	Pounds.	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*
1880	1,166,667	$46,850	(a)	(a)	1,166,667	$46,850
1887	2,757,638	36,969	1,636,530	$133,788	4,394,168	170,757
1888	2,674,675	37,438	2,208,829	161,331	4,883,504	198,769
1890	2,388,099	31,723	4,056,110	228,690	6,444,209	260,413
1891	2,776,898	37,460	4,828,872	266,256	7,605,770	303,716
1897	5,333,316	39,949	4,115,879	177,637	9,449,195	217,586
1901	9,824,793	85,884	4,303,582	202,563	14,128,375	288,447
1904	12,665,282	168,996	5,732,865	189,851	18,398,147	358,847
1908 [b]	12,786,000	124,000	7,587,000	195,000	20,373,000	319,000
1915	22,491,675	335,375	7,602,207	329,276	30,093,882	664,651

Years.	Virginia.						Grand total.	
	Crabs, hard.		Crabs, soft.		Total.			
	Pounds.	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*
1880	2,139,200	$32,088	(a)	(a)	2,139,200	$32,088	3,305,867	$78,938
1887	626,820	15,479	(a)	(a)	626,820	15,479	5,020,988	186,236
1888	956,843	24,669	(a)	(a)	956,843	24,669	5,840,347	223,438
1890	2,584,794	28,210	440,310	$26,054	3,025,104	54,264	9,469,313	314,677
1891	2,208,071	32,683	585,956	29,379	2,794,027	62,062	10,399,797	365,778
1897	5,331,398	28,331	1,068,116	39,914	6,399,514	68,245	15,848,709	285,831
1901	6,113,277	52,863	1,288,424	65,972	7,401,701	118,835	21,530,076	407,282
1904	10,356,052	179,575	1,910,654	92,909	12,266,706	272,484	30,664,853	631,331
1908 [b]	23,001,000	239,000	2,082,000	87,000	25,083,000	326,000	45,456,000	645,000
1915	18,765,148	242,754	1,484,238	74,402	20,249,386	317,156	50,343,268	981,807

[a] Statistics not available.
[b] The statistics for 1908 are from data published by the Bureau of the Census.

SHAD AND ALEWIFE INDUSTRY OF CHESAPEAKE BAY AND TRIBUTARIES.

In view of the large interests dependent on the perpetuation of the supply of shad and alewives, or river herring, in the Chesapeake Basin, the Bureau in 1915 made a complete canvass of the industries connected with these fishes, for the purpose of being in position to substantiate the often expressed opinion that radical action was demanded of the States in order to prevent commercial extermination. The results of the canvass were promptly published in a statistical bulletin, which was at once sent to the governors and legislators of Maryland and Virginia, accompanied by three large charts showing the actual location of each pound net and gill net set for shad in 1915 on certain sections of the western shore of Virginia. The data thus supplied are thought to have influenced the Virginia Legislature, in its closing hours, to pass an act, effective in 1917, which will have the effect of permitting a larger portion of the run of spawning fish to reach their spawning grounds. This act, if its object is realized, will supplement in an effective way the protection that has heretofore been afforded to the migrating fish by the War Department through the insistence that certain lanes for navigational purposes shall be left in the maze of set nets on the shores of Chesapeake Bay and its major tributaries.

The fishery for alewives is closely connected with that for shad, the same apparatus being used and the seasons being coincident. The canvass therefore included the alewives as well as the shad, and the published bulletin, herein reprinted, gives the statistics of both fisheries.

The catch of shad in Maryland in 1915, compared with that of 1909, the latest previous year for which statistics are available, declined more than 50 per cent in quantity and about 29 per cent in value, and the catch of alewives decreased nearly 47 per cent in quantity and about 15 per cent in value. Chesapeake Bay, in Maryland, showed a decline of about 45 per cent in the shad catch and 31 per cent in the alewife catch. A still larger decrease occurred in some of the more important rivers. In the Susquehanna River, in Maryland and Pennsylvania, there was a decrease of 88 per cent in the shad and 88 per cent in the alewife catch. In the Choptank River and tributaries there was a decrease of 83 per cent in the catch of shad and 84 per cent in that of alewives. In the Potomac River the shad catch decreased 11 per cent and the alewife catch 74 per cent. In the Northeast River, which was the only one of importance which did not show a decided decline in these species, the catch of shad fell off less than 10 per cent and that of alewives increased 47 per cent.

The catch of shad in the Patuxent River in 1915 amounted to 1,118 in number, compared with 7,485 in 1909, 9,577 in 1904, 43,000 in 1901, and 52,354 in 1896, the only years for which statistics are available. The alewife catch fell off from 796,300 in 1909 to 20,400 in 1915.

The Elk River has never been a prolific shad stream, but has always furnished large quantities of alewives. The largest output of shad was in 1904, when 8,850 were taken. The catch of alewives in this river was 6,736,000 in 1909 and 3,608,950 in 1915.

The decreased run of shad and alewives in the Chesapeake Bay basin of Maryland, Delaware, and Pennsylvania in 1915 resulted in a noticeable decline in the amount of all forms of apparatus used for their capture.

In Virginia the catch of shad in 1915, compared with 1909, decreased 1,316,066 pounds, or 21.82 per cent in quantity, but increased $169,674, or 34.74 per cent, in value, and the catch of alewives decreased 11,733,850 pounds, or 42.22 per cent in quantity, and increased $37,575, or 29.26 per cent, in value.

The pound nets fished in Virginia in these waters during the season of 1915, compared with 1909, show a decrease of 31, but the number of gill nets increased from 7,121 in 1909 to 16,793 in 1915. The total catch of shad in Virginia during the year was 1,629,872 in number, or 4,714,134 pounds, valued at $658,010, and that of alewives was 40,135,328 in number, or 16;054,130 pounds, valued at $165,950.

In the Potomac River there were but two seines fished during the season of 1915 for herring and shad—one on the Maryland side at Chapmans Point and the other on the Virginia side at Stony Point. There are very few pound nets along the Maryland side of this river, but quite a number of large traps on the Virginia side off Northumberland County near the mouth. The alewife fisheries of Westmoreland County were quite extensive up to a few years ago, and it was in this county that the canning of the roe originated. Several large packing houses were located in this county as recently as 1909, but now there is but one, and that very small. There are a number of large packing houses in that part of Northumberland County bordering on the Potomac, or rather in Coan River and Yeocomico River, which are tributary to the Potomac. Both alewives and roe are packed in large quantities at these points. Drift gill nets are not fished for shad below Maryland Point, and from this place they are used in various locations up to Jones Point, a short distance below Alexandria. The gill-net catch of 1915 was reported by fishermen as the lightest they had ever taken, and many of them made little more than expenses. Some fishermen of Northumberland County along the Potomac reported the herring and shad catch for 1915 as very gratifying and thought that it was the best they have had for several seasons.

The total number of pound nets fished in Virginia during the year was 2,012, valued at $408,675. Of these, 527, or about 26 per cent, valued at $107,200, were fished by Mathews County fishermen. Elizabeth City County ranks second in the number of pound nets, having 317, valued at $73,900; Accomac County third, with 273 nets, valued at $48,150; followed by Northumberland County with 269, valued at $73,250, and Gloucester County with 204, valued at $33,100.

The catch for 1915 showed a great many more bucks than for the average year, and many of these were smaller than usual. This seemed to be the case on all parts of the bay.

In the James River stake gill nets are the leading form of apparatus used for shad fishing. The only drifting grounds remaining are located quite a distance up the river, and the catch with drift nets was negligible in the 1915 season. During the summer of 1909, when a canvass of the shad fisheries was made on this river, very few stake nets were found above Ferguson's Wharf, now called Rushmere, located in Isle of Wight County about 12 miles above Newport News.

Such nets are now found at various points up as far as Tar Bay, near Coggins Point, within a short distance of the mouth of Appomattox River. The shad run appeared in 1915 about March 15 to 20, though a few stray fish were seen earlier, and the gill-net fishing was practically over by the third or fourth week in May. Gill nets can not be used after the water is warm enough to start the crabs, as these hang in the nets and interfere too much with the handling of them. The run was much lighter than usual, but the greater part of the gill-net catch was roe fish, and the high price received partly made up for the decrease in the catch.

The apparatus used in the Chickahominy River consists entirely of seines and drift gill nets, and the catch includes shad and other species. Pound nets are not permitted in this river.

In the Rappahannock River stake gill nets having 2¾-inch mesh are fished during the winter for perch and discontinued when the shad season opens. The shad nets are then used on the same stands, being the same length as the perch nets but of a larger mesh. Herring do not usually figure in the catch of the perch nets, but there was an early run of branch herring in 1915 and some of the nets made fairly good catches. The fishermen received as high as $20 per thousand for these early herring. Some herring are caught also in the small pound nets in this river, and the average price for these was about $10 per thousand.

The number of persons engaged in the shad and alewife industries of Chesapeake Bay and tributaries in 1915 was 8,839, of whom 6,612 were fishermen and 2,227 were employed in shore industries. The investment in boats, fishing apparatus, shore and accessory property, and cash capital amounted to $1,528,824. The products of these fisheries aggregated 2,129,486 shad in number, or 6,225,549 pounds, valued at $857,771, and 71,571,278 alewives in number, or 28,628,510 pounds, valued at $297,899, a total value for both species of $1,155,670. Compared with the returns for 1909, there was a decrease of 258 in the number of pound nets and an increase of 7,968 in the number of gill nets operated. The catch of shad decreased 3,114,219 pounds, but increased $88,322 in value, and the catch of alewives decreased 22,803,590 pounds and increased $13,855 in value.

Statistics by States of the shad and alewife industry of Chesapeake Bay and tributaries in 1915, and also comparative statistics for Maryland and Virginia for various years from 1880 to 1915, and by waters for certain years from 1896 to 1915, are given in detail in the following tables.

SHAD AND ALEWIFE INDUSTRY OF CHESAPEAKE BAY AND TRIBUTARIES, 1915.

Items.	Pennsylvania.			Delaware.			Maryland.			Virginia.			Total.		
	Number.	*Pounds.*	*Value.*	*Number.*	*Pounds.*	*Value.*	*Number.*	*Pounds.*	*Value.*	*Number.*	*Pounds.*	*Value.*	*Number.*	*Pounds.*	*Value.*
Persons engaged:															
Fishermen	192			70			2,388			3,962			6,612		
Shoresmen							1,034			1,193			2,227		
Total	192			70			3,422			5,155			8,839		
Boats, apparatus, and other property:															
Gasoline boats							a 559		$147,510	659		$230,080	1,218		$377,590
Sail and row boats	110		$1,360	33		$400	b 555		19,723	1,091		20,355	1,789		41,838
Apparatus—															
Pound nets							1,062		161,920	2,012		408,675	3,074		570,595
Stake gill nets							2,172		6,209	16,267		16,325	18,439		22,534
Drift and anchored gill nets				68		912	1,703		33,293	526		14,333	2,297		48,538
Seines	8		660	2		400	17		7,925	8		3,795	35		12,780
Dip nets	150		300				53		230				203		530
Shore and accessory property									121,622			125,197			246,819
Cash capital									35,000			172,600			207,600
Total			2,320			1,712			533,432			991,360			1,528,824
Products:															
With pound nets—															
Shad							312,182	908,635	118,395	1,347,482	3,782,574	523,670	1,659,664	4,691,209	642,065
Alewives (herring)							23,874,350	9,549,740	105,849	39,653,000	15,861,200	160,762	63,527,350	25,410,940	266,611
With stake gill nets—															
Shad							21,320	70,075	9,612	158,605	534,508	77,599	179,925	604,583	87,211
Alewives (herring)										99,900	39,960	1,998	99,900	39,960	1,998
With drift and anchored gill nets—															
Shad				7,850	25,000	3,590	130,332	422,539	57,251	118,381	380,922	54,479	256,563	828,461	115,320
Alewives (herring)							90,000	36,000	475	250,000	100,000	2,500	340,000	136,000	2,975
With seines—															
Shad	6,100	18,300	2,650	1,100	3,080	429	10,299	32,289	3,394	5,404	16,130	2,262	22,903	69,799	8,735
Alewives (herring)				17,000	6,800	170	7,454,600	2,981,840	25,455	132,428	52,970	630	7,604,028	3,041,610	26,315
With dip nets—shad	3,000	10,500	1,575				7,431	20,997	2,865				10,431	31,497	4,440
Total shad	9,100	28,800	4,225	8,950	28,080	4,019	481,564	1,454,535	191,517	1,629,872	4,714,134	658,010	2,129,486	6,225,549	857,771
Total alewives (herrings)				17,000	6,800	170	c 31,418,950	12,567,580	131,779	40,135,328	16,054,130	165,950	71,571,278	28,628,510	297,899
Grand total			4,225			4,189			323,296			823,960			1,155,670

Wholesale and canning trade:															
Wages									34,195			31,691			65,886
Barrels, boxes, cans, and salt used									32,378			55,969			88,347
Salt alewives (herring), barrels							20,227	4,091,400	103,278	35,958	7,191,600	158,895	56,185	11,283,000	262,173
Corned alewives (herring)							1,624,300	649,720	8,844	7,237,700	2,895,080	45,162	8,862,000	3,544,800	54,006
Canned alewives (herring), cans							27,144	24,093	1,331				27,144	24,093	1,331
Canned alewives (herring) roe ... cans							351,888	374,404	34,046	839,160	944,055	83,321	1,191,048	1,318,459	117,367

[a] Includes one steamer valued at $2,500.
[b] Includes 3 vessels of 24 net tons, valued at $2,450, used as house-boats.
[c] 4,364,950, weighing 1,745,980 pounds, valued at $33,492, were salted, and 30,000, weighing 12,000 pounds, valued at $175, were smoked by the fishermen.

Comparative Statistics of the Shad and Alewife Product of Maryland and Virginia for Various Years from 1880 to 1915.[a]

Years.	Maryland.					Virginia.					Grand total.			
	Shad.		Alewives.		Total value.	Shad.		Alewives.		Total value.	Shad.		Alewives.	
	Pounds.	*Value.*	*Pounds.*	*Value.*		*Pounds.*	*Value.*	*Pounds.*	*Value.*		*Pounds.*	*Value.*	*Pounds.*	*Value.*
1880	3,774,426	$140,926	9,203,959	$139,667	$280,593	3,171,953	$134,496	6,925,413	$76,300	$210,796	6,946,379	$275,422	16,129,372	$215,967
1887	4,040,820	146,951	11,062,270	89,273	236,234	3,815,126	172,272	4,401,635	29,585	201,857	7,855,946	319,223	15,463,905	118,858
1888	4,868,435	176,655	11,511,774	110,291	286,946	7,056,473	321,634	6,453,005	40,369	362,003	11,924,908	498,289	17,964,779	150,660
1890	7,127,486	242,909	19,766,994	143,793	386,702	7,266,207	228,897	10,641,698	91,674	320,571	14,393,693	471,806	30,408,692	235,467
1891	6,224,873	211,575	17,418,850	131,245	342,820	6,498,242	207,394	11,013,485	93,905	301,299	12,723,115	418,969	28,432,335	225,150
1896	5,541,499	166,551	17,667,315	126,050	292,601	11,170,519	307,055	12,197,607	63,024	370,079	16,712,018	473,606	29,864,922	189,074
1897	5,799,563	159,365	17,139,459	123,453	282,818	11,529,474	304,448	13,689,510	70,841	375,289	17,329,037	463,813	30,828,969	194,294
1901	3,111,181	120,602	13,747,157	91,308	211,910	6,972,212	366,203	13,913,444	115,424	481,627	10,083,393	486,805	27,660,601	206,732
1904	2,912,249	159,772	14,484,970	137,982	297,754	7,419,899	439,625	14,603,866	90,733	530,358	10,332,148	599,397	29,088,836	228,715
1908[b]	3,937,000	247,000	28,805,000	157,000	404,000	7,314,000	486,000	37,885,000	171,000	657,000	11,251,000	733,000	66,690,000	328,000
1909	3,252,688	272,869	23,637,320	155,499	428,368	6,030,200	488,336	27,787,980	128,375	616,711	9,282,888	761,205	51,425,300	283,874
1915	1,454,535	191,517	12,567,580	131,779	323,296	4,714,134	658,010	16,054,130	165,950	823,960	6,168,669	849,527	28,621,710	297,729

[a] The catch of shad and alewives in these States outside of the Chesapeake Bay region is included for some years, but is practically negligible.
[b] The statistics for 1908 in this table are from data published by the Bureau of the Census.

COMPARATIVE STATISTICS OF THE APPARATUS USED IN THE SHAD AND ALEWIFE FISHERIES OF MARYLAND AND VIRGINIA FOR VARIOUS YEARS FROM 1891 TO 1915.

Years.	Maryland.												Virginia.									
	Pound nets.		Gill nets.		Seines.		Fyke nets.		Dip nets.		Traps.		Pound nets.		Gill nets.		Seines.		Fyke nets.		Traps.	
	No.	*Value.*	*No.*	*Value.*	*No.*	*Value.*	*No.*	*Value.*	*No.*	*Value.*	*No.*	*Value.*	*No.*	*Value.*	*No.*	*Value.*	*No.*	*Value.*	*No.*	*Value.*	*No.*	*Value.*
1891	625	$59,510	10,254	$90,650	214	$36,650	.....	.....	.....	.....	.....	.....	708	$133,880	6,287	$39,464	27	$18,510	.....	.....	.....	.....
1896	901	66,816	6,593	53,996	90	25,816	335	$5,223	128	$625	15	$600	1,156	236,680	10,748	36,947	42	19,005	72	$1,032	22	$805
1909	1,289	.....	5,620	.....	29	.....	34	.....	65	.....	6	.....	2,043	.....	7,121	.....	16	.....	7	.....	18	.....
1915	1,062	161,920	3,875	39,502	17	7,925	.....	.....	53	230	.....	.....	2,012	408,675	16,793	30,658	8	3,795	.....	.....	.....	.....

CATCH OF SHAD AND ALEWIVES IN CHESAPEAKE BAY AND ITS SEVERAL TRIBUTARIES FOR CERTAIN YEARS FROM 1896 TO 1915, BY WATERS.

Waters.	Shad.										Alewives.			
	1896		1901		1904		1909		1915		1909		1915	
	Number.	*Value.*	*Number.*	*Value.*	*Number.*	*Value.*	*Number.*	*Value.*	*Number.*	*Value.*	*Number.*	*Value.*	*Number.*	*Value.*
Chesapeake Bay:														
Virginia	1,122,225	$109,749	a 1,052,180	$199,355	a 1,525,137	$330,073	1,117,328	$278,789	1,130,116	$440,756	38,037,440	$68,506	30,475,100	$122,749
Maryland	417,857	47,465	311,360	44,395	473,860	98,095	580,207	149,187	321,378	128,293	26,222,500	66,203	18,083,300	69,125
Total	1,540,082	157,214	1,363,540	243,750	1,998,997	428,168	1,697,535	427,976	1,451,494	569,049	64,259,940	134,709	48,558,400	191,874
James River and tributaries	495,762	51,247	311,231	61,868	265,664	57,463	216,748	73,108	205,835	98,621	563,487	2,479	122,000	610
York River and tributaries	546,548	50,361	.....	.....	.....	.....	132,139	32,788	22,443	10,341	3,259,167	6,829	43,000	172
Mobjack Bay	140,777	13,874	.....	.....	.....	.....	49,657	11,748	7,563	2,865	1,001,015	2,267	116,000	464
Piankatank River	.....	.....	.....	.....	.....	.....	1,050	250	.....	.....	37,000	67	.....	.....
Rappahannock River	417,789	35,371	.....	.....	.....	.....	94,935	22,486	50,636	21,444	968,800	1,900	687,900	5,554
Potomac River:														
Virginia	450,825	43,084	648,462	104,566	289,500	51,709	172,813	44,500	165,206	65,300	24,601,040	42,854	7,276,428	30,741
Maryland	233,238	20,524	146,000	14,800	83,147	16,343	31,158	9,232	17,196	6,827	4,883,000	10,369	335,000	1,420
Total	684,063	63,608	794,462	119,366	372,647	68,052	203,971	53,732	182,402	72,127	29,484,040	53,223	7,611,428	32,161
Patuxent River	52,354	5,867	43,000	6,941	9,577	2,483	7,485	2,106	1,118	415	796,300	3,192	20,400	149
West River	.....	.....	8,200	1,050	3,750	962	.....	.....	.....	.....	.....	.....	.....	.....
South River	.....	.....	470	60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Severn River	.....	.....	27,500	4,259	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Magothy River	.....	.....	.....	.....	.....	.....	22	7	.....	.....	100,000	290	.....	.....
Patapsco River	.....	.....	1,900	160	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Back River	.....	.....	.....	.....	.....	.....	20	6	.....	.....	62,000	124	.....	.....
Middle River	.....	.....	235	50	.....	.....	.....	.....	.....	.....	7,500	17	.....	.....

Gunpowder River	...	...	850	177	...	...	16	5	...	...	57,000	137	...	...
Bush River	...	...	...	...	866	180	206	82	70	25	442,500	1,327	705,000	1,565
Susquehanna River:														
Maryland	69,488	8,157	67,000	8,874	39,275	8,087	65,717	19,379	6,585	2,359	8,741,500	33,735	1,070,000	3,870
Pennsylvania	70,599	11,996	98,883	23,412	76,521	19,867	60,045	22,224	9,100	4,225	25,000	75	...	...
Total	140,087	20,153	165,883	32,286	115,796	27,954	125,762	41,603	15,685	6,584	8,766,500	33,810	1,070,000	3,870
Northeast River	60,620	6,382	(b)	(b)	(b)	(b)	62,375	14,627	56,247	21,917	3,740,000	9,500	5,504,000	27,105
Elk River	5,244	637	4,000	478	8,850	1,600	1,053	287	1,426	524	6,736,000	11,251	3,608,950	18,194
Sassafras River	1,290	166	2,500	298	8,150	1,592	329	91	386	150	3,527,000	10,285	1,125,000	6,170
Chester River	53,507	7,918	4,475	739	4,215	1,010	5,718	1,711	1,565	574	646,500	1,771	243,000	1,057
St. Michaels River	2,215	423	...	...	...	...	...	...	...	...	...	...	...	...
Eastern Bay	...	...	...	...	...	...	5,743	1,699	2,755	991	269,500	462	95,000	355
Choptank River and tributaries	338,420	35,810	142,297	20,918	40,267	8,237	108,956	32,725	17,960	7,016	2,072,000	4,771	336,000	1,596
Honga River	...	...	1,555	266	718	148	...	...	...	...	...	...	...	...
Fishing Bay	9,790	1,174	6,000	905	10,980	1,801	800	240	...	...	4,000	20	...	...
Blackwater River	13,160	1,480	2,125	290	2,088	497	2,800	840	...	...	116,000	232	...	...
Transquaking River	13,694	1,287	4,100	553	5,618	899	9,900	2,970	...	...	33,000	83	...	...
Nanticoke River:														
Maryland	125,181	11,648	34,985	5,977	31,028	7,308	21,945	6,583	8,740	4,005	105,727	271	3,000	12
Delaware	52,467	5,155	37,097	6,315	22,450	5,321	7,700	2,310	8,950	4,019	30,000	90	17,000	170
Total	177,648	16,803	72,082	12,292	53,478	12,629	29,645	8,893	17,690	8,024	135,727	361	20,000	182
Marshyhope Creek	38,660	3,865	(c)	(c)	(c)	(c)	...	...	...	...	...	...	...	...
Wicomico River	68,015	8,480	34,348	4,500	28,370	5,946	14,475	4,242	2,374	1,092	28,000	216	...	...
Manokin River	...	...	...	...	16	5	...	...	...	...	...	...	...	...
Pocomoke:														
Virginia	...	...	2,137	414	1,550	380	5,600	1,960	...	...	55,000	412	...	...
Maryland	29,752	4,304	28,575	4,004	13,995	3,179	24,130	8,445	9,734	3,977	30,000	75	...	...
Total	29,752	4,304	30,712	4,418	15,545	3,559	29,730	10,405	9,734	3,977	85,000	487	...	...
Tangier Sound:														
Virginia	21,257	2,422	...	...	...	...	49,776	17,317	42,916	16,743	642,000	1,685	1,311,400	5,246
Maryland	1,416	163	800	155	1,090	153	55,272	17,530	32,065	12,578	418,273	1,032	250,300	1,001
Total	22,673	2,585	800	155	1,090	153	105,048	34,847	74,981	29,321	1,060,273	2,717	1,561,700	6,247
Pocomoke Sound:														
Virginia	8,320	947	...	...	...	...	15,400	5,390	5,157	1,940	305,000	1,376	103,500	414
Maryland	7,149	801	2,900	560	5,360	814	2,500	875	1,965	774	55,000	136	40,000	160
Total	15,469	1,748	2,900	560	5,360	814	17,900	6,265	7,122	2,714	360,000	1,512	143,500	574
Grand total	4,867,619	490,757	3,025,165	516,339	2,952,042	624,152	2,924,018	785,739	2,129,486	857,771	128,618,249	284,039	71,571,278	297,899

a Includes all tributaries of Chesapeake Bay except the James, Potomac, and Pocomoke Rivers. b Included with Chesapeake Bay. c Included with Nanticoke River.

NUMBER OF POUND NETS, THE CATCH OF SHAD AND ALEWIVES, AND THE AVERAGE CATCH OF EACH SPECIES PER NET FOR CERTAIN SECTIONS OF CHESAPEAKE BAY AND POTOMAC RIVER, 1915.

Locality.	Number of pound nets.	Number of shad.	Number of alewives.	Average number of shad to net.	Average number of alewives to net.
From Cape Henry to Tue Point (lower side of York River mouth)	496	268,374	1,974,490	541	3,980
From York Spit (inclusive) to Stingray Point	623	491,196	4,437,345	772	7,122
From Rappahannock Spit (inclusive) to Smith Point	276	291,266	21,667,166	1,054	78,504
Potomac River	211	147,271	7,336,000	697	34,760

COASTAL FISHERIES OF NEW YORK AND NEW JERSEY.

Following a conference with the fishery authorities of the States of New York and New Jersey in January, 1916, regarding the condition of the coastal fisheries of those States and the measures necessary for their conservation, the Bureau undertook, by request, the canvass of those fisheries so that their actual extent might be known. The field work was completed in June and the results of the canvass were communicated to those interested. The figures related to the calendar year 1915 and covered only fishes proper.

In New York the number of persons engaged in the coastal fisheries was 2,504, and the investment in vessels, boats, fishing apparatus, and shore and accessory property was $1,771,166. The products amounted to 34,047,775 pounds of fish, valued at $1,121,641. Some of the more important species taken were bluefish, 6,107,113 pounds, valued at $492,928; butterfish, 1,244,475 pounds, valued at $51,636; cod, 1,259,160 pounds, valued at $59,400; eels, 426,330 pounds, valued at $34,387; flounders, 3,440,053 pounds, valued at $96,337; mackerel, 342,489 pounds, valued at $25,620; menhaden, 14,518,812 pounds, valued at $100,935; scup, 1,026,736 pounds, valued at $44,447; sea bass, 973,686 pounds, valued at $44,894; and squeteague, 1,859,143 pounds, valued at $98,324.

In New Jersey there were 2,303 persons employed in the coastal fisheries, and the investment amounted to $1,192,057. The products aggregated 47,856,176 pounds of fish, valued at $1,348,667. The species taken in largest quantities were bluefish, 2,728,779 pounds, valued at $177,906; butterfish, 5,462,917 pounds, valued at $151,677; cod, 679,133 pounds, valued at $31,896; croaker, 2,084,719 pounds, valued at $47,366; eels, 377,698 pounds, valued at $28,257; flounders, 1,531,376 pounds, valued at $58,443; mackerel, 367,307 pounds, valued at $26,161; menhaden, 4,354,789 pounds, valued at $36,602; scup, 3,279,693 pounds, valued at $94,776; sea bass, 6,171,922 pounds, valued at $203,163; squeteague, 14,121,330 pounds, valued at $358,977; and whiting, 2,407,217 pounds, valued at $36,367.

The statistics of these fisheries, by counties, are given in detail in the following table:

STATISTICS OF COASTAL FISHERIES OF NEW YORK AND NEW JERSEY, BY COUNTIES, EXCLUSIVE OF SHELLFISH, 1915.

NEW YORK.

Items.	Kings, New York, Queens, and Richmond Counties.		Nassau County.		Suffolk County.		Total.	
	Number.	*Value.*	*Number.*	*Value.*	*Number.*	*Value.*	*Number.*	*Value.*
Persons engaged	841		119		1,544		2,504	
Vessels fishing	57	$306,395	4	$5,850	84	$763,896	145	$1,076,141
Tonnage	2,576		32		2,371		4,979	
Outfit		145,225		620		49,256		195,101
Vessels transporting					21	52,720	21	52,720
Tonnage					266		266	
Outfit						2,240		2,240
Sail, row, and house boats	11	225	39	890	474	16,160	524	17,275
Gasoline boats	4	2,850	34	14,750	282	112,025	320	129,625
Pound nets	4	2,800			460	114,215	464	117,015
Seines	20	17,900	23	1,173	117	37,010	160	56,083
Gill nets	100	1,100	84	3,375	469	11,670	653	16,145
Fyke nets					5,373	24,152	5,373	24,152
Lines		4,500		635		1,838		6,973
Otter trawls					156	3,815	156	3,815
Eelpots	250	275	390	430	5,055	5,503	5,695	6,208
Other apparatus				2,276		112		2,388
Shore and accessory property		650		1,050		63,585		65,285
Total		481,020		31,049		1,258,197		1,771,166
Products:	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*
Albacore and horse mackerel	430	$25			4,450	$129	4,880	$154
Alewives	11,000	140	500	$10	523,605	7,214	535,105	7,364
Bluefish	5,790,205	466,522	27,200	2,690	289,708	23,716	6,107,113	492,928
Bonito	1,054	100	300	30	11,795	1,157	13,149	1,287
Butterfish	60,000	1,800			1,184,475	49,836	1,244,475	51,636
Carp					102,300	7,592	102,300	7,592
Cod	723,375	32,855	201,000	9,550	334,785	16,995	1,259,160	59,400
Croaker	14,949	336			10,000	350	24,949	686
Eel	5,630	532	32,900	3,395	387,800	30,460	426,330	34,387
Flounders	28,123	838	115,000	3,240	3,296,930	92,259	3,440,053	96,337
Haddock	34,041	1,238	2,000	100	49,550	2,573	85,591	3,911
Hake	2,044	63	8,500	200	52,725	1,238	63,269	1,501
Hog choker					7,200	60	7,200	60
Kingfish	89	18			31,005	3,170	31,094	3,188
Mackerel	9,360	968	6,800	630	326,329	24,022	342,489	25,620
Menhaden	2,632,100	19,307	6,000	60	11,880,712	81,568	14,518,812	100,935
Mullet, fresh					5,113	203	5,113	203
Mummichog			8,000	40	138,250	1,023	146,250	1,063
Pike					800	96	800	96
Pollock	16,170	529	30,000	900	35,540	1,465	81,710	2,894
Scup, or porgy	511,476	20,574			515,260	23,873	1,026,736	44,447
Sea bass	270,263	14,398	150,000	2,500	553,423	27,996	973,686	44,894
Sea robins	2,657	29			97,905	1,251	100,562	1,280
Shad	5,250	785			14,705	1,365	19,955	2,150
Sharks	20,975	84			19,225	192	40,200	276
Skates	7,700	77			204,463	1,360	212,163	1,437
Smelt			2,300	350	4,450	1,320	6,750	1,670
Spanish mackerel	529	162	50	10	20	2	599	174
Spot					1,500	60	1,500	60
Squeteague	592,254	22,477	56,950	3,022	1,209,939	72,825	1,859,143	98,324
Squid	1,200	12			556,425	8,306	557,625	8,318
Striped bass			2,200	344	14,700	2,460	16,900	2,804
Sturgeon					3,826	673	3,826	673
Sturgeon caviar					241	248	241	248
Swellfish					50,225	370	50,225	370
Swordfish					7,362	756	7,362	756
Tautog	881	38	100	5	98,100	3,989	99,081	4,032
Tilefish	a 183,484	7,748					183,484	7,748
Tomcod					70,157	2,716	70,157	2,716
White bait					28,200	2,220	28,200	2,220
White perch					19,400	2,038	19,400	2,038
Whiting	1,000	10			328,925	3,742	329,925	3,752
Other fish					213	12	213	12
Total	10,926,239	591,665	649,800	27,076	22,471,736	502,900	34,047,775	1,121,641

a Landed by New York vessels and does not include tilefish landed at New York by vessels from other ports.

STATISTICS OF COASTAL FISHERIES OF NEW YORK AND NEW JERSEY, BY COUNTIES, EXCLUSIVE OF SHELLFISH, 1915—Continued.

NEW JERSEY.

Items.	Atlantic County.		Bergen and Hudson Counties.[a]		Cape May County.		Middlesex County.	
	Number.	*Value.*	*Number.*	*Value.*	*Number.*	*Value.*	*Number.*	*Value.*
Persons engaged	298		43		680		54	
Vessels fishing	19	$71,485			25	$74,690		
Tonnage	349				330			
Outfit		25,130				32,725		
Vessels transporting	2	3,500			1	50		
Tonnage	15				10			
Outfit		45						
Sail, row, and house boats	63	1,720	16	$742	38	480	21	$900
Gasoline boats	34	12,250	4	900	130	69,600	8	2,400
Pound nets	3	1,950			58	128,325	1	600
Seines	42	1,722	5	215	21	3,988	10	4,175
Gill nets	45	1,785	10	1,315	192	15,912		
Fyke nets	11	460	26	400	48	2,050	4	200
Bag nets	15	375						
Lines		624		10		3,186		
Eelpots	50	45	4	6	202	325	98	98
Other apparatus				75				
Shore and accessory property		2,420		1,436		38,840		550
Total		123,511		5,099		370,171		8,923
Products:	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*
Albacore and horse mackerel	800	$11			10,220	$172		
Alewives	13,862	329	300	$30	29,500	474	7,500	$100
Bluefish	163,664	12,001			874,335	55,620	18,900	915
Bonito	800	48			17,469	857		
Butterfish	49,205	1,041			2,166,453	61,712		
Carp			10,650	1,157			12,500	1,100
Cod	201,000	9,330			261,870	12,842		
Croaker	297,278	6,488			1,063,735	24,515		
Drum	480	5			5,550	63		
Eel	5,875	419	8,025	670	42,885	4,669	1,800	127
Flounders	68,744	2,728			318,044	11,748	4,400	107
Haddock					200	10		
Hake	200	3			1,249	37		
Kingfish	24,068	2,150			17,429	1,925		
Mackerel	152,125	10,860			148,232	10,509		
Menhaden	1,200,000	14,000			101,381	508	112,569	236
Mullet, fresh	5,500	103			34,750	990		
Mullet, salted					500	50		
Pollock					325	4		
Scup, or porgy	840,400	25,109			1,887,117	53,090		
Sea bass	1,522,238	49,280			3,943,624	123,796		
Shad	115	19	20,104	2,674	170	20	1,705	312
Sharks					10,198	143		
Skates	1,200	11			89,180	911		
Smelt							6,000	1,200
Spanish mackerel					270	39		
Spot	4,175	132			13,085	304	2,000	60
Squeteague	1,634,099	42,613			4,331,759	122,331	88,200	3,013
Squid	500	6			289,826	3,617		
Striped bass	7,080	1,384					200	25
Sturgeon					65	4		
Suckers	3,550	226	15,000	1,645				
Tautog	600	12			760	19		
White perch	27,159	2,373			1,575	145	75	6
Whiting					2,000	33		
Yellow perch	165	15			450	22		
Other fish	1,200	83	5,035	495	180	19		
Total	6,226,082	180,782	59,114	6,671	15,664,386	491,288	255,849	7,291

[a] Includes men, boats, apparatus, and shore property employed and catch of fish taken in Upper New York Bay and Hackensack River, and also men, boats, apparatus, and shore property employed and catch of shad taken in Hudson River.

STATISTICS OF COASTAL FISHERIES OF NEW YORK AND NEW JERSEY, BY COUNTIES, EXCLUSIVE OF SHELLFISH, 1915—Continued.

NEW JERSEY—Continued

Items.	Monmouth County.		Ocean and Burlington Counties.		Total.	
	Number.	*Value.*	*Number.*	*Value.*	*Number.*	*Value.*
Persons engaged	582		646		2,303	
Vessels fishing	3	$7,300	1	$1,500	48	$154,975
Tonnage	38		6		723	
Outfit		3,900		80		61,835
Vessels transporting	2	11,000			5	14,550
Tonnage	21				46	
Outfit		1,450				1,495
Sail, row, and house boats	67	1,655	206	10,436	411	15,933
Gasoline boats	179	78,150	154	55,100	509	218,400
Pound nets	65	83,090	47	127,800	174	341,765
Seines	8	2,440	46	2,410	132	14,950
Gill nets	155	8,050	1,359	10,626	1,761	37,688
Fyke nets	103	1,430	778	5,660	970	10,200
Bag nets			75	1,900	90	2,275
Lines		2,327		725		6,872
Otter trawls			1	20	1	20
Eelpots	1,424	1,822	3,461	2,685	5,239	4,981
Other apparatus		7		30		112
Shore and accessory property		118,725		144,035		306,006
Total		321,346		363,007		1,192,057
Products:	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*
Albacore and horse mackerel	14,255	$654	44,987	$1,095	70,262	$1,932
Alewives	214,270	2,153	351,865	3,779	617,297	6,865
Bluefish	1,402,898	87,697	268,982	21,670	2,728,779	177,906
Bonito	23,175	1,908	75,878	6,291	117,322	9,104
Butterfish	711,881	22,297	2,535,378	66,627	5,462,917	151,677
Carp					23,150	2,257
Cod	122,908	5,697	93,355	4,027	679,133	31,896
Croaker	288,080	7,178	435,626	9,185	2,084,719	47,366
Drum	8,600	86			14,630	154
Eel	131,238	9,161	187,875	13,211	377,698	28,257
Flounders	373,415	15,297	766,773	28,473	1,531,376	58,443
Goosefish	40,000	125			40,000	125
Haddock					200	10
Hake	727,493	9,305	439,683	4,638	1,168,625	13,983
Hickory shad	3,500	165			3,500	165
Kingfish	5,910	904	13,190	2,188	60,597	7,167
Mackerel	50,175	3,490	16,775	1,302	367,307	26,161
Menhaden	2,765,830	20,142	175,000	1,626	4,354,789	36,602
Mullet, fresh	22,750	910			63,000	2,003
Mullet, salted					500	50
Pollock	3,500	111	8,099	267	12,824	382
Round herring	35,432	717			35,432	717
Scup, or porgy	164,950	5,092	387,226	10,585	3,279,693	94,776
Sea bass	327,800	16,339	378,260	13,748	6,171,922	203,163
Sea robins	35,500	425	41,375	620	76,875	1,045
Shad	12,813	2,183	7,230	1,060	42,137	6,268
Sharks	84,550	748	17,800	175	112,548	1,066
Skates	272,470	1,600	150,716	857	513,566	3,379
Smelt					6,000	1,200
Spanish mackerel	164	34	621	109	1,055	182
Spot	18,950	431	28,450	740	66,660	1,667
Squeteague	3,055,048	86,973	5,012,224	104,047	14,121,330	358,977
Squid	157,370	2,125	525,975	7,082	973,671	12,830
Striped bass	220	44	7,148	1,770	14,648	3,223
Sturgeon	2,788	435	500	50	3,353	489
Sturgeon caviar	270	272			270	272
Suckers			8,700	586	27,250	2,457
Tautog	40,650	1,772	3,000	105	45,010	1,908
Tilefish	30	3			30	3
Toadfish	5,800	80			5,800	80
White bait	750	33			750	33
White perch			136,130	12,881	164,939	15,405
Whiting	1,754,995	26,636	650,222	9,698	2,407,217	36,367
Yellow perch					615	87
Other fish			365	21	6,780	618
Total	12,880,428	334,122	12,770,317	328,513	47,856,176	1,348,667

SHAD FISHERY OF THE HUDSON RIVER.

In connection with the canvass of the coastal fisheries of New York and New Jersey the shad fishery of the Hudson River was covered for the years 1915 and 1916. The statistics are given in the following table, showing for the latter year 119 fishermen, 79 gill nets, 3 seines, and a catch of 9,287 shad, valued at $5,465. The Hudson was at one time one of the great shad streams, its annual output running into the hundreds of thousands. Thus, in 1896 the number of shad taken was 588,898, valued at $83,237. The present condition of the shad fishery is most deplorable.

SHAD FISHERY OF THE HUDSON RIVER, 1915 AND 1916.[a]

1915.

Items.	New York.			New Jersey.			Total.		
	No.	*Lbs.*	*Value.*	*No.*	*Lbs.*	*Value.*	*No.*	*Lbs.*	*Value.*
Fishermen	133			27			160		
Sail and row boats	81		$2,975	7		$430	88		$3,405
Gasoline boats	2		225	2		600	4		825
Gill nets	79		3,984	7		1,035	86		5,019
Seines	2		190				2		190
Shore and accessory property			528			1,230			1,758
Total			7,902			3,295			11,197
Shad caught:									
With gill nets	11,333	47,333	5,834	4,249	20,104	2,674	15,582	67,437	8,508
With seines	62	298	33				62	298	33
With other apparatus incidentally	211	933	102				211	933	102
Total	11,606	48,564	5,969	4,249	20,104	2,674	15,855	68,668	8,643

1916.

Items.	New York.			New Jersey.			Total.		
	No.	*Lbs.*	*Value.*	*No.*	*Lbs.*	*Value.*	*No.*	*Lbs.*	*Value.*
Fishermen	108			11			119		
Sail and row boats	64		$2,240	3		$195	67		$2,435
Gasoline boats	2		225	1		350	3		575
Gill nets	76		2,937	3		480	79		3,417
Seines	3		350				3		350
Shore and accessory property			528			540			1,068
Total			6,280			1,565			7,845
Shad caught:									
With gill nets	7,536	31,670	4,399	1,500	7,250	925	9,036	38,920	5,324
With seines	191	1,008	99				191	1,008	99
With other apparatus incidentally	60	245	42				60	245	42
Total	7,787	32,923	4,540	1,500	7,250	925	9,287	40,173	5,465

[a] Includes Albany, Columbia, Dutchess, Green, Orange, Rennselaer, Rockland, Schuyler, Ulster, and Weschester Counties in New York, and Bergen and Hudson Counties in New Jersey.

NEW ENGLAND VESSEL FISHERIES.

Statistics of the extensive offshore vessel fisheries centering at Boston and Gloucester, Mass., have been collected during the year by the local agents, and published in monthly and annual bulletins showing, by species and fishing grounds, the quantities and values of the fishery products landed by the American fishing vessels at these ports.

The fleet in 1915 was composed of 410 sail, steam, and gasoline screw vessels. These vessels landed at Boston 3,772 trips, aggregating

97,899,487 pounds of fish, valued at $2,911,314, and at Gloucester 3,472 trips, aggregating 73,696,241 pounds, valued at $1,826,603. The total for the two ports was 7,244 trips, aggregating 171,595,728 pounds of fresh and salted fish, having a value to the fishermen of $4,737,917. Compared with the previous year there was a decrease of 354 trips, but an increased production amounting to 9,006,508 pounds in quantity and $342,887 in value. There was a small decrease in the catch of cod, but an increase in that of practically all the other important species. The value of haddock and cusk was slightly less than that of the previous year. The halibut product increased 491,100 pounds in quantity and $46,946 in value. The mackerel catch increased 6,688,850 pounds, or over 63 per cent, in quantity, and $259,354, or 73 per cent, in value. There was some decrease in the take of Newfoundland herring, but an increase in the value. Swordfish increased 739,123 pounds in quantity and $43,890 in value.

The following tables present in detail (1) by fishing grounds and (2) by months the products of the vessel fisheries of Boston and Gloucester during the calendar year 1915. 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. The grades, or sizes, given for certain species are those recognized in the trade.

QUANTITIES AND VALUES OF CERTAIN FISHERY PRODUCTS LANDED AT BOSTON AND GLOUCESTER, MASS., BY AMERICAN FISHING VESSELS DURING THE CALENDAR YEAR 1915, SHOWN BY FISHING GROUNDS.

Fishing grounds.	Number of trips.	Cod.											
		Large (10 pounds and over).				Market (under 10 and over 2½ pounds).				Scrod (1 to 2½ pounds).			
		Fresh.		Salted.		Fresh.		Salted.		Fresh.		Salted.	
		Pounds.	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*
LANDED AT BOSTON.													
East of 66° west longitude.													
La Have Bank	25	141,030	$5,383			155,543	$3,288			20,000	$261		
Western Bank	36	172,639	5,046			204,735	3,730			20,400	227		
Quereau Bank	2	15,000	400										
Green Bank	1												
Grand Bank	3	4,285	563			4,210	86						
St. Peters Bank	1	3,300	164										
Off Newfoundland	4												
Cape North	1	1,300	36										
Cape Shore	167	415,194	14,881			554,093	11,212			85,393	871		
Gulf of St. Lawrence	5	3,065	121			3,465	89			1,950	22		
St. Anns Bank	2	3,390	102			1,660	33			175	4		
The Gully	1	11,100	461			8,000	187						
Roseway Bank	1	1,000	25										
West of 66° west longitude.													
Browns Bank	282	1,343,950	50,449			2,235,641	45,333			216,774	2,799	695	$14
Georges Bank	507	1,519,392	66,574			2,753,489	64,879			142,071	2,147		
Cashes Bank	33	64,870	3,311			84,660	2,083			8,627	111		
Clark Bank	5	22,295	1,088			60,202	1,368			2,325	21		
Fippenies Bank	10	14,170	755			25,355	626			1,835	23		
Tillies Bank	1	570	48			1,070	43			540	8		
Middle Bank	222	159,055	8,531			208,112	5,666			28,086	423		
Jeffreys Ledge	541	345,375	16,895			457,004	13,147			42,222	712		
Ipswich Bay	50	145,566	5,913			60,260	1,597			3,667	61		
South Channel	516	663,110	40,226			1,883,970	53,989			241,555	3,530		
Nantucket Shoals	62	114,508	5,843			567,113	13,558			47,352	576		
Off Highland Light	9	5,740	355			6,175	235			835	12		
Off Chatham	494	1,365,015	66,469			2,261,528	53,368			226,330	2,758		
Off Race Point	61												
Bay of Fundy	5	7,730	216			13,965	235			340	4		
Seal Island	1	6,830	126			7,045	93			275	2		

South	4	...	...	...	...	...	...	...	...	...	...	...	...
Shore, general	720	632,203	23,526	...	...	370,919	9,066	...	...	19,005	285	...	...
Total	3,772	7,181,682	317,507	...	...	11,928,214	283,911	...	...	1,109,757	14,857	695	14
LANDED AT GLOUCESTER.													
East of 66° west longitude.													
La Have Bank	28	71,930	1,383	30,195	$1,062	203,399	3,009	52,010	$1,702	11,575	87	12,960	285
Western Bank	58	823,735	15,644	122,871	4,350	1,231,960	18,246	107,185	3,590	47,389	364	16,475	443
Quereau Bank	44	369,297	7,417	993,996	35,608	344,580	5,394	650,111	22,403	10,395	78	96,010	2,410
Green Bank	5	45,430	862	15,020	456	900	13	5,240	180	...	...	...	...
Grand Bank	42	348,405	6,882	1,021,825	36,002	14,775	232	358,239	11,707	...	...	15,450	392
St. Peters Bank	2	...	...	12,950	494	...	...	2,920	100	...	...	...	...
Sambro Bank	2	13,015	247	100	4	15,285	229	260	8	...	...	330	7
Burgeo Bank	2	31,200	583	15,460	661	2,150	32	5,290	189	...	...	...	...
Bacalieu Bank	3	5,280	100	62,855	2,190	430	6	9,065	294	...	...	475	11
Off Newfoundland	46	18,100	344	1,303,721	46,544	6,350	95	162,905	5,309	...	...	...	...
Cape North	1	...	...	40,360	1,413	...	...	13,265	431	...	...	150	5
Cape Shore	30	161,477	3,232	55,621	1,936	211,480	2,984	51,700	1,706	21,915	165	6,405	148
Gulf of St. Lawrence	60	2,493,260	49,286	2,160,188	75,697	1,279,370	22,235	1,466,098	47,640	20,585	255	81,270	2,140
St. Anns Bank	8	218,495	4,183	26,640	932	302,345	4,536	24,540	698	17,720	133	800	18
The Gully	14	165,370	3,218	55,690	2,305	39,887	598	15,900	593	150	6	365	9
Labrador Coast	1	...	...	13,120	459	...	...	4,855	158	...	...	...	...
West of 66° west longitude.													
Browns Bank	70	561,276	11,001	32,665	1,240	891,764	14,037	27,845	937	65,881	504	5,376	117
Georges Bank	161	395,993	8,680	686,464	29,068	1,385,379	23,534	1,007,460	36,037	37,539	296	51,756	1,524
Cashes Bank	8	13,540	266	...	...	24,805	393	...	...	2,950	22	...	...
Fippenies Bank	1	...	...	...	...	...	...	...	...	...	...	...	...
Middle Bank	75	...	...	...	...	...	...	...	...	...	...	...	...
Jeffreys Ledge	5	9,950	199	...	...	9,090	146	...	...	930	7	...	...
Ipswich Bay	6	103,745	2,075	...	...	11,045	177	...	...	2,005	15	...	...
South Channel	13	5,130	104	...	...	115,330	2,010	...	...	5,270	39	...	...
Nantucket Shoals	18	82,445	1,635	21,810	872	68,526	1,085	26,265	920	765	6	720	22
Off Race Point	2	...	...	...	...	...	...	...	...	...	...	...	...
Bay of Fundy	1	1,000	20	...	...	3,980	60	...	...	...	...	...	...
Shore, general	2,766	1,448,779	53,036	8,374	414	63,080	1,072	3,092	123	10,640	80	4,366	131
Total	3,472	7,386,852	170,397	6,679,925	241,707	6,225,910	100,123	3,994,245	134,725	255,709	2,057	292,908	7,662
Grand total	7,244	14,568,534	487,904	6,679,925	241,707	18,154,124	384,034	3,994,245	134,725	1,365,466	16,914	293,603	7,676

QUANTITIES AND VALUES OF CERTAIN FISHERY PRODUCTS LANDED AT BOSTON AND GLOUCESTER, MASS., BY AMERICAN FISHING VESSELS DURING THE CALENDAR YEAR 1915, SHOWN BY FISHING GROUNDS—Continued.

Fishing grounds.	Haddock.						Hake.					
	Large (over 2½ pounds).				Scrod (1 to 2½ pounds).		Large (6 pounds and over).				Small (under 6 pounds).	
	Fresh.		Salted.		Fresh.		Fresh.		Salted.		Fresh.	
	Pounds.	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*
LANDED AT BOSTON.												
East of 66° west longitude.												
La Have Bank	378,625	$12,403			31,242	$523	33,250	$911			67,710	$958
Western Bank	2,160,230	38,661			179,995	1,815	10,000	200			7,045	133
Grand Bank											225	3
St. Peters Bank							2,800	70				
Cape North							3,800	49				
Cape Shore	1,637,452	45,100			92,330	1,129	94,955	3,540	5,000	$75	118,975	2,426
Gulf of St. Lawrence	76,360	2,512			3,560	38	1,300	52			1,500	25
St. Anns Bank	25,900	616			100	2	2,885	87			1,580	27
The Gully							4,900	245			2,400	96
Roseway Bank	2,675	47										
West of 66° west longitude.												
Browns Bank	7,438,830	201,325			717,381	9,930	265,403	11,126			358,607	8,701
Georges Bank	3,974,542	103,064			1,869,868	36,671	58,612	1,098			41,060	686
Cashes Bank	38,200	957			2,960	36	162,102	4,754			289,979	4,393
Clark Bank	166,495	3,376			36,075	200	300	6			3,850	50
Fippenies Bank	12,040	309			2,675	30	30,065	1,058			42,910	841
Tillies Bank	2,300	58			1,060	11					4,000	48
Middle Bank	849,883	36,111			302,696	6,425	174,522	6,842			553,474	11,384
Jeffreys Ledge	1,587,032	73,835			552,373	12,707	304,100	12,084			1,350,172	27,153
Ipswich Bay	9,327	341			665	6	3,105	76			8,560	128
South Channel	11,464,217	311,271			6,225,145	76,898	564,687	15,590			1,461,593	22,504
Nantucket Shoals	83,175	2,178			21,220	172	18,950	709			26,735	497
Off Highland Light	37,585	1,717			9,115	203	7,640	257			18,030	295
Off Chatham	5,618,771	161,469			1,634,349	16,524	256,365	7,404			750,515	12,215
Bay of Fundy	17,175	569			3,290	39	70,360	1,996			123,645	1,469
Seal Island	6,970	181			800	8	5,360	107			1,980	23
Shore, general	447,312	18,123			117,470	2,697	767,145	24,929			1,585,752	25,899
Total	36,035,096	1,014,223			11,804,369	166,064	2,842,606	93,190	5,000	75	6,820,297	119,954

LANDED AT GLOUCESTER.												
East of 66° west longitude.												
La Have Bank	230,660	2,408	11,035	$193	....	....	964,811	11,530	28,680	453	....	....
Western Bank	987,020	10,189	9,695	183	27,120	184	1,165,560	14,164	45,798	800	....	....
Quereau Bank	108,810	1,091	2,960	52	....	....	110,230	1,297	23,633	398	....	....
Green Bank	....	....	....	....	....	....	14,615	183	3,385	60	....	....
Grand Bank	....	....	14,075	246	....	....	33,975	415	81,640	1,282	....	....
St. Peters Bank	....	....	....	....	....	....	435	5	5,200	91	....	....
Sambro Bank	6,780	71	....	....	....	....	171,880	2,149	....	....	....	....
Burgeo Bank	....	....	....	....	....	....	1,675	17	....	....	....	....
Bacalieu Bank	....	....	....	....	....	....	....	....	975	17	....	....
Off Newfoundland	100	1	....	....	....	....	1,135	11	....	....	....	....
Cape North	....	....	50	1	....	....	....	....	13,585	238	....	....
Cape Shore	115,250	2,780	5,584	98	520	3	341,890	4,226	29,270	512	....	....
Gulf of St. Lawrence	8,785	91	17,490	352	1,115	20	84,905	937	28,266	474	....	....
St. Anns Bank	12,760	140	30	1	....	....	10,730	134	3,375	59	....	....
The Gully	5,230	53	....	....	....	....	78,240	1,213	7,105	120	....	....
West of 66° west longitude.												
Browns Bank	1,410,412	17,601	5,215	91	12,540	122	506,533	5,849	11,915	207	....	....
Georges Bank	4,835,132	50,480	61,926	1,100	777,965	5,693	69,442	838	2,646	43	....	....
Cashes Bank	12,070	126	....	....	....	....	244,600	2,467	....	....	....	....
Fippenies Bank	....	....	....	....	....	....	13,675	137	....	....	....	....
Jeffreys Ledge	1,075	11	....	....	....	....	78,435	784	....	....	....	....
Ipswich Bay	1,725	17	....	....	....	....	5,885	59	....	....	....	....
South Channel	400,245	4,128	....	....	235,625	1,639	29,690	367	....	....	....	....
Nantucket Shoals	740	8	2,300	40	....	....	....	....	....	....	....	....
Bay of Fundy	....	....	....	....	....	....	46,900	469	....	....	....	....
Shore, general	776,216	28,242	234	4	5,690	67	951,171	17,075	10,152	178	....	....
Total	8,913,010	117,437	130,594	2,361	1,060,575	7,728	4,926,412	64,326	295,625	4,932	....	....
Grand total	44,948,106	1,131,660	130,594	2,361	12,864,944	173,792	7,769,018	157,516	300,625	5,007	6,820,297	119,954

QUANTITIES AND VALUES OF CERTAIN FISHERY PRODUCTS LANDED AT BOSTON AND GLOUCESTER, MASS., BY AMERICAN FISHING VESSELS DURING THE CALENDAR YEAR 1915, SHOWN BY FISHING GROUNDS—Continued.

Fishing grounds.	Pollock.				Cusk.				Halibut.			
	Fresh.		Salted.		Fresh.		Salted.		Fresh.		Salted.	
	Pounds.	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*
LANDED AT BOSTON.												
East of 66° west longitude.												
La Have Bank	17,428	$277			76,088	$1,132			16,647	$1,998		
Western Bank	18,680	419			1,995	29			22,504	2,354		
Quereau Bank									8,338	577		
Green Bank									50,000	3,500		
Grand Bank	555	11							60,000	3,760		
St. Peters Bank									30,000	2,400		
Off Newfoundland									55,000	4,400		
Cape North									35,000	3,150		
Cape Shore	51,987	1,204			155,595	2,222			28,743	3,823		
Gulf of St. Lawrence									160,000	10,400		
St. Anns Bank									47	3		
The Gully	185	3			200	3						
Roseway Bank									231	19		
West of 66° west longitude.												
Browns Bank	334,799	7,051			1,371,140	20,386			191,392	28,372		
Georges Bank	484,521	10,775			71,058	1,071			124,512	16,700		
Cashes Bank	22,490	550			190,171	3,079			2,023	261		
Clark Bank	5,355	104			10,135	130			2,406	354		
Fippenies Bank	6,345	161			49,985	854			420	70		
Tillies Bank	1,350	44			600	4						
Middle Bank	253,397	6,441			180,963	3,345			8,687	1,225		
Jeffreys Ledge	998,231	29,054			479,261	8,541			7,771	1,348		
Ipswich Bay	17,700	415			9,100	165			31	4		
South Channel	498,737	12,101			148,307	2,236			86,968	12,504		
Nantucket Shoals	42,275	825			12,195	215			4,173	448		
Off Highland Light	2,645	66			3,100	53			1,176	114		
Off Chatham	1,224,002	26,972			83,362	1,609			26,394	3,551		
Bay of Fundy	3.470	44			49,965	686			120	25		
Seal Island	955	12			14,720	155			584	57		
Shore, general	299,340	7,204			413,741	7,212			7,242	910		
Total	4,284,447	103,733			3,321,681	53,127			930,409	102,327		

LANDED AT GLOUCESTER.												
East of 66° west longitude.												
La Have Bank	28,530	267	5,795	$102	539,944	7,563	5,295	$133	80,412	6,544	....	....
Western Bank	58,525	536	3,635	64	462,095	6,764	14,125	353	244,487	19,626	2,525	$152
Quereau Bank	4,461	45	8,193	144	38,449	569	12,050	300	540,334	40,804	20,609	1,405
Green Bank	....	....	90	2	390	6	1,040	26	83,115	5,970	114	10
Grand Bank	....	....	7,775	136	1,820	28	3,680	91	672,373	52,750	41,035	2,462
St. Peters Bank	110	1	....	....	270	4	30	1	6,200	558	20	2
Sambro Bank	3,455	35	....	....	57,605	796	....	....	....	....	....	....
Burgeo Bank	....	....	....	....	455	7	137	3	95,092	5,545	400	40
Bacalieu Bank	....	....	....	....	....	....	415	10	31,940	1,930	1,945	117
Off Newfoundland	....	....	....	....	410	7	85	2	65,688	3,201	....	....
Cape North	....	....	280	5	....	....	2,010	50	2,500	164	510	31
Cape Shore	9,460	89	1,640	29	308,917	4,385	10,925	269	100,424	9,269	....	....
Gulf of St. Lawrence	70	1	26,972	471	15,595	228	930	21	228,504	11,969	116,621	8,575
St. Anns Bank	1,795	18	....	....	550	8	....	....	....	....	....	....
The Gully	2,835	57	255	4	10,212	151	3,075	76	266,516	22,791	275	21
Labrador Coast	....	....	....	....	....	....	....	....	....	....	102,151	8,673
West of 66° west longitude.												
Browns Bank	58,820	593	1,950	31	864,602	13,196	8,200	206	64,784	4,522	....	....
Georges Bank	151,978	1,500	173,359	2,995	153,170	2,161	31,150	761	171,397	13,817	305	21
Cashes Bank	8,320	75	....	....	167,068	2,417	....	....	....	....	....	....
Fippenies Bank	....	....	....	....	7,280	116	....	....	....	....	....	....
Jeffreys Ledge	870	8	....	....	91,250	1,458	....	....	....	....	....	....
Ipswich Bay	1,385	13	....	....	....	....	....	....	....	....	....	....
South Channel	4,880	44	....	....	530	7	....	....	....	....	....	....
Nantucket Shoals	2,945	26	2,850	50	....	....	....	....	....	....	....	....
Bay of Fundy	360	3	....	....	940	15	....	....	....	....	....	....
Shore, general	8,338,067	142,144	1,846	37	192,568	2,990	1,796	45	....	....	....	....
Total	8,676,866	145,455	234,640	4,070	2,914,120	42,876	94,943	2,347	2,653,766	199,460	286,510	21,509
Grand total	12,961,313	249,188	234,640	4,070	6,235,801	96,003	94,943	2,347	3,584,175	301,787	286,510	21,509

QUANTITIES AND VALUES OF CERTAIN FISHERY PRODUCTS LANDED AT BOSTON AND GLOUCESTER, MASS., BY AMERICAN FISHING VESSELS DURING THE CALENDAR YEAR 1915, SHOWN BY FISHING GROUNDS—Continued.

Fishing grounds.	Mackerel.											
	Large (over 2¼ pounds).				Medium (1½ to 2¼ pounds).				Small (under 1½ pounds).			
	Fresh.		Salted.		Fresh.		Salted.		Fresh.		Salted.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
LANDED AT BOSTON.												
East of 66° west longitude.												
Cape Shore	258,790	$26,316	104,037	$4,160	269,592	$20,488	37,763	$1,781	281,792	$14,434	20,243	$810
West of 66° west longitude.												
Georges Bank	125,247	14,750	15,000	1,260	228,690	22,514	1,400	181	166,346	8,408	....	....
Middle Bank	2,399	503	161	26	5,354	454	833	100	62,568	3,104	210	17
Jeffreys Ledge	1,439	304	....	....	1,000	100	....	....	5,112	433	....	....
Ipswich Bay	....	....	....	....	1,545	170	....	....	8,420	618	....	....
South Channel	3,140	675	....	....	8,147	996	....	....	20,490	808	....	....
Nantucket Shoals	7,050	1,274	....	....	17,711	1,929	....	....	57,790	3,089	....	....
Off Chatham	26,531	994	6,000	420	37,811	2,703	36,000	2,460	197,973	10,009	20,000	660
Off Race Point	36,007	2,098	....	....	30,123	1,703	....	....	574,542	28,882	78,100	1,959
South	11,852	1,422	18,000	856	6,864	961	6,000	285	701	112	....	....
Shore, general	166,433	15,515	2,700	113	244,554	20,697	3,600	180	2,463,370	98,885	146,460	7,603
Total	638,888	63,851	145,898	6,835	851,391	72,715	85,596	4,987	3,839,104	168,782	265,013	11,049
LANDED AT GLOUCESTER.												
East of 66° west longitude.												
Cape Shore	....	....	624,700	23,958	....	....			....	....	2,200	88
Gulf of St. Lawrence	....	....	22,800	1,980	....	....	23,600	2,210	....	....	70,000	5,090
West of 66° west longitude.												
Georges Bank	5,100	391	221,700	15,596	7,600	650	....	....			....	....
Middle Bank	....	....	....	....	126,865	5,365	21,500	1,505	532,921	25,103	981,200	81,506
Nantucket Shoals	....	....	....	....	....	....	20,600	1,157	6,730	220	125,000	6,801
Off Race Point	....	....	....	....	....	....	2,000	140	13,600	945	....	....
Shore, general	51,025	3,479	....	....	14,669	782	....	....	1,256,681	40,733	962,021	68,161
Total	56,125	3,870	869,200	41,534	149,134	6,797	67,700	5,012	1,809,932	67,001	2,140,421	161,646
Grand total	695,013	67,721	1,015,098	48,369	1,000,525	79,512	153,296	9,999	5,649,036	235,783	2,405,434	172,695

Fishing grounds.	Miscellaneous.				Total.				Grand total.	
	Fresh.		Salted.		Fresh.		Salted.			
	Pounds.	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*
LANDED AT BOSTON.										
East of 66° west longitude.										
La Have Bank	6,796	$464			944,359	$27,598			944,359	$27,598
Western Bank	82,882	8,991			2,881,105	61,605			2,881,105	61,605
Quereau Bank					23,338	977			23,338	977
Green Bank					50,000	3,500			50,000	3,500
Grand Bank	360	31			69,635	4,454			69,635	4,454
St. Peters Bank	508	37			36,608	2,671			36,608	2,671
Off Newfoundland	[a] 600,000	15,900			655,000	20,300			655,000	20,300
Cape North					40,100	3,235			40,100	3,235
Cape Shore	871,924	67,023			4,916,815	214,669	167,043	$6,826	5,083,858	221,495
Gulf of St. Lawrence					251,200	13,259			251,200	13,259
St. Anns Bank					35,737	874			35,737	874
The Gully					26,785	995			26,785	995
Roseway Bank					3,906	91			3,906	91
West of 66° west longitude.										
Browns Bank	188,492	8,670			14,662,409	394,142	695	14	14,663,104	394,156
Georges Bank	1,475,094	142,324			13,034,502	491,661	16,400	1,441	13,050,902	493,102
Cashes Bank	34,858	1,814			900,940	21,349			900,940	21,349
Clark Bank	9,399	235			318,837	6,932			318,837	6,932
Fippenies Bank	6,325	118			192,125	4,845			192,125	4,845
Tillies Bank	650	21			12,140	285			12,140	285
Middle Bank	80,375	1,797			2,869,571	92,251	1,204	143	2,870,775	92,394
Jeffreys Ledge	222,079	5,632			6,353,171	201,945			6,353,171	201,945
Ipswich Bay	1,698	37			269,644	9,531			269,644	9,531
South Channel	1,028,835	34,432			24,298,901	587,760			24,298,901	587,760
Nantucket Shoals	50,361	1,708			1,070,608	33,021			1,070,608	33,021
Off Highland Light	5,483	99			97,524	3,406			97,524	3,406
Off Chatham	465,647	9,310			14,174,593	375,355	62,000	3,540	14,236,593	378,895
Off Race Point	11,949	228			652,621	32,911	78,100	1,959	730,721	34,870
Bay of Fundy	9,300	291			299,360	5,574			299,360	5,574
Seal Island	750	16			46,269	780			46,269	780
South	28,483	1,101			47,900	3,596	24,000	1,141	71,900	4,737
Shore, general	627,096	13,834			8,161,582	268,782	152,760	7,896	8,314,342	276,678
Total	5,809,344	314,113			97,397,285	2,888,354	502,202	22,960	97,899,487	2,911,314

[a] Herring.

QUANTITIES AND VALUES OF CERTAIN FISHERY PRODUCTS LANDED AT BOSTON AND GLOUCESTER, MASS., BY AMERICAN FISHING VESSELS DURING THE CALENDAR YEAR 1915, SHOWN BY FISHING GROUNDS—Continued.

Fishing grounds.	Miscellaneous.				Total.				Grand total.	
	Fresh.		Salted.		Fresh.		Salted.			
	Pounds.	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*
LANDED AT GLOUCESTER.										
East of 66° west longitude.										
La Have Bank					2,131,261	$32,791	145,970	$3,930	2,277,231	$36,721
Western Bank					5,047,891	85,717	322,309	9,935	5,370,200	95,652
Quereau Bank	138	$12			1,526,604	56,707	1,807,562	62,720	3,334,256	119,427
Green Bank					144,450	7,034	24,889	734	169,339	7,768
Grand Bank					1,071,348	60,307	1,543,719	52,318	2,615,067	112,625
St. Peters Bank					7,015	568	21,120	688	28,135	1,256
Sambro Bank					268,020	3,527	690	19	268,710	3,546
Burgeo Bank					130,572	6,184	21,287	893	151,859	7,077
Bacalieu Bank					37,650	2,036	75,730	2,639	113,380	4,675
Off Newfoundland	[a] 1,770,150	53,075	[b] 8,931,550	$186,819	1,861,933	56,734	10,398,261	238,674	12,260,194	295,408
Cape North					2,500	164	70,210	2,174	72,710	2,338
Cape Shore	9,936	696			1,281,269	27,829	788,045	28,744	2,069,314	56,573
Gulf of St. Lawrence					4,132,189	85,022	4,014,235	144,650	8,146,424	229,672
St. Anns Bank					564,395	9,152	55,385	1,708	619,780	10,860
The Gully					568,440	28,087	82,665	3,128	651,105	31,215
Labrador Coast							120,126	9,290	120,126	9,290
West of 66° west longitude.										
Browns Bank					4,436,612	67,425	93,166	2,829	4,529,778	70,254
Georges Bank					7,990,695	108,040	2,236,766	87,145	10,227,461	195,185
Cashes Bank					473,353	5,766			473,353	5,766
Fippenies Bank					20,955	253			20,955	253
Middle Bank	5,250	81			665,036	30,549	1,002,700	83,011	1,667,736	113,560
Jeffreys Ledge					191,600	2,613			191,600	2,613
Ipswich Bay	16,100	64			141,890	2,420			141,890	2,420
South Channel					796,700	8,338			796,700	8,338
Nantucket Shoals					162,151	2,980	199,545	9,862	361,696	12,842
Off Race Point					13,600	945	2,000	140	15,600	1,085
Bay of Fundy					53,180	567			53,180	567
Shore, general	2,847,995	30,824			15,956,581	320,524	991,881	69,093	16,948,462	389,617
Total	4,649,569	84,752	8,931,550	186,819	49,677,980	1,012,279	24,018,261	814,324	73,696,241	1,826,603
Grand total	10,458,913	398,865	8,931,550	186,819	147,075,265	3,900,633	24,520,463	837,284	171,595,728	4,737,917

[a] Herring, 1,768,150 pounds, value $53,045; and caplin, dried, 2,000 pounds, value $30.

[b] Herring, 8,930,800 pounds, value $186,783; and salmon, 750 pounds, value $36. Other items under "Miscellaneous" include bluebacks, 707,970 pounds, value $5,686; butterfish, 316,234 pounds, value $7,370; catfish or wolffish, 179,999 pounds, value $3,197; flounders, 652,172 pounds, value $29,884; herring, 1,977,620 pounds, value $20,381; horse mackerel, 671 pounds, value $27; redfish, 88,694 pounds, value $1,134; shad, 421,701 pounds, value $8,602; sharks, 24,418 pounds, value $246; skates, 114,876 pounds, value $1,429; swordfish, 2,238,967 pounds, value $221,559; tilefish, 28,518 pounds, value $1,102; whiting, or silver hake, 4,800 pounds, value $48; porpoise, 200 pounds, value $3; lobster, 6,000 pounds, value $1,080; turtle, 75 pounds, value $3; livers, 1,153,450 pounds, value $16,088; sounds, 100,685 pounds, value $5,947; spawn, 70,213 pounds, value $6,029; and tongues, 1,500 pounds, value $75.

Quantities and Values of Certain Fishery Products Landed at Boston and Gloucester, Mass., by American Fishing Vessels During the Year 1915, Shown by Months.

Months.	Number of trips.	Cod.											
		Large (10 pounds and over).				Market (under 10 and over $2\frac{1}{2}$ pounds).				Scrod (1 to $2\frac{1}{2}$ pounds).			
		Fresh.		Salted.		Fresh.		Salted.		Fresh.		Salted.	
		Pounds.	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*
LANDED AT BOSTON.													
January	213	521,945	$18,874	...	...	714,205	$14,510	...	...	97,582	$1,328	...	...
February	213	395,844	19,025	...	...	707,559	16,187	...	...	67,667	1,068	695	$14
March	276	728,602	31,226	...	...	760,754	18,301	...	...	78,454	1,184	...	...
April	224	704,191	19,101	...	...	730,398	12,682	...	...	64,495	759	...	...
May	233	1,029,582	27,288	...	...	1,098,431	19,076	...	...	91,000	930	...	...
June	318	980,456	44,807	...	...	1,728,108	36,084	...	...	135,247	1,414	...	...
July	425	578,066	30,251	...	...	1,391,218	32,322	...	...	93,381	1,154	...	...
August	400	549,639	31,694	...	...	1,504,854	38,797	...	...	94,489	1,290	...	...
September	388	484,308	28,457	...	...	1,198,356	32,746	...	...	124,661	1,518	...	...
October	477	420,340	27,107	...	...	862,061	28,934	...	...	92,022	1,574	...	...
November	357	372,504	22,557	...	...	583,320	18,865	...	...	85,864	1,430	...	...
December	248	416,205	17,120	...	...	648,950	15,407	...	...	84,895	1,208	...	...
Total	3,772	7,181,682	317,507	...	...	11,928,214	283,911	...	...	1,109,757	14,857	695	14
LANDED AT GLOUCESTER.													
January	243	370,890	12,160	127,079	$5,316	221,035	3,105	28,660	$1,197	15,725	118	1,625	49
February	127	89,351	4,131	24,170	915	35,475	591	7,905	304	4,820	36	240	8
March	412	330,730	11,817	84,729	3,910	121,600	2,047	29,605	1,243	6,420	59	725	22
April	562	1,285,754	28,447	368,255	14,625	866,509	12,798	225,665	7,552	34,859	262	1,905	58
May	292	898,669	18,612	219,985	8,901	755,470	11,666	185,983	6,577	53,904	416	5,282	159
June	225	1,311,015	25,137	1,650,650	58,061	702,025	10,809	1,057,747	34,712	22,070	190	52,099	1,567
July	154	834,553	18,556	1,649,330	58,861	1,007,968	18,582	1,915,270	30,238	31,965	314	64,380	1,680
August	200	790,938	15,345	563,039	20,227	932,505	15,170	423,443	14,445	27,327	209	31,890	794
September	181	775,313	14,318	759,375	27,441	868,886	14,066	600,773	20,813	25,845	203	97,922	2,449
October	224	259,758	5,978	861,459	30,061	415,107	6,801	411,295	13,931	11,815	93	28,696	664
November	453	254,963	9,799	219,177	7,638	152,285	2,280	25,619	863	14,279	107	2,365	49
December	399	184,918	6,097	152,677	5,751	147,045	2,208	82,280	2,850	6,680	50	5,779	163
Total	3,472	7,386,852	170,397	6,679,925	241,707	6,225,910	100,123	3,994,245	134,725	255,709	2,057	292,908	7,662
Grand total	7,244	14,568,534	487,904	6,679,925	241,707	18,154,124	384,034	3,994,245	134,725	1,365,466	16,914	293,603	7,676
Grounds E. of 66° W. long	595	5,536,297	120,563	5,930,612	210,113	4,584,617	76,234	2,929,583	96,708	257,647	2,473	230,690	5,868
Grounds W. of 66° W. long	6,649	9,032,237	367,341	749,313	31,594	13,569,507	307,800	1,064,662	38,017	1,107,819	14,441	62,913	1,808
Landed at Boston in 1914	3,389	8,019,801	325,323	2,720	122	12,304,351	255,541	1,100	44	1,012,441	14,904	...	...
Landed at Gloucester in 1914	4,209	5,843,388	152,554	7,092,272	278,991	8,342,072	165,118	3,953,624	150,288	557,820	4,468	400,036	12,063

QUANTITIES AND VALUES OF CERTAIN FISHERY PRODUCTS LANDED AT BOSTON AND GLOUCESTER, MASS., BY AMERICAN FISHING VESSELS DURING THE YEAR 1915, SHOWN BY MONTHS—Continued.

Months.	Haddock.						Hake.					
	Large (over 2½ pounds).				Scrod (1 to 2½ pounds).		Large (6 pounds and over).				Small (under 6 pounds).	
	Fresh.		Salted.		Fresh.		Fresh.		Salted.		Fresh.	
	Pounds.	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*
LANDED AT BOSTON.												
January	3,289,737	$101,203			662,212	$13,323	69,795	$2,953			238,924	$5,604
February	4,204,753	141,988			1,083,046	21,292	115,642	6,547			309,065	9,358
March	4,689,670	127,744			910,516	15,101	135,692	7,021			431,213	11,434
April	3,053,352	55,756			395,035	3,634	177,061	5,356			449,185	6,627
May	1,676,049	56,784			565,499	6,067	260,345	5,598			472,700	5,505
June	2,604,526	61,593			851,452	6,294	284,855	8,086			625,030	8,840
July	2,476,960	62,628			710,040	6,083	248,530	7,968	5,000	$75	361,335	5,883
August	3,151,393	62,286			1,164,780	7,610	229,809	7,588			376,601	6,576
September	3,564,508	76,693			1,416,061	11,799	321,068	10,667			522,306	9,612
October	3,535,237	95,248			1,774,698	17,464	592,954	14,292			1,592,295	21,539
November	1,777,816	88,310			1,136,057	28,984	261,947	10,941			907,061	17,320
December	2,011,095	83,990			1,134,973	28,413	144,908	6,173			534,582	11,656
Total	36,035,096	1,014,223			11,804,369	166,064	2,842,606	93,190	5,000	75	6,820,297	119,954
LANDED AT GLOUCESTER.												
January	285,240	8,986	1,180	$25	7,490	41	48,160	1,801	1,785	28		
February	234,759	5,471	2,615	45	4,200	62	37,285	1,105	610	9		
March	747,803	14,937	1,735	29	20,000	188	54,668	2,095	625	10		
April	1,802,934	26,003	2,870	51	10,490	58	253,198	3,051	2,635	45		
May	190,297	2,672	11,070	195			593,025	5,930	2,690	48		
June	155,500	1,594	18,674	326	55,455	279	535,290	5,354	56,233	971		
July	943,435	9,613	41,980	791	165,755	1,094	540,580	5,774	70,008	1,081		
August	2,180,675	22,778	26,307	473	277,230	2,097	1,074,576	13,214	50,724	824		
September	1,681,430	17,683	11,845	208	406,355	3,057	1,157,675	14,501	48,708	853		
October	701,715	7,441	8,990	159	113,600	852	389,602	4,826	37,277	644		
November	10,250	108	1,203	22			177,194	4,493	20,080	353		
December	8,972	151	2,125	37			65,159	2,182	4,250	66		
Total	8,913,010	117,437	130,594	2,361	1,060,575	7,728	4,926,412	64,326	295,625	4,932		
Grand total	44,948,106	1,131,660	130,594	2,361	12,864,944	173,792	7,769,018	157,516	300,625	5,007	6,820,297	119,954
Grounds E. of 66° W. long	5,756,637	116,163	60,919	1,126	335,982	3,714	3,133,971	41,435	275,912	4,579	199,435	3,668
Grounds W. of 66° W. long	39,191,469	1,015,497	69,675	1,235	12,528,962	170,078	4,635,047	116,081	24,713	428	6,620,862	116,286
Landed at Boston in 1914	40,984,573	1,089,696			6,235,842	107,211	2,398,923	76,671			5,112,273	92,089
Landed at Gloucester in 1914	10,145,172	179,684	155,522	3,087	233,019	1,478	5,005,412	69,359	222,033	4,218	14,330	166

Months.	Pollock.				Cusk.				Halibut.			
	Fresh.		Salted.		Fresh.		Salted.		Fresh.		Salted.	
	Pounds.	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*
LANDED AT BOSTON.												
January	222,014	$5,505	....	....	213,707	$3,902	....	....	19,683	$4,967	....	....
February	143,595	5,199	....	....	499,862	8,195	....	....	46,330	7,183	....	....
March	211,215	5,586	....	....	501,277	8,187	....	....	109,151	12,647	....	....
April	135,746	2,714	....	....	285,273	4,078	....	....	135,177	13,171	....	....
May	229,943	3,567	....	....	239,308	3,108	....	....	72,318	7,218	....	....
June	599,389	10,596	....	....	142,677	2,178	....	....	239,679	18,509	....	....
July	661,652	13,767	....	....	102,040	1,678	....	....	54,734	6,085	....	....
August	671,647	18,398	....	....	91,705	1,654	....	....	101,307	11,501	....	....
September	553,840	18,468	....	....	251,139	3,841	....	....	61,432	4,795	....	....
October	529,300	14,256	....	....	284,806	4,693	....	....	46,515	6,566	....	....
November	188,206	3,406	....	....	292,505	5,010	....	....	25,363	5,416	....	....
December	137,900	2,271	....	....	417,382	6,603	....	....	18,720	4,269	....	....
Total	4,284,447	103,733	....	....	3,321,681	53,127	....	....	930,409	102,327	....	....
LANDED AT GLOUCESTER.												
January	294,600	8,824	4,065	$61	51,325	907	490	$12	79,546	9,027	230	$23
February	74,488	3,199	200	3	38,827	752	450	10	123,820	9,159	20	2
March	284,541	7,032	2,489	38	103,650	1,551	2,760	69	407,347	34,205	455	46
April	373,147	7,782	3,595	63	434,335	6,893	4,962	124	440,169	29,018	65	7
May	583,211	5,607	25,600	458	410,385	6,269	130	3	136,528	11,272	3,818	382
June	129,498	1,276	56,392	987	150,275	2,255	16,036	398	451,662	24,942	98,621	6,232
July	31,610	310	64,040	1,094	278,117	4,000	12,100	302	255,951	19,596	18,685	1,121
August	68,385	616	36,800	643	400,537	5,649	13,113	327	274,850	20,464	5,200	313
September	73,025	730	16,346	292	688,757	9,644	14,575	365	221,931	14,767	56,926	4,680
October	449,235	5,609	15,462	272	318,513	4,413	18,935	452	143,672	13,617	102,151	8,673
November	4,010,630	64,847	616	11	27,674	378	10,775	270	90,880	10,245	339	30
December	2,304,496	39,623	9,035	148	11,725	165	617	15	27,410	3,148	....	....
Total	8,676,866	145,455	234,640	4,070	2,914,120	42,876	94,943	2,347	2,653,766	199,460	286,510	21,509
Grand total	12,961,313	249,188	234,640	4,070	6,235,801	96,003	94,943	2,347	3,584,175	301,787	286,510	21,509
Grounds E. of 66° W. long	198,076	2,963	54,635	957	1,670,590	23,902	53,797	1,335	2,884,095	217,505	286,205	21,488
Grounds W. of 66° W. long	12,763,237	246,225	180,005	3,113	4,565,211	72,101	41,146	1,012	700,080	84,282	305	21
Landed at Boston in 1914	4,655,089	90,372	....	....	2,668,546	45,970	....	....	826,836	88,441	....	....
Landed at Gloucester in 1914	7,588,457	105,150	211,177	4,214	3,078,507	53,577	111,937	3,232	2,236,164	157,836	316,585	30,073

QUANTITIES AND VALUES OF CERTAIN FISHERY PRODUCTS LANDED AT BOSTON AND GLOUCESTER, MASS., BY AMERICAN FISHING VESSELS DURING THE YEAR 1915, SHOWN BY MONTHS—Continued.

Months.	Mackerel.											
	Large (over 2½ pounds).				Medium (1½ to 2½ pounds).				Small (under 1½ pounds).			
	Fresh.		Salted.		Fresh.		Salted.		Fresh.		Salted.	
	Pounds.	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*
LANDED AT BOSTON.												
May	16,451	$1,771			14,308	$1,540			718	$114		
June	302,755	30,028	124,898	$5,155	320,420	22,482	46,906	$2,262	358,565	17,348	20,453	$827
July	199,892	19,313	21,000	1,680	289,855	27,859	38,600	2,725	502,997	25,701	32,400	1,460
August	24,097	2,813			60,650	5,751			1,256,253	38,847	2,800	160
September	9,954	1,217			7,810	750			809,026	35,679	2,800	280
October	35,797	1,962			28,699	1,526			866,313	47,854	206,560	8,322
November	48,228	6,503			103,567	10,006			45,232	3,239		
December	1,714	244			26,082	2,801						
Total	638,888	63,851	145,898	6,835	851,391	72,715	85,596	4,987	3,839,104	168,782	265,013	11,049
LANDED AT GLOUCESTER.												
May	4,900	245			4,100	254			1,680	134		
June	3,930	222	579,800	21,992					137,941	3,709	17,200	845
July	5,280	400	136,800	8,817	7,600	650	19,400	1,070	22,085	725	178,760	9,832
August			129,800	8,745	3,300	165	22,700	1,592	571,882	19,215	317,771	20,175
September							2,000	140	556,498	18,711	467,557	34,464
October	24,040	1,202			134,134	5,728	23,600	2,210	519,846	24,507	910,733	75,474
November	18,005	1,801	22,800	1,980							248,400	20,856
Total	56,125	3,870	869,200	41,534	149,134	6,797	67,700	5,012	1,809,932	67,001	2,140,421	161,646
Grand total	695,013	67,721	1,015,098	48,369	1,000,525	79,512	153,296	9,999	5,649,036	235,783	2,405,434	172,695
Grounds E. of 66° W. long	258,790	26,316	751,537	30,098	269,592	20,488	61,363	3,991	281,792	14,434	92,443	5,988
Grounds W. of 66° W. long	436,223	41,405	263,561	18,271	730,933	59,024	91,933	6,008	5,367,244	221,349	2,312,991	166,707
Landed at Boston in 1914	448,311	45,897	15,200	760	505,967	34,139			2,412,000	92,620	24,000	1,084
Landed at Gloucester in 1914	123,466	6,595	884,800	51,384	167,906	7,910	669,980	54,310	322,745	9,140	1,114,475	50,886

Months.	Miscellaneous.[a]				Total.				Grand total.	
	Fresh.		Salted.		Fresh.		Salted.			
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
LANDED AT BOSTON.										
January	529,461	$15,486			6,579,265	$187,655			6,579,265	$187,655
February	329,574	12,117			7,902,937	248,159	695	$14	7,903,632	248,173
March	172,210	5,992			8,728,754	244,423			8,728,754	244,423
April	61,120	1,235			6,191,033	125,113			6,191,033	125,113
May	174,383	2,838			5,941,035	141,404			5,941,035	141,404
June	544,399	31,046			9,717,558	299,305	192,347	8,244	9,909,905	307,549
July	1,200,904	85,702			8,871,604	326,394	97,000	5,940	8,968,604	332,334
August	824,559	61,267			10,101,783	296,072	2,800	160	10,104,583	296,232
September	901,024	54,703			10,225,493	290,945	2,800	280	10,228,293	291,225
October	634,153	30,321			11,295,190	313,336	206,560	8,322	11,501,750	321,658
November	239,604	6,905			6,067,274	228,892			6,067,274	228,892
December	197,953	6,501			5,775,359	186,656			5,775,359	186,656
Total	5,809,344	314,113			97,397,285	2,888,354	502,202	22,960	97,899,487	2,911,314
LANDED AT GLOUCESTER.										
January	1,770,150	53,075	2,495,586	$38,379	3,144,161	98,044	2,660,700	45,090	5,804,861	143,134
February					613,025	24,506	36,210	1,296	649,235	25,802
March					2,076,759	73,931	123,123	5,367	2,199,882	79,298
April	120,000	1,837			5,621,395	116,149	609,952	22,525	6,231,347	138,674
May	543,400	6,332			4,175,569	69,409	454,558	16,723	4,630,127	86,132
June	1,351,730	13,464	1,226	613	5,016,361	89,231	3,604,678	126,704	8,621,039	215,935
July	545,210	4,500			4,670,109	84,114	3,170,753	114,887	7,840,862	199,001
August	244,620	2,050			6,846,825	116,972	1,620,787	68,558	8,467,612	185,530
September	10,638	117			6,466,353	107,797	2,076,027	91,705	8,542,380	199,502
October	18,246	844			3,499,283	81,911	2,418,598	132,540	5,917,881	214,451
November	7,600	587	310,304	6,379	4,763,760	94,645	861,678	38,451	5,625,438	133,096
December	27,975	1,946	6,124,434	141,448	2,784,380	55,570	6,381,197	150,478	9,165,577	206,048
Total	4,649,569	84,752	8,931,550	186,819	49,677,980	1,012,279	24,018,261	814,324	73,696,241	1,826,603
Grand total	10,458,913	398,865	8,931,550	186,819	147,075,265	3,900,633	24,520,463	837,284	171,595,728	4,737,917
Grounds E. of 66° W. long	3,342,694	146,229	8,931,550	186,819	28,710,215	816,087	19,659,246	569,070	48,369,461	1,385,157
Grounds W. of 66° W. long	7,116,219	252,636			118,365,050	3,084,546	4,861,217	268,214	123,226,267	3,352,760
Landed at Boston in 1914	4,646,219	251,003	70,000	2,100	92,231,172	2,609,877	113,020	4,110	92,344,192	2,613,987
Landed at Gloucester in 1914	5,685,365	118,734	5,768,764	106,528	49,343,823	1,031,769	20,901,205	749,274	70,245,028	1,781,043

[a] Includes herring from Newfoundland, 2,368,150 pounds frozen, $68,945, and 8,930,800 pounds salted, $186,783.

The fish landed at Boston and Gloucester, Mass., by American fishing vessels are taken principally from fishing grounds lying off the coast of the United States. In 1915, 71.78 per cent of the quantity and 70.74 per cent of the value of the catch landed by the American fishing fleet at these ports were obtained from these grounds. Of the remainder, 9.41 per cent of the quantity and 9.70 per cent of the value were taken from fishing banks off the coast of Newfoundland, 18.73 per cent of the quantity and 19.35 per cent of the value from grounds off the Canadian Provinces, and less than 1 per cent of both the quantity and value from the coast of Labrador. Newfoundland herring constituted 6.58 per cent of the quantity and 5.39 per cent of the value of the products landed at these ports during the year. The herring were taken on the treaty coasts of Newfoundland, but cod and other species from that region were obtained chiefly from fishing banks on the high seas. All the fish caught by American fishing vessels off the Canadian Provinces were from offshore fishing grounds. The catch from each of these fishing regions is given in detail in the following table:

QUANTITY AND VALUE OF FISH LANDED BY AMERICAN FISHING VESSELS AT BOSTON AND GLOUCESTER, MASS., IN 1915, FROM GROUNDS OFF THE COAST OF THE UNITED STATES, NEWFOUNDLAND, AND CANADIAN PROVINCES.

Species.	United States.		Newfoundland.[a]		Canadian Provinces.		Total.	
	Pounds.	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*
Cod:								
Fresh	23,695,413	$689,361	484,815	$9,962	9,907,896	$189,529	34,088,124	$888,852
Salted	1,876,888	71,419	3,009,390	105,146	6,081,495	207,543	10,967,773	384,108
Haddock:								
Fresh	51,712,661	1,185,386	100	1	6,100,289	120,065	57,813,050	1,305,452
Salted	69,675	1,235	14,075	246	46,844	880	130,594	2,361
Hake:								
Fresh	11,248,569	232,237	54,860	704	3,285,886	44,529	14,589,315	277,470
Salted	24,713	428	91,200	1,450	184,712	3,129	300,625	5,007
Pollock:								
Fresh	12,762,282	246,213	665	12	198,366	2,963	12,961,313	249,188
Salted	180,005	3,113	7,865	138	46,770	819	234,640	4,070
Cusk:								
Fresh	4,550,491	71,946	3,345	52	1,681,965	24,005	6,235,801	96,003
Salted	41,146	1,012	5,387	133	48,410	1,202	94,943	2,347
Halibut:								
Fresh	699,496	84,225	1,149,408	84,014	1,735,271	133,548	3,584,175	301,787
Salted	305	21	145,665	11,304	140,540	10,184	286,510	21,509
Mackerel:								
Fresh	6,534,400	321,778	....	....	810,174	61,238	7,344,574	383,016
Salted	2,668,485	100,986	....	....	905,343	40,077	3,573,828	231,063
Herring:								
Fresh	1,977,620	20,381	2.368,150	68,945	....	....	4,345,770	89,326
Salted	....	....	8,930,800	186,783	....	....	8,930,800	186,783
Swordfish:								
Fresh	1,307,317	145,155	868	68	930,782	76,336	2,238,967	221,559
Miscellaneous:								
Fresh	3,830,532	87,084	2,000	30	41,644	866	3,874,176	87,980
Salted	....	....	750	36	....	....	750	36
Total	123,179,998	3,351,980	16,269,343	469,024	32,146.387	916,913	171,595,728	4,737,917

[a] Includes 17,075 pounds of salted cod, valued at $617, and 102,151 pounds of salted halibut, valued at $8,673, from the Labrador coast.

Cod.—In 1915 there were 33 vessels employed in the salt-bank fishery and 102 in the market fishery landing their fares at Boston and Gloucester. Considerable cod was landed also by vessels operating on shore grounds. There were landed at these ports 45,055,897 pounds of fresh and salted cod, 34,088,124 pounds of the former and 10,967,773 pounds of the latter, valued at $1,272,960, against 47,529,625 pounds in 1914, of which 36,079,873 pounds were fresh and

11,449,752 pounds salted, valued at $1,359,416. There was, therefore, a decrease in the quantity in 1915, as compared with the previous year, of 1,991,749 pounds in the fresh and 481,979 pounds in the salted cod landed.

Several large fares of cod were caught during the season of 1915. A trip amounting to 359,483 pounds taken on trawl lines was landed at Gloucester in July, and one of the dory hand-line fleet brought in 478,365 pounds in September, this being the largest fare taken since 1909, when the same vessel weighed off 479,433 pounds.

Haddock.—The haddock fishery in 1915 was carried on with about the same success as in the previous year. The quantity of haddock landed was 57,943,644 pounds, valued at $1,307,813, an increase over the previous year of 189,516 pounds in quantity and a decrease of $73,343 in value. The catch of haddock by line trawlers landed at Boston amounted to 30,776,733 pounds, of which 16.57 per cent were "scrod." The greater part of the scrod haddock brought in by line trawlers came from the inshore grounds, the offshore banks supplying a greater proportion of large haddock. On the inshore grounds the amount of scrod haddock taken varied from 18 to 22 per cent of the total catch and on the offshore grounds from 2 to 8 per cent.

Pollock.—The pollock fishery, which in recent years has supported a considerable fleet of small craft employing purse seines as a means of capture, was carried on with greater success than in 1914. The total catch of pollock landed at Boston and Gloucester, including those taken on hand and trawl lines and in gill nets, was 13,195,953 pounds, having a value of $253,258, an increase of 741,230 pounds in quantity and $53,522 in value compared with 1914. As in previous years, most of the pollock landed by purse seiners and gill netters were caught in spring and fall months.

Halibut.—In the last few years the halibut fishery on the Atlantic coast has fluctuated but little. The yield of fresh and salted halibut in 1915 was 3,870,685 pounds, 3,584,175 pounds of the former and 286,510 pounds of the latter, valued at $323,296, an increase of 491,100 pounds and $46,946 over 1914. The largest catches of this species were made on Georges, Browns, La Have, Quereau, Western, and Grand Banks, the last-mentioned bank supplying the greatest amount. The fishery was conducted throughout the year, but the bulk of the catch was taken during the early spring and summer months. The vessels regularly employed in this fishery numbered 33 sail, although many of the cod hand-line and trawl-line fishermen frequently caught halibut in considerable quantities. The usual activity was displayed in this fishery in the spring of 1916. At the end of May the fleet engaged numbered 26 vessels, and a considerable number of fairly large fares were landed.

The otter-trawl fishery.—This method of fishing, as in 1914, was carried on by 12 steamers. With the exception of several trips landed at Portland and an occasional trip disposed of at Gloucester during such times when there was a glut of fresh haddock in the market, the bulk of fish caught by otter trawlers was landed at Boston. The year's catch was 21,116,300 pounds, representing 380 trips, an increase of 8 trips. There were landed from Georges 105 trips, from South Channel 248, Western Bank 26, and Browns Bank 1. As in the previous year, Western Bank was resorted to in March, April, and May, when haddock were less plentiful on Georges and in the South Channel than during the winter months. Of the total quantity of fish landed at Boston by this class of vessels, 17,062,732 pounds were haddock, of which 39.28 per cent were "scrod." The great disparity in the landings of small fish by this method as compared with line trawls is confined wholly to haddock, the large and small fish of other species caught by the two methods, such as cod, cusk, and hake, being more equally divided.

On July 20, 1915, the otter trawler *East Hampton* landed at Gloucester 310,000 pounds of fresh fish, most of which were haddock. The largest trip previously brought in was 300,000 pounds, caught by the otter trawler *Long Island*. These were the largest fares ever taken by American otter trawlers.

Mackerel.—The amount of salted mackerel taken in 1915 was 19,691 barrels, exceeding the catch of the previous year by 4,170 barrels. The catch off the New England coast was 15,480 barrels and on the Cape Shore, including a few fares from the Gulf of St. Lawrence, 4,211 barrels, or 750 barrels less than was taken in those regions in 1914. The total catch of fresh mackerel by the fleet was 71,564 barrels, compared with 68,582 barrels the previous season. The number of fresh mackerel taken on the Cape Shore was 781,000, which exceeded the catch of 1914 by over 200,000 fish. In the fall of 1915 several vessels of the seining fleet made phenomenal catches in Massachusetts Bay, one vessel making a stock of $6,548 in three weeks, at which time it was reported that a much larger body of mackerel was on the coast than had been observed for several years.

The mackerel fishery in the spring of 1916 showed a marked improvement over that of 1915, the catch up to May 15 being nearly double the amount recorded the previous season on the same date. Three vessels of the seining fleet stocked over $9,000 each and one $11,246, the last-mentioned stock being $2,361 more than the highest made by a single vessel to the end of May, 1915. There were engaged in the southern mackerel fishery 24 seiners and 58 netters. Fifteen of the latter sailed from Gloucester and 43 from other ports. The number of seiners was one less than in 1915, but there was an increase of 41 netters. A portion of the seining fleet sailed on March 24, but none of the netters sailed until April 25. The first mackerel of the season of 1916, amounting to 7 barrels, were caught on April 5 about 80 miles east by south from Cape Henlopen, or practically in the same locality where the first fish were encountered the previous season. The fish were landed at Lewes, Del., from which place they were shipped to New York by rail. Other small trips were caught in the same region within a few days, but the first fare of any considerable size was landed at New York on April 26, one vessel bringing in 41,800 fish, followed the next day by the arrival of 6 vessels with trips ranging from 6,000 to 40,000 fish. From this time until the middle of May the supply of mackerel in the New York market was about equal to the demand. For the week ended May 3 the amount of fresh mackerel landed was 553,000 in number, mostly large and medium, compared with 268,576 fish last year, which were mostly small. Many of the large mackerel in April sold for 40 cents each. The average price ranged from 12 to 20 cents for large and medium, while tinkers brought from 3 to 6 cents a pound.

On May 31 there were 1,200 mackerel landed at Boston, the first fare of the season. Four vessels of the seining fleet sailed for the

Cape Shore May 25, and on June 6 the number had increased to 24 sail. The first mackerel of the season from this region were landed at Boston on June 9, the trip consisting of 10,000 large and 35,000 medium fresh mackerel and 170 barrels salted. On June 10 there were 3 other arrivals from the Cape Shore with fares taken off Halifax and Liverpool, the combined catch amounting to 125,000 of mixed fresh mackerel and 230 barrels salted. At that time there were 15 other seiners on the ground, all of which captured schools of mackerel. Mackerel were reported plentiful on the Cape Shore until June 21, and many large trips were taken. The highest stock made by a single vessel in this region was $6,343, which is the largest recorded for one trip in recent years. Fish were also abundant during the month on grounds in the vicinity of No Mans Land, the entire fleet of seiners and netters fishing in that locality doing well.

Swordfish.—This species was more plentiful in 1915 than in the previous year, and 2,238,967 pounds, having a value of $221,559, were landed at Boston and Gloucester, an increase of 739,123 pounds and $43,860 over 1914. There were 42 vessels engaged in the fishery, operating mostly on the more eastern grounds, although some good catches were made on Georges, Nantucket Shoals, and adjacent grounds. On July 20, 17 vessels landed at the Boston Fish Pier 1,126 swordfish that had been taken on Georges. This was probably the greatest number of swordfish ever landed at an American port in one day.

Winter gill-net fishery.—The winter gill-net fishery practically ceased at the end of May. A fleet of 30 vessels was employed at Gloucester during the season, and there were a few vessels that operated out of other ports. Fishing was conducted on the inshore grounds along the New England coast from Cape Ann to Portland. As in previous years, the principal species taken by this method were cod, haddock, and pollock. While the fleet as a whole did not meet with the same degree of success as in some years past, the fishery was an improvement over the previous season. Several good stocks were made, one vessel making $30,000, with a share of $1,500 to each member of the crew. This was probably the highest record ever attained in one season by a vessel engaged in the winter gill-net fishery.

Italian fishing boats.—The number of Italian motor boats fishing out of Boston and landing their catch at that port has increased in the last few years. At the present time there are approximately 200 boats of this class engaged in the shore fisheries, all of which are too small for registration, being under 5 tons, and in consequence their catch is not recorded in the Boston and Gloucester bulletins. These boats take a variety of species and operate several kinds of fishing gear, namely, trawl lines, hand lines, and drag seines.

Some ten years ago the catch of this class of boats consisted largely of flounders, but in the last few years greater efforts have been made to capture other species of ground fish, such as cod, haddock, cusk, hake, etc. Mackerel also have been taken to some extent. In 1915 the Italian catch landed at Boston, and sold through the New England Fish Exchange, was over 3,500,000 pounds of fish, valued at $135,000. The catch consisted largely of cod, haddock, pollock, hake, and cusk. The amount of flounders landed was about 36,000 pounds.

PACIFIC HALIBUT AND COD FISHERIES.

The halibut banks off Oregon and Washington, recently surveyed by the steamer *Albatross*, were resorted to during the month of June, 1915, by a portion of the halibut fleet sailing out of Seattle, from which grounds 26 trips of halibut were taken in that month, comprising 1,318,000 pounds, valued at $64,623. As halibut were scarce on these grounds in the summer months, the remainder of the catch of that species landed at Seattle from June to December was taken from banks farther north, extending from Flattery Bank, off the coast of Washington, to Portlock Bank, Alaska. This amounted to 13,876,970 pounds, having a market value of $820,585. In the first half of the calendar year 1916, 25 fares were brought from the banks off Oregon and Washington, amounting to 931,692 pounds, valued at $77,819. The total quantity of halibut landed at Seattle during that period, including the catch from banks farther north, was 7,391,384 pounds, valued at $608,947, taken in 274 trips.

According to the Pacific Fisherman, the total catch of halibut on the Pacific coast by American vessels in 1915 was 50,238,390 pounds, of which 33,133,313 pounds were landed at Seattle, 11,323,500 pounds in Canadian ports, and 5,781,577 pounds in Alaska, against 48,902,575 pounds the preceding year, a gain of 1,335,815 pounds. The American fleet engaged in this fishery consisted of 100 sail, known as "independent" and "company" vessels, there being 89 of the former and 11 of the latter, ranging in size from 7 to 196 tons. The Canadian fleet comprised 27 vessels, the catch of which amounted to 16,031,265 pounds, an increase of 1,074,465 pounds over 1914.

The fleet employed in the cod fishery of the Pacific coast numbered 20 sail, including 2 vessels engaged in transporting cured fish from the shore stations in Alaska. Three regions were represented in the fishery—San Francisco by 9 vessels, Puget Sound by 8 vessels, and Alaska by 3 vessels. One of the Alaskan vessels was lost in the early part of the season. The fleet met with very good success and made a catch of 3,798,071 fish, equivalent to 19,092,319 pounds, the fish being reckoned at $4\frac{1}{2}$ pounds each. The catch fell short of that of 1914 by 122,831 fish, or 552,739 pounds.

The work of collecting statistics of the quantity and value of fishery products landed at Seattle, Wash., by American fishing vessels was reestablished in June, 1915, by the appointment of a local agent at that port. The products landed from July, 1915, to June, 1916, comprised 513 trips, including 19,580,163 pounds of halibut, valued at $1,330,609, and 948,024 pounds of other species, valued at $23,285; a total of 20,528,187 pounds, valued at $1,353,894. The monthly receipts by species are shown in the following table:

QUANTITIES AND VALUES OF CERTAIN FISHERY PRODUCTS LANDED AT SEATTLE, WASH., BY AMERICAN FISHING VESSELS DURING THE FISCAL YEAR 1916.

Month.	Number of trips.	Halibut.		Cod.		Black cod.	
		Pounds.	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*
1915.							
July	61	2,700,430	$152,859			39,300	$855
August	36	1,698,288	92,253	645	$10	8,860	217
September	53	2,172,000	132,496	1,312	20	332,000	8,300
October	31	1,644,792	103,952			130,545	3,164
November	30	2,312,527	147,994			17,000	425
December	28	1,660,742	92,108			26,000	650
1916.							
January	8	923,055	68,049			18,000	360
February	7	706,931	47,669			16,232	443
March	31	815,209	82,226	60	1	16,175	484
April	61	1,207,372	130,438			10,566	318
May	89	2,024,105	129,672			84,955	2,124
June	78	1,714,712	150,893			200,233	4,883
Total	513	[a] 19,580,163	1,330,609	2,017	31	899,866	22,223

Month.	Ling cod.		Rock cod.		Total.	
	Pounds.	*Value.*	*Pounds.*	*Value.*	*Pounds.*	*Value.*
1915.						
July					2,739,730	$153,714
August			1,000	$15	1,708,793	92,496
September					2,505,312	140,816
October			10,000	250	1,785,337	107,306
November					2,329,527	148,419
December					1,686,742	92,758
1916.						
January					941,055	68,409
February					723,163	48,112
March					831,444	82,711
April	6,006	$120	11,413	293	1,235,357	131,169
May					2,109,060	131,796
June	11,732	230	5,990	123	1,932,667	156,129
Total	17,738	350	28,403	681	20,528,187	1,353,894

[a] Includes 5,000 pounds of salt halibut, worth $125, landed in August. The remainder of the catch was sold fresh.

PROMOTION OF AMERICAN CAVIAR.

One of the most valuable of all fishery products is caviar, which is prepared from the roe of sturgeon primarily, but also from that of the paddlefish of the Mississippi Valley, and sometimes, under appropriate descriptive names, from the eggs of carp, whitefish, and other species. The product has always been imported extensively, while it is known that suitable material in this country is often wasted through ignorance of the fishermen as to the methods of preservation to employ. After a suitable investigation of the matter, the Bureau issued an economic circular describing in simple language the methods which may be efficiently employed by any fisherman. The paper had the twofold object of preventing unnecessary waste through ignorance or neglect and of awakening a more effective interest in the protection of the sturgeon and the paddlefish.

INTRODUCTION OF NEW AQUATIC FOODS.

One of the most useful ways in which the Bureau of Fisheries can serve the fishermen and the general fish-eating public is to make known new sources of aquatic foods and to assist in establishing fisheries and markets therefor. The conspicuous success achieved in the case of the sea mussel has been referred to in previous reports. This excellent, abundant, accessible, cheap, and widely distributed shellfish, formerly neglected, has now become a staple in certain important markets. Various other water products of great prospective value, but now largely unutilized, should be exploited as speedily as possible, but the limited funds and facilities at the disposal of the Bureau for such work make it impossible to conduct an active campaign with more than one or two such articles at one time. In the fiscal year 1916 one hitherto neglected fish has been given a permanent and important place in the fisheries and fish trade by the Bureau's efforts, and a campaign of great prospective consequence has been inaugurated with reference to several others.

In October, 1915, the Bureau undertook to popularize the tilefish in the belief that it is a fish of great prospective food value. Its utilization had been advocated years ago, but the efforts to introduce it were not sufficiently comprehensive or sustained to bring success, and the fish in reality came into some disrepute because of the failures that attended the attempts to give it a commercial status. The task confronting the Bureau was to induce fishermen to catch the fish, dealers to handle the fish, and the public to consume the fish, and to bring all this about simultaneously. The effective methods pursued made it possible for the Government to withdraw from the campaign within one month and to intrust future developments to private enterprise.

The essential feature of the exploit was the chartering of a regular fishing vessel with practical fishermen as its crew. The auxiliary schooner *Stranger*, of Gloucester, carrying 12 men, was the vessel selected for the purpose. The Bureau had guaranteed the *Stranger* $1,500 for one month's service, but in 27 days she caught 38,383 pounds of tilefish, which, after deducting commissions, sold for $2,036.63; and not only was the Bureau at no expense whatever for the fishing operations, but the proceeds, taking no account of several thousand pounds gratuitously distributed for advertising purposes, yielded a substantial bonus to the crew over their regular remuneration.

When the wholesale trade of New York was requested to cooperate in the proposed campaign, the unfortunate past stood in the way of immediate acquiescence. "There is no demand for the fish," said the dealers, but the Bureau explained that getting the fish and creating a demand were its part of the work and that all that was desired of the trade was a cheerful willingness to handle the fish to satisfy such demand as might develop. When the first fare was landed in New York on October 22, four or five dealers in Fulton Market rather reluctantly agreed to handle the fish, some of which were given away and the remainder sold for 5 cents per pound. When the fourth trip arrived but 20 days later, 15 dealers were competing for the fish, which sold for 7 cents. In the interval a demand had arisen which no large wholesale or commission house could afford to ignore. This demand was created solely by an advertising campaign which kept the fish constantly before the public and concentrated attention on its points of interest and excellence. Newspapers were furnished items recounting the unusual history of the fish—its discovery, practical extermination, and reappearance; incidents in the campaign were exploited; fish were more or less conspicuously supplied to prominent persons; leading hotels and restaurants were induced to give the tilefish prominence on their menus; a great motion-picture company placed a camera man on the *Stranger* and exhibited motion pictures of the fishery as a feature of its weekly news reel; and the Bureau's own advertising matter was distributed freely.

The propaganda conducted in behalf of this fishery covered practically the entire field. The fishing grounds were found and pointed out to fishermen; a regular commercial fishing vessel was engaged to demonstrate the financial yield of this fishery under regular industrial conditions; the wholesale trade was enlisted in the distribution of the fish; the retailer was furnished with attractive display advertising matter calling his customers' attention to the fact that the fish was on sale; and the consumer was told about the tilefish and how to cook it, and his curiosity and interest were stimulated to the point where he wished to try it and asked his dealer for it. As a consequence, when the Bureau ceased its fishing operations, other vessels were already at work, and within 10 days of the landing of the last fare by the *Stranger* eight schooners were either in the fishery or about to enter it and by the end of the month had landed in New York about 156,000 pounds of tilefish.

The progress of this fishery has far exceeded expectations. While New York continues to be the center of the industry, Boston, Atlantic City, Newport, and other places have become practically interested by putting vessels in the fishery. At the end of June, 1916, the New York fleet consisted of 13 vessels making regular trips to the fishing grounds, although earlier in the season a number of other vessels were engaged. The catch has varied from month to month, but has shown a general upward trend as increased fares were brought in to meet the growing demand, and the yield in June exceeded that of any preceding month, aggregating over 1,221,000 pounds landed at New York in 28 fares. A new record was made in July, 1916, when 2,200,000 pounds were landed at New York, 230,000 at Boston, and various minor fares at other ports.

By the end of the fiscal year 1916, when the fishery was only eight months old, upward of 4,388,500 pounds of tilefish, which brought the fishermen over $210,000, were caught and sold. The monthly receipts at New York were as follows:

Months.	Pounds.	Months.	Pounds.
November, 1915	156,500	April, 1916	626,000
December, 1915	170,200	May, 1916	620,000
January, 1916	398,000	June, 1916	1,221,000
February, 1916	469,000		
March, 1916	615,000	Total	4,275,700

The tilefish grounds extend along the edge of the continental shelf from a point south of Nantucket to an area east of Atlantic City. Few fish have been taken in depths over 100 fathoms, and the best fish are in from 60 to 65 fathoms of water. Tilefish are not particular as to the kind and quality of bait offered them. While squid, bluebacks, menhaden, clams, etc., are very acceptable, they will bite freely on inferior kinds of bait, making the bait question comparatively easy to solve.

The fishery has proved a great deal more remunerative than was at first expected by most fishermen and is now considered by them as being well established. The prices received by the fishermen have at times been as high as 7 cents a pound and as low as 1½ cents, the average being about 5 cents. The fish bears shipment perhaps better than any other staple fish of the Atlantic coast and now reaches consumers all over the eastern half of the country. Some large shipments have gone as far west as Kansas City. The catch in recent months has been at the rate of 20,000,000 pounds per annum.

Following long consideration and much discussion, the present Congress has passed an act, approved June 21, 1916, which provides a way of alleviating the losses sustained by the fishermen, more especially those of the Atlantic coast, from the ravages of dogfishes. The act carries an appropriation of $25,000 to enable the Commissioner of Fisheries to conduct investigations and experiments to this end, and the method of procedure, as recommended by the Bureau and understood by Congress, is to make the dogfishes useful. Mistaken economic and biological conceptions as to the possibility of bringing about the extermination of dogfishes have been abandoned, and all persons now interested in the welfare of the fishermen and the advancement of the fisheries are united in the efforts that will be made, under authority of law, to convert an injurious and hitherto useless article into a valuable asset. While the dogfishes and other sharks yield by-products, such as oil, gelatin, and leather, of undoubted economic importance, their principal utility comes through their known value as food. The task before the Bureau is to overcome the deep-seated prejudice that exists against these fishes and to determine the ways and means for creating a demand for fresh and preserved dogfish that will react on the fishermen and enable them to market their catch at a profit.

ALASKA FISHERIES SERVICE.

EXTENT OF THE ALASKAN FISHERIES.

The enormous fishing industry in Alaska over which the Bureau exercises administrative jurisdiction was in some respects more extensive in the calendar year 1915 than ever before. The number of persons engaged in all branches was 22,462, an increase of more than 1,200 over 1914; the investment was $37,316,560, an increase of upward of a quarter of a million dollars over the previous year; and the value of the output as placed on the market was $20,999,343, a decrease of nearly a quarter of a million dollars compared with 1914, which year registered the highest value attained by the industry. The quantity of fishery products taken in 1915 was greater than in any previous season, but lower prices prevailed for several grades of salmon taken in large numbers.

The salmons continue to overshadow all other fishes in Alaska, and the industry they support represents 86 per cent of the capital invested and nearly 80 per cent of the persons employed, while the salmon output is worth more than 91 per cent of the total value of all fisheries. The salient features of the salmon industry in 1915 were the extraordinary abundance of humpbacks in southeast Alaska, the large run of cohos in central and west Alaska, the lighter run of redfish in west and southeast Alaska, and the increased abundance in central Alaska. The value of all salmons as prepared for sale was $19,214,145, of which $18,653,015 represented canned fish. The number of salmon taken was 63,537,244, of which 30,896,394 were humpbacks and 25,878,811 were redfish. The canned-salmon pack was the largest in the history of the Territory, amounting to 4,500,293 cases of 48 1-pound cans, an increase of 443,640 cases over 1914, which was the previous record. The canneries operated numbered 85, against 81 in 1914.

Other fishes in the order of importance were the halibut, with an output of $781,011; the cod, valued at $390,199; and the herring, which, as food, fertilizer, and oil, brought $155,579. The products of the whale fishery were valued at $381,750. The whale fishery was conducted from two shore stations, which handled 470 whales of four species.

ENFORCEMENT OF LAW.

Congress has shown a disposition to provide adequate facilities for enforcing the fishing laws along the extensive Alaskan littoral, but the need for more men and boats is great, and satisfactory results can not be accomplished until the need is met. The available vessel service in 1915 was supplemented by the charter of power boats during the active fishing season, and the patrol covered upward of 10,000 miles of coast.

It is a pleasure to be able to state that the fishery laws are now more generally observed in both spirit and letter than was the case a few years ago, and comparatively few violations were reported in 1915. These are noted in full in the special report on "Alaska fisheries and fur industries in 1915," which forms an appendix to the report of the Commissioner of Fisheries for that year. Some convictions have been secured, some defendants have been discharged, and some indictments are still pending. In one case, involving fishing during the Sunday close time, the defendant pleaded guilty and the jury found him not guilty.

WATERS CLOSED TO COMMERCIAL FISHING.

On October 1, 1915, a hearing was held in Seattle to give all persons interested an oportunity to present their views on the desirability of closing to commercial fishing certain waters in southeast Alaska to be preserved for natural salmon breeding. The hearing confirmed the view that the waters should be closed, and, accordingly, on the recommendation of the Bureau, the Secretary issued an order, dated October 25, 1915, and effective January 1, 1916, prohibiting all fishing for salmon or for other fishes if salmon are taken or injured thereby in the following waters:

1. All waters tributary to Barnes Lake, Prince of Wales Island.
2. Hetta Creek, its tributary waters, and the region within 500 yards of the mouth of said creek.

3. Sockeye Creek, its tributary Boca de Quadra hatchery waters, and the region within 500 yards of the mouth of said creek.

COMMERCIAL FISHING WITHIN RESERVATIONS.

Permits have been issued by the Department, on the recommendation of the Bureau, to conduct certain fishing operations within the limits of the Aleutian Islands Reservation, established by executive order of March 3, 1913. In January, 1916, the company known as the Pacific-American Fisheries was authorized to construct and operate on Unalaska Island a plant for canning or salting salmon or other food fishes. This is the first permit of this character granted, as former permits have covered only minor fishing. The matter of granting a permit for a cannery within the reservation came about as the result of a petition signed by 109 natives of Unalaska Island, who set forth that the construction of a cannery on Unalaska Island would afford them a most advantageous means of employment and at the same time the operations of the cannery would not make such a heavy demand upon the runs of salmon that there would not be enough left for the food requirements of the natives. The permit was granted under the condition that all work except that requiring skilled mechanics and operators in connection with the taking of fish and their subsequent preparation for market should be performed by the Aleuts or Indians resident upon the said reservation. Other conditions were that the weekly close season should be observed, that fishing would not be conducted with fixed appliances, and that no fishing would be carried on within any salmon stream or within 100 yards outside of the mouth of any such stream. Failure to observe the stipulations of the permit will automatically result in its termination. The permit is not transferable and is revocable at any time at the pleasure of the Secretary of Commerce.

In January, 1916, a private individual of Unalaska was authorized to conduct certain specified fishing within the reservation, with a stipulation as to the employment of native help. In June, 1916, the Union Fish Co., of San Francisco, was granted permission to engage in cod-fishing operations from Tigalda Island.

On the Afognak Reservation 79 licenses were issued to natives to take salmon for commercial purposes under restrictions imposed by the Department. The catch, which was disposed of to a cannery located outside the reservation, comprised 134,692 salmon of the red, coho, and humpback species and yielded the natives about $4,500.

By the terms of a presidential proclamation issued April 28, 1916, the waters within 3,000 feet of Annette Island and several small adjacent islands in southeast Alaska were set apart as a fishing reserve for the exclusive benefit of Alaskan natives living thereon, to be used by them under the fishery laws and regulations of the Territory as administered by the Department of Commerce.

SALMON CENSUS IN WOOD RIVER.

The Wood River has been closed to fishing for many years and is resorted to for breeding purposes by red salmon escaping the nets in Nushagak Bay. The counting of the salmon was first undertaken in 1908 and has been continued annually since that time except in 1914.

The counting is made possible by throwing a rack across the stream and compelling the fish to pass through a narrow gate where they are easily visible to persons immediately above. Agents of the Bureau in relays are kept on duty day and night for the entire period of the run, and the tally is kept by an automatic counting device manipulated by hand. In 1915 the counting began on June 14, when 161 fish passed, and continued till August 2, when the run had dwindled to 70. The maximum was reached in the seven days from July 7 to 13, 26,901 fish being observed on July 7 and 25,554 on July 12. The total count was 259,341 redfish.

It was noted that many of the fish bore scars, abrasions, and mutilations produced by gill nets from which they had managed to escape. The number of netted fish usually ranged from 12 to 26 per hundred and sometimes from 30 to 42 per hundred, averaging about 18 per cent of those specially enumerated. On the other hand, in one count of 1,103 fish there were only 2 injured. It is estimated that fully 90 per cent of the fish that liberated themselves from the gill nets died before spawning as a result of the injuries received.

As on previous occasions, the Bureau was rendered invaluable assistance in conducting this interesting work by the Alaska Packers Association and the Alaska-Portland Packers Association.

INSPECTION OF HATCHERIES.

The five private salmon hatcheries operated in Alaska in 1915 were inspected from time to time by agents of the Bureau. Cognizance was taken of the number of eggs received and hatched, the number of fry planted, and the hatchery records and methods.

The output of these plants in the fiscal year ending June 30, 1916, was 79,619,500 red-salmon fry. Under the law the operators were entitled to a tax rebate of 40 cents for every thousand fry hatched and liberated; and affidavits having been made in the manner prescribed by law, the operators became entitled to receive rebate certificates aggregating $31,847.80, which amount is applied to the tax of 4 cents per case on canned salmon.

In June, 1916, a communication was received from the Alaska Packers Association announcing that, in view of certain unfavorable conditions at the hatchery belonging to that company at Karluk, it had been decided to close the plant at the end of the fiscal year 1916 or as soon as the fry then on hand could be liberated. This is the oldest hatchery in Alaska, having been built in 1896. During the period of its operation, which was continuous, it has handled over 627,000,000 red-salmon eggs.

ALASKA FISHERY LEGISLATION.

The necessity for revising the present fishery laws of Alaska has been appreciated for some years. The matter took definite shape in January, 1916, when Hon. J. W. Alexander, of Missouri, introduced in the House of Representatives a bill for the protection, regulation, and conservation of the fisheries of Alaska. The bill was referred to the Committee on the Merchant Marine and Fisheries, of which he was chairman, and numerous hearings thereon were held during the latter part of the fiscal year. The bill has the approval of the Department, was prepared after protracted conferences with representatives of the fishing industry, and is designed to meet the new conditions that have arisen since the law of June 26, 1906, was passed. It is believed that the essential features of the bill, if enacted into law, will insure the perpetuation of the Alaskan fisheries at their maximum productivity and will yield to Federal and Territorial Governments a handsome revenue. Up to the close of the fiscal year the measure had not been acted on by the committee, but this was subsequently done, and a favorable report was ordered on a revised bill introduced by Mr. Alexander on August 18.

The halibut fishery, which ranks next to the salmon industry in importance and is capable of still further expansion, is reported to be injuriously affected as an Alaskan industry by the unusual course followed by the Canadian Government for the promotion of the interests of the Grand Trunk Pacific Railroad and its western terminus, Prince Rupert. The matter has had the attention of the Department of Commerce, in cooperation with other executive departments, and the decision has been reached that legislative action is required to prevent the diversion of the Alaskan halibut fishery, whose output goes only to the American market, from Alaska to British Columbia. The Bureau has, therefore, approved a measure, introduced in Congress, which is intended to meet the peculiar geographic and economic conditions surrounding the fishery. Under the terms of the proposed bill, fresh halibut (and salmon) from the Pacific Ocean and its tributaries coming into the United States through a foreign country must be shipped in bond from an American port.

On June 3, 1916, the Senate passed a bill for the protection and conservation of the halibut fishery of the Pacific Ocean, which includes the establishment of a close season for halibut fishing in certain waters and places restrictions on the landing of halibut during that time. The chief feature of the bill is the fixing of a close season during the months of December and January, when all fishing for halibut in any of the waters of the Pacific Ocean or its tributaries over which the United States has jurisdiction is prohibited. The bill also provides for a reserved area off the coast of southeast Alaska, in which fishing for halibut is prohibited at all times. This area is defined definitely in the bill, but, briefly, it may be described as a rectangular area of water about 19 miles long and averaging 15 miles in width extending offshore between Cape Lynch and Cape Addington. Its area is approximately 290 square nautical miles. The bill provides that it shall take effect as soon as possible after the enactment of concurrent or essentially similar regulations by Canada, and that if at any time after due investigation it is the opinion of the Secretary of Commerce that the regulations adopted by Canada are inadequate either as to their provisions or enforcement he is authorized and directed to suspend the operations of the act until such time as he may be satisfied that such provisions and their enforcement have been made adequate for the protection of the halibut fishery. Violations of the measure are punishable by a fine not exceeding $1,000 or by imprisonment for not more than 90 days. Vessels and their catch may be seized and held subject to the payment of fines. This bill embodies the Bureau's views, and its passage will, it is believed, meet with general favor alike with the American and Canadian halibut fishing interests, which have advocated most of the principles set forth in the bill.

ALASKA FUR-SEAL SERVICE.

SEAL HERD.

The fur seals resorting to the Pribilof Islands, having enjoyed continued immunity from indiscriminate killing at sea through the operation of an international agreement, have increased in a manner that has justified optimistic predictions.

The regular census of the herd taken in 1915, under the direction of G. Dallas Hanna, showed a noteworthy increase over 1914. The actual number of pups born was 103,527, as compared with 93,250 in 1914, 92,269 in 1913, and 81,984 in 1912. The total number of seals computed to be in the herd was 363,872, as compared with 294,687 in 1914, 268,305 in 1913, and 215,738 in 1912. The classes of seals which are susceptible of actual enumeration are pups, harem bulls, and idle bulls. The number of breeding cows, since each gives birth to but one pup a season, is, of course, equal to the number of pups. The numbers of animals in the remaining classes must be obtained from estimates of death rates, fortified by incomplete counts, etc. In 1915, in view of the increased knowledge of the herd, the enumerator felt it desirable to change the percentages heretofore used in estimating the losses for the first three years of the seal's life. This makes the total of the number of seals determined to be in the herd of 1915 not exactly comparable with the totals of previous censuses. The details of the 1915 count are as follows:

Pups	103,527	3-year-old males	18,282
Breeding cows	103,527	4-year-old males	15,848
Harem bulls	2,151	5-year-old males	11,271
Idle bulls	673		
Yearlings	60,613	Total	363,872
2-year-olds	47,980		

In 1912, 5,228 pups of the season were branded on the Pribilof Islands. Subsequent observations made on these branded animals have been productive of valuable additional knowledge in regard to the natural history and growth of the seals. Some of these animals were observed in 1913, and in 1914 they were noted in large numbers. The number which returned in 1915 was so large, in comparison with the total number of seals under observation, as to indicate a lower mortality in the first three years of the seal's life than had ordinarily been assumed. In 1915, from January 1 to August 10, inclusive, 53 of these branded seals were killed on St. Paul Island and 49 on St. George Island, the skins of which were shipped to St. Louis that year. One hundred of these were graded in accordance with the London trade classification, with the following result:

Small pups	7
Middling pups	42
Large pups	42
Smalls	8
Middling and smalls	1
Total	100

At the same time the skins of 15 of 18 branded seals killed in 1914, and therefore 2 years old, were graded as follows, the remaining 3 not being accessible at the time:

Extra small pups	3
Small pups	8
Middling pups	4

The census for 1916, taken under the same conditions as in 1915 and with the same basis for computing the various elements of the herd, gave a total of 417,329, as follows:

Pups	116, 977	Yearlings, both sexes	67, 291
Breeding cows	116, 977	2-year-olds, both sexes	48, 460
Harem bulls	3, 500	Bachelors and young bulls	61, 492
Idle bulls	2, 632		

These figures indicate a large surplus of male seals, as was to have been expected from the operation of the existing close-time law, which restricts the killing of seals to the limited needs of the natives. The conditions, biological and economic, arising from the presence of large numbers of mature and adolescent males far beyond the requirements of the herd, demand the serious attention of the Department and of Congress, and the conditions will be much more acute by the expiration of the close-time law in August, 1917.

SEALS TAKEN FOR NATIVES' FOOD.

The killing of seals on the Pribilof Islands has been limited to that number necessary for the food purposes of the natives. In the calendar year 1915 the quota of surplus male seals that could be taken was fixed at 5,500. The number actually taken was 2,666 on St. Paul and 1,281 on St. George, a total of 3,947. For 1916 the maximum number that could be taken was fixed at 7,500. Improved facilities for caring for seal meat make it possible for the natives to properly utilize a larger number of seals than formerly, and a saving will, therefore, be effected in the amount of meats that would otherwise have to be sent from the States.

The sealskins shipped from the islands in 1915 numbered 3,000, which were consigned to St. Louis for sale. No skins were disposed of during the past fiscal year. The condition of the market did not warrant the offering of the skins on hand resulting from the food killings for natives in 1914 and previously, and trade considerations made it desirable to postpone beyond the fiscal year 1916 the marketing of those pelts and the additional ones shipped to St. Louis in the fall of 1915. Congress passed a joint resolution, approved June 22, 1916, giving to the Secretary of Commerce authority to dispose of sealskins in such market, at such times, and in such manner as he may deem most advantageous, and the sale was, accordingly, postponed until the fall of 1916.

ESTABLISHMENT OF THE FUR-SEAL TRADE IN AMERICA.

The announced purpose of the Department to market its Alaskan fur-seal and other skins in America, instead of sending them abroad as heretofore, was given definite form in 1915 by the making of a contract with Messrs. Funsten Bros. & Co., of St. Louis, under which the sale of fur-seal and fox skins belonging to the Government will for a term of years take place at public auction in St. Louis. In connection with this contract, the Department has been instrumental in securing the establishment in St. Louis, through Messrs. Funsten Bros. & Co., of a plant for the dressing and dyeing of sealskins in accordance with the most approved methods known to the trade, and arrangements have been made under which all or part of the take of Alaskan fur-seal skins may be dressed and dyed before being offered for sale. The actual treatment of fur-seal skins for this purpose was begun in St. Louis in December, 1915, and the results obtained indicate that the work will be highly successful. A limited offering of such skins was made at the public auction held in St. Louis in September, 1916, and the Department has reason to be pleased with the outcome. The interests of the trade and the Government are favored by the offering of dressed instead of raw skins, and general satisfaction has been expressed over this important innovation.

SUPPORT OF THE NATIVES.

The native inhabitants of the Pribilof Islands on June 30, 1915, numbered 314, of whom 193 were on St. Paul and 121 on St. George. The population remains fairly uniform from year to year.

The physical condition of these people is excellent, all things considered. Improved sanitary measures have been enforced, and the promiscuous making and use of intoxicating liquors, once prevalent and sanctioned by the Government, has been entirely suppressed. Congress has recently provided new housing facilities, which, with additional improvements that are contemplated, will conduce still further to the comfort, contentment, and advancement of the natives.

The teaching staff on the islands has performed efficient service, and the native schools are in a satisfactory condition. Stress is being laid on manual training and on the use of the English language instead of Aleut or Russian.

Owing to the delay in making the steamer *Roosevelt* available for carrying supplies to the islands other arrangements had to be made, a navy collier being availed of in the fall of 1915 and a private vessel in the summer of 1916. The very satisfactory and economical method of purchasing supplies, as mentioned in last year's report, has been followed.

In 1911 small numbers of reindeer were placed on both St. Paul and St. George Islands to serve as a nucleus for herds which would contribute materially to the support and welfare of the natives. The herds have thrived and have shown satisfactory increases from year to year. In 1915 the number of fawns born was 45 and the total number of all ages was 154. The natives, however, have not thus far shown the interest in the reindeer that was hoped for, and it will probably be necessary for the Bureau's officers on the islands to direct most of the activities in respect to these herds for a number of years to come. Early in 1916 comprehensive plans were prepared in connection with this work. These plans, in addition to the management of the herd itself, contemplate that the inhabitants of the islands shall be trained to make economic use of the skins, horns, and other parts by manufacturing them into articles of clothing and household furnishings for local use and perhaps export for sale for the natives' benefit.

BLUE FOXES.

The herds of blue foxes which inhabit the Pribilof Islands continue productive of revenue to the natives and the Government. The taking of foxes in the season of 1915–16 was begun in November on

St. George Island and early in December on St. Paul Island. The take for the season consisted of 211 blue-fox pelts and 18 white-fox pelts on St. Paul Island and 209 blues and 2 whites on St. George Island, a total for both islands of 420 blues and 20 whites. These skins were consigned to Messrs. Funsten Bros. & Co., St. Louis, for sale in September, 1916. In the calendar year 1915 there were shipped from the Pribilof Islands 253 blue-fox skins and 40 white-fox skins. These skins represented the take for the 1914-15 season and, together with 256 blue-fox skins and 25 white-fox skins shipped from the islands in 1914, were sold at public auction on October 21, 1915. The net proceeds of this sale amounted to over $56,000. The sale was very successful and many pelts brought unusually good prices. Five lots consisting of four blues each brought $1,092, $1,020, $1,012, $1,000, and $980, respectively. The white-fox pelts brought from $17 to $30 per pelt.

The number of foxes that the island will support under existing conditions is limited, and the trapping of a certain number each season, under the strict supervision of the agents, is beneficial to the herd. The natives are credited with supplies valued at $5 for each fox skin taken.

COAST-GUARD PATROL AND THE NAVAL RADIO SERVICE.

The usual efficient patrol of the North Pacific Ocean and Bering Sea was maintained by the Coast Guard Service in the seasons of 1915 and 1916 for the purpose of preventing pelagic sealing. The vessels of this patrol rendered invaluable assistance in carrying persons, mails, and supplies, to and from the Pribilof Islands. The agent on St. Paul Island in 1915 reported some evidences of illegal seal hunting, but no proof of such operations could be obtained.

The North Pacific Sealing Convention of July 7, 1911, and the act of Congress giving effect to that convention, approved August 24, 1912, permit certain Indians, Aleuts, or other aborigines dwelling on the Pacific coast of America north of latitude 30° to kill seals under certain restricted conditions. As far as is known, no seals were taken in accordance with these provisions in 1915. In 1916 several hundred skins were taken by Indians of the State of Washington, but complete details in regard to these skins are not yet available. By far the larger proportion of the seals so killed are females.

The Department is under obligations to the Navy Department for the continuous service which the latter has rendered in connection with the two radio stations on the islands. These stations make it possible to keep in prompt touch with conditions on the islands at all times of the year and permit the agents to send full reports of conditions and needs. Formerly the islands were cut off from communication with the entire world through the long winter season, when navigation in Bering Sea is closed.

MINOR FUR-BEARING ANIMALS OF ALASKA.

The laws and regulations for the protection of the minor fur-bearing animals of Alaska have been enforced by a corps of wardens, who have been constantly in the field, supplemented by members of the Alaska fishery service at such times as their regular duties would permit. In October, 1915, Reginald F. Irwin, a warden, while engaged in patrol work in southeast Alaska, lost his life. Accompanied by two men in a hired boat he left Ketchikan on October 9, and several days later his wrecked boat was discovered in the Chickamin River. Prolonged and systematic search was at once instituted, but no trace of Mr. Irwin and his companions was found and no explanation of the disaster has been possible.

Under date of May 24, 1915, revised regulations for the protection of fur-bearing animals in Alaska were issued in Department Circular No. 246, third edition. These have proved generally satisfactory. No special restrictions are put upon the shipping of live fur-bearing animals from Alaska or upon the taking of live animals at any time for use for breeding purposes. The law does not clearly authorize the Department to make the necessary regulations restricting the shipping of live animals from the Territory; and owing, apparently, to the decreased outside demand for fur-bearing animals for use for breeding purposes, particularly foxes, but few were shipped from Alaska in the calendar year 1915. This cessation of demand for live Alaska fur bearers may be only temporary, and it is very important that the Department have authority to make proper regulations in regard to the exportation of these animals. It is felt that legitimate fur farmers should be permitted to secure breeding animals from wild stock in the close season, at least until breeding stock may be obtained from other farms. The inability to regulate this matter results in abuses which meet with disapproval throughout Alaska.

The marked decrease in the abundance of martens has necessitated further measures for their protection. The Department has, therefore, issued a regulation, effective March 15, 1916, making the killing of this valuable animal illegal until November 15, 1921. This regulation has met with general approval from persons familiar with the facts. It is covered in Department Circular No. 246, fourth edition, issued under date of February 1, 1916.

The value of the furs shipped from Alaska in the year ended November 15, 1915, exclusive of Pribilof Islands skins, aggregated $400,532. All shipments are required to be reported to the Bureau, and the returns are believed to be quite complete, owing to the effective cooperation given by postmasters, agents of commercial companies, and individual shippers.

In the fiscal year 1916 no additional islands were leased for the breeding of fur-bearing animals. The islands now under lease are Carlson, Middleton, Simeonof, and Little Koniuji. Shortly after the close of the fiscal year there was accepted an offer for the leasing of Marmot Island, near Afognak, for a period of five years at an annual rental of $200.

It is regretted that Congress has not yet taken action to relieve the Bureau of custody over the terrestrial fur bearers of Alaska. A bill to accomplish this purpose was introduced in the House on January 29, 1916, and referred to the Committee on Territories. No hearings have been held thereon, but it is strongly urged that prompt steps be taken to terminate the existing arrangement.

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MISCELLANEOUS MATTERS.

NEW ESTABLISHMENTS AND CONSTRUCTIONS.

The site for the fish-cultural station in Utah authorized in 1914 was selected near Springville, and title to 24.3 acres of land was acquired by deed dated August 24, 1915, together with rights to 15 second-feet of water so disposed as to furnish a gravity supply. Springville is in Utah County on the Denver & Rio Grande Railroad, and the property immediately adjoins the town, being about 1 mile distant from the business center. Water is obtained from springs which flow about 5,000 gallons per minute. A topographical survey of the property has been made; plans of buildings, water supply, and drainage systems have been prepared; and construction work has been begun. The hatchery is a one-story frame structure, built on a cement foundation, and contains hatching room, office, storeroom, boiler room, etc., on the first floor and two bedrooms and workroom in the attic. The building is 32 by 95 feet and is intended to accommodate 120 troughs.

The site selected for the marine biological station on the Gulf coast of Florida was acquired by a deed dated July 10, 1915. It is about 3 miles distant from the city of Key West at the extreme eastern end of the island. The act authorizing the establishment of this station required that the land be donated, and the Key West Realty Co., from which the property was obtained, not only donated 4 acres of land, but, without cost to the Government, constructed a sea wall along the water front of the property and excavated a channel 30 feet wide and 6 feet deep from near Cow Key to the selected site. The full amount authorized in the original act, namely, $50,000, has now been provided, and the preparation of plans and specifications for the laboratory building is under way.

The hatchery authorized for Rhode Island will be located on Block Island and will be devoted to the commercial species of that region. The site has been selected and surveyed, but title to the property has not yet been secured.

The special appropriation of $10,000 for the Orangeburg, S. C., station has been used chiefly in making improvements to the water supply and drainage systems and in constructing six brood ponds and six concrete rearing ponds.

The appropriation of $20,000 for the completion of the Louisville, Ky., station has been expended in part in improving the extensive grounds, providing a fish-culturist's cottage, and constructing 20 concrete retaining tanks under cover.

With the sum of $18,000 provided for the Saratoga, Wyo., station, in addition to the amount previously provided, there have been completed the hatchery, superintendent's residence, fish-culturist's cottage, tool house, ice house, one stock pond, six concrete rearing ponds, and concrete distributing cistern and reservoir. A hydraulic ram has been installed and the main water-supply pipe lines have been laid. The hatchery building is 32 by 64 feet and accommodates 36 troughs.

An additional tract of land containing 6½ acres, adjoining the Cold Spring, Ga., station, was acquired by deed dated July 24, 1915, for the sum of $5,000. The property includes a dwelling, which has been repaired and is utilized to good advantage, and the possession of this land enables the Bureau to protect the water supply and construct additional ponds.

At the Clackamas, Oreg., station, a one-story six-room frame building, with attic and cellar, has been completed as a superintendent's residence.

The special appropriation of $4,500 for reconstruction of the hatchery building and barn at the Baker Lake, Wash., station, which were destroyed by fire, has been expended in accordance with the terms of the appropriation. Substantial new buildings constructed by the station force were completed early in the summer of 1915 and were ready for the salmon operations that year.

It is a pleasure to record the donation of a fish hatchery by a private individual. Mary A. Scully, widow of John S. Scully, has transferred to the Government the property known as the Berkshire Trout Hatchery, in the Berkshire Hills, Mass., comprising about 135 acres of land, with buildings, ponds, etc. The hatchery was run for a number of years by Mr. Scully, and Mrs. Scully's object in making this noteworthy bequest was to insure the perpetual maintenance of the property for the purpose to which her husband had dedicated it. The acceptance of the gift was authorized by joint resolution of Congress approved July 28, and the property has now passed into the custody of the Bureau of Fisheries. The necessary permanent personnel has been provided for in the 1918 estimates submitted to Congress.

MOVEMENTS, REPAIR, AND CONSTRUCTION OF VESSELS.

The special fishery and other work with which certain vessels have been connected has been noted elsewhere. There may be given under this head some data that pertain more particularly to the mere movements and the repairs of some of the seagoing craft.

On July 1, 1915, the *Albatross* was being prepared to take up again the halibut investigations off the coasts of Washington and Oregon, and on July 6 the vessel sailed from Sausalito, Cal., arriving off the mouth of the Columbia River July 9. The work was continued until September 9, and the ship then proceeded to San Francisco, arriving two days later. Until October 11 she was anchored off Sausalito and was then taken to docks at Alameda. From that time until March 7, 1916, the crew was kept busy overhauling the ship and machinery, repainting, etc. The vessel was docked on March 7. This long period of inactivity was owing to lack of funds sufficient for cruising expenses. The deficiency act approved February 28, 1916, appropriated $7,500 for maintenance of vessels for the Bureau, and with this sum an investigation of the tuna fisheries off the coasts of southern and lower California was undertaken, an investigation which had been in contemplation for a number of years. The cruise was begun April 4, and the work was in progress at the close of the fiscal year. During the year the *Albatross* cruised some six months, covering 9,850 miles and consuming 950 tons of coal. On July 1, 1915, Lieut. L. B. Porterfield, U. S. Navy, was detached from the command of the vessel and was succeeded on the same day by Lieut. Commander J. J. Hannigan, U. S. Navy.

During the early part of the summer of 1915 the steamer *Fish Hawk* was utilized in connection with the Beaufort laboratory and on August 10 was assigned to special investigations in Long Island Sound, with which she was occupied until October 7. On October 21 the biological and physical investigation of the waters of Chesapeake Bay was undertaken and arrangements were made for periodical trips, five of which were made prior to July 1. Between March 21 and April 15, 1916, the vessel was used in experimental shad hatching on the Cape Fear River. Some minor repairs were made at the Norfolk Navy Yard during November and December, 1915. During the year the vessel cruised 5,811 miles and consumed 703 tons of coal. On September 6, 1915, Boatswain James J. O'Brien, U. S. Navy, was succeeded in command by Chief Boatswain James Mahoney, U. S. Navy.

The *Phalarope* has been attached to the Woods Hole station, as heretofore, and has rendered service in both fish-cultural and biological work at that place. When the shad-hatching season began on the Potomac River in the spring of 1916, the vessel was detailed to that field.

The *Curlew* has been employed on the Mississippi River, in connection with the rescue of fishes from the overflowed lands and with the operations of the Fairport laboratory.

The steamer *Osprey* has been employed in southeast Alaska on fishery-patrol work.

The auxiliary schooner *Grampus*, having headquarters at Gloucester, Mass., was used in oceanographic and herring investigations in the Gulf of Maine from July 1 to October 27, 1915. From November to May the vessel was laid up and her crew was assigned to fish-cultural work at the Gloucester hatchery. From May 9 to June 30 the vessel was at Gloucester, with the crew engaged in scraping, painting, overhauling rigging, and general cleaning, in preparation for cruising after the new fiscal year began.

The alterations originally contemplated on the steamer *Roosevelt* proceeded satisfactorily and were completed at the Norfolk Navy Yard. The vessel was inspected by a board, of which the superintendent of naval construction, Bureau of Lighthouses, was the senior member, and on April 5 this board advised certain additional work before the ship was sent to sea. This was authorized as soon as funds permitted, and all was practically completed in August, 1916, except for the installation of a new tail shaft, a forging for which was difficult to obtain owing to the excessive demands on the steel mills for material. The *Roosevelt* has cost the Government somewhat over $72,000. The original cost of this vessel was about $150,000, and it is estimated that it would have cost not less than $100,000 to build a vessel of similar dimensions which would fill the Bureau's requirements.

A contract for the construction of a new vessel for use on the Maine coast, for which there was an appropriation of $45,000, was awarded, in March, 1916, to the Townsend Marine Railway & Construction Co., of Boothbay Harbor, Me., for $44,217. The vessel was designed for use not only in connection with the operations of the marine hatchery but for oceanographic and fishery investigations as well. She is a single-screw steam-propelled wooden vessel, 108 feet 6 inches over all, with 22 feet beam and 8 feet draft. She is equipped with a 320-horsepower engine and an Almy water-tube boiler, with a mast fitted for dredging. On the main deck are quarters for the officers and investigators, with laboratory and cabin. Below decks are the crew's quarters, water tanks, machinery, storerooms, etc., and an arrangement for transporting live fishes. It is expected the vessel will be completed during the coming winter.

PUBLICATIONS.

During the fiscal year the following publications were issued and distributed, chiefly through the Superintendent of Documents, on special mailing lists:

REPORT OF THE COMMISSIONER AND APPENDIXES THERETO.

Report of the Commissioner of Fisheries to the Secretary of Commerce for the fiscal year ended June 30, 1915. 83 p.

Alaska fisheries and fur industries in 1914. By Ward T. Bower and Henry D. Aller. Appendix IX to Report of Commissioner for 1914. 89 p.

The distribution of fish and fish eggs during the fiscal year 1915. Appendix I to Report of Commissioner for 1915. 138 p.

Fish ponds on farms. By Robert S. Johnson and M. F. Stapleton. Appendix II to Report of Commissioner for 1915. 28 p., 18 pl.

BULLETIN OF THE BUREAU OF FISHERIES.

An ecological reconnoissance of the fishes of Douglas Lake, Cheboygan County, Mich., in midsummer. By Jacob Reighard. Bulletin, vol. XXXIII, 1913, p. 215–250, 4 text fig. 1915.

The Potamogetons in relation to pond culture. By Emmeline Moore. Bulletin, vol. XXXIII, 1913, p. 251–292, pl. XXII–XXXIX.

Changes in shade, color, and patterns in fishes, and their bearing on the problems of adaptation and behavior, with especial reference to the flounders Paralichthys and Ancylopsetta. By S. O. Mast. Bulletin, vol. XXXIV, 1914, p. 173–238, pl. XIX–XXXVII, 3 text fig.

The sharks and rays of Beaufort, N. C. By Lewis Radcliffe. Bulletin, vol. XXXIV, 1914, p. 239–284, pl. XXXVIII–XLIX, 26 text fig.

Copepod parasites of fresh-water fishes and their economic relations to mussel glochidia. By Charles Branch Wilson. Bulletin, vol. XXXIV, 1914, p. 331–374, pl. LX–LXXIV.

The fishes of the streams tributary to Tomales Bay, Cal. By John Otterbein Snyder. Bulletin, vol. XXXIV, 1914, p. 375–382, 1 text fig.

The Fairport fisheries biological station: Its equipment, organization, and functions. By Robert E. Coker. Bulletin, vol. XXXIV, 1914, p. 383–406, 6 text fig., pl. LXXV–LXXXI.

Notes on the embryology and larval development of five species of teleostean fishes. By Albert Kuntz. Bulletin, vol. XXXIV, p. 407–429, 68 text fig.

SPECIAL PUBLICATIONS.

The Bureau of Fisheries and its station at Woods Hole, Mass. 11 p., illus.

The Bureau of Fisheries and its biological station at Beaufort, N. C. 11 p., illus.

ECONOMIC CIRCULARS.

Fishes destructive to the eggs and larvæ of mosquitoes. 19 p., 28 text fig.

Oysters: The food that has not "gone up". A little of their history and how to cook them. 16 p.

The tilefish: A new deep-sea food fish. 6 p., 2 text fig.

Caviar: What it is and how to prepare it. 8 p., 3 text fig.

Information concerning parasitic worms in fish. 4 p.

STATISTICAL BULLETINS.

Monthly and annual statements of the quantities and values of certain fishery products landed by American fishing vessels at the ports of Gloucester and Boston, Mass., Portland, Me., and Seattle, Wash.

Crab industry of Maryland and Virginia in 1915.

Fresh-water mussel fishery of the Mississippi River and its western tributaries from Kansas northward in 1914.

Coastal fisheries of New York and New Jersey, exclusive of shellfish, in 1915, with shad fishery of the Hudson River in 1915 and 1916.

Shad and alewife industry of Chesapeake Bay and tributaries in 1915.

The Fisheries Service Bulletin has proved of great interest throughout the Bureau and also to State fishery authorities, technical publications, etc. In order to meet the demand the monthly editions have had to be enlarged from time to time, and the number of pages has been increased from four to eight.

APPROPRIATIONS.

The appropriations for the Bureau of Fisheries for the fiscal year 1916 aggregated $1,075,340, as follows:

Salaries	$393, 840
Miscellaneous expenses:	
Administration	10, 000
Propagation of food fishes	350, 000
Maintenance of vessels	60, 000
Inquiry respecting food fishes	40, 000
Statistical inquiry	7, 500
Protecting sponge fisheries	2, 500
Protecting seal and salmon fisheries of Alaska	75, 000
Pay of crew of vessel, Alaska service	16, 000
Purchase or construction of vessels for Boothbay Harbor station	45, 000
Purchase or construction of a steel distribution car	20, 000
Cold-storage plant fur-seal islands	3, 000
Completion of and improvements at fish-cultural stations:	
Orangeburg, S. C	10, 000
Louisville, Ky	20, 000
Saratoga, Wyo	18, 000
Baker Lake, Wash	4, 500

Respectfully,

H. M. SMITH,
Commissioner.

To Hon. WILLIAM C. REDFIELD,
Secretary of Commerce.

THE DISTRIBUTION OF FISH AND FISH EGGS DURING THE FISCAL YEAR 1916

HENRY O'MALLEY
Assistant in Charge of Fish Culture

Appendix I to the Report of the U. S. Commissioner of Fisheries for 1916

CONTENTS.

INDEX TO SPECIES DISTRIBUTED.

THE DISTRIBUTION OF FISH AND FISH EGGS DURING THE FISCAL YEAR 1916.

CHARACTER OF WORK.

The fish-cultural operations of the Bureau of Fisheries are directed to the restoration and maintenance of the commercial fisheries of the country and to the development and extension of the fish-producing area of its interior waters. The needs of the great fisheries industries, which embrace large investments of capital and contribute important food supplies of salmon, shad, codfish, lobster, etc., are paramount. The work of assembling and hatching the eggs of the commercial species and the liberating of the resulting fry in suitable waters has been unremittingly prosecuted by the Bureau, and there has been no relaxation of the efforts of past years to discover and develop new fields. A glance at the appended tabulation will disclose the magnitude of the distributions and the wide extent of territory covered. With an output of the size indicated it may readily be understood that it is necessary to liberate the greater portion of the fish during the very early stages of their existence.

The fishes furnished for the stocking of the streams, lakes, and ponds of the interior during the fiscal year 1916 were largely of the fingerling sizes. Of trout, grayling, and salmon it has been possible to produce requisite numbers with facility, but the species applicable to the needs of a considerable portion of the country—the so-called warm-water fishes—are in a different category, and the Bureau has been unable to supply them in numbers sufficient to meet the rapidly growing demands. The eggs of fishes of this class, owing to adhesiveness or other deterrent qualities, are not adapted to hatchery processes and resultant multiplication on a large scale. Their production is therefore limited to such numbers as the brood fishes themselves are able to bring off their nests in ponds where partial protection is afforded, and while the output of the pond fish-cultural stations is annually expanding, it is far from being adequate to satisfy public requirements.

To make up for the deficiency so far as practicable, recourse is had to collections of the young of black bass and kindred species which abound in the temporary lagoons existing at times in the high-water zones of the Mississippi and Illinois Rivers.

Early in the year these rivers overflow their banks and spread out over miles of territory, and in the warm shallows thus formed many varieties of the native game and food fishes deposit their eggs. The young fish hatched therefrom are imprisoned in immense numbers, with the subsidence of the floods in the thousands of depressions ranging in depths from a few inches to several feet, and here they are preyed upon for several months by game birds and the alligator gar. Finally all that escape these enemies must perish incident to the drying of the pools in the fall. From depressions of this character the Bureau rescues many thousands of fish annually, returning by far the greater portion of them to the original streams, but culling out choice specimens to supplement its stock for distribution to applicants. This great resource is capable of being turned to highly successful account when funds are available for the extension of the rescue operations.

While only about 5 per cent of the Bureau's total output is applied to the interior waters of the country, the benefits accruing therefrom have been widely disseminated, and with the increasing cost of food materials this branch of the work is attaining greater significance. In its prosecution the Bureau has received valuable assistance from certain State fisheries authorities, club representatives, and public-spirited individuals, not only in formulating plans for but in the actual distributions of fish. One highly important and beneficial effect of such cooperation has been the development and growth of a sentiment opposed to the ruthless and destructive fishing methods in vogue in many localities.

METHOD OF DISTRIBUTION.

The fry hatched from the shad, whitefish, salmons, lake trout, lake herring, pike perch, white perch, yellow perch, striped bass, cod, lobster, pollock, flatfish, and haddock—constituting the commercial species—are planted on the spawning grounds from which the eggs are derived, or utilized for the stocking of new and suitable waters in an effort to extend the fisheries.

With respect to the game and food fishes of the interior, which are propagated in comparatively small numbers, provision is made for the return of a sufficient number of young fish to the waters where eggs are collected for the maintenance of the supply therein; the remainder of the stock is then assigned to suitable lakes or streams for which applications have been submitted by responsible individuals. This class includes the various trouts, basses, sunfishes, and catfishes.

Blanks upon which formal applications for fish can be made are furnished by the Bureau on request. Upon the receipt of applications properly executed and bearing the indorsement of a United States Senator or Representative, an assignment of fish is made, suitable for the waters described and to the Bureau's facilities to supply, and the delivery is arranged for as soon as possible thereafter. Applicants should confine their choice of fish to species that are indigenous to the region of the waters to be stocked. Nonindigenous species of fish are assigned only upon the recommendation of the State fisheries authorities, and not then unless such recommendation conforms to the Bureau's judgment.

The Bureau refuses requests for such predaceous fishes as the black bass, sunfish, and kindred species for introduction into waters in California, Oregon, Washington, Idaho, Nevada, Wyoming, or western Montana, as it is believed their presence in such waters might prove harmful to the trout and salmon fisheries of that region.

Each species of fish spawns at a specific time during the year—the brook trout and the domesticated rainbow trout of eastern waters in the fall or early winter; the blackspotted trout, steelhead trout, and the wild rainbow trout of western waters during the spring; while all of the pond fishes reproduce in the spring or early summer.

The product of each season is distributed as the fish attain proper size for shipment, and after the exhaustion of the stock of one season no more are available until the same season the following year.

The distribution of trout in the Eastern States begins in March and is completed by the last of June, while trout shipments to applicants in the Middle States extend from about May 1 until well along in July. In the Rocky Mountain States the trout distributions occur somewhat later, the work usually starting by September 1 and continuing into the early winter.

The black basses produced at the Bureau's pond-cultural stations are distributed between May and August, while the miscellaneous fishes rescued from overflowed lands and the output of rock bass, crappie, sunfish, and catfish from these stations are shipped simultaneously, the distribution usually extending from August to December.

It is the policy of the Bureau to fill applications in the order of their receipt so far as practicable, but it is impossible to state definitely, in advance, when the fish requested by an applicant can be furnished, the approximate time of delivery depending upon transportation facilities, which are not always available on a given date, and, in the case of the pond or river fishes, upon the degree of success attained in the collections.

The number of fish assigned on an application must necessarily be governed by the available supply of the species requested and the time of year scheduled for the delivery, it being obvious that very young fishes which have not been fed can be furnished in much larger numbers than those which have been held at considerable expense at the Bureau's stations until they have attained the size of fingerlings. It is the aim of the Bureau in all cases to allot a sufficient number of a given species to form a brood stock for the water area described, and those interested in the lake or stream so stocked are relied upon to see that the fish are afforded proper protection, by the restriction or prohibition of fishing, until a sufficient length of time has elapsed for them to reproduce, a period which will vary from two to three years, according to the species furnished.

Fry or very young fish can be shipped in much larger numbers than those of the fingerling sizes. A 10-gallon transportation can will safely carry from 2,000 to 3,000 fry of the trouts or black basses, from 500 to 1,000 one-inch fish of these species, and of those 2 inches long, from 100 to 300. It has been calculated that the varying numbers of the different sizes stated have practically equal value for stock purposes, as the losses in open waters from natural causes are in about the ratios indicated.

Some of the commercial species propagated—whitefish, pike perch, white perch, and shad, which are distributed only as fry—are so small that as many as 100,000 can be carried to a 10-gallon can.

Fish intended for applicants are carried to destination in specially-equipped railroad cars belonging to the Bureau, or in the regular baggage cars attached to passenger trains, an experienced messenger accompanying them for the purpose of aerating the water en route. The only expense the applicant is put to in connection with the transaction is that of transporting the fish from the railroad station designated in the application to the waters in which they are to be liberated. Some days in advance of an intended delivery the consignee is notified and given detailed instructions regarding the reception and care of the fish after they are turned over to him. He is notified again by wire a few hours before the arrival, in order that he may meet the train and receive the consignment, which will be handed to him from the car by the messenger.

During the fiscal year ended June 30, 1916, the Bureau received 12,487 applications from individuals and associations for fish to stock public and private waters. Requests for blanks upon which to submit applications for fish should be addressed to the Commissioner of Fisheries, Washington, D. C.

SPECIES CULTIVATED.

During the fiscal year 1916 the Bureau handled some 50 species of fish, the fresh-water mussel, and the lobster. Of these the following were produced at its regular propagating stations:

THE CATFISHES (SILURIDÆ):
- Horned pout, bullhead, yellow cat (*Ameiurus nebulosus*).
- Marbled cat (*Ameiurus nebulosus marmoratus*).

THE SUCKERS AND BUFFALOFISHES (CATOSTOMIDÆ):
- Smallmouth buffalofish (*Ictiobus bubalus*).
- Common buffalofish (*Ictiobus cyprinella*).
- Black buffalofish (*Ictiobus urus*).

THE SHADS AND HERRINGS (CLUPEIDÆ):
- Shad (*Alosa sapidissima*).
- Glut herring, blueback (*Pomolobus æstivalis*).

THE SALMONS, TROUTS, WHITEFISHES, ETC. (SALMONIDÆ):
- Common whitefish (*Coregonus albus* and *C. clupeaformis*).
- Lake herring, cisco (*Leucichthys artedi*).
- Chinook salmon, king salmon, quinnat salmon (*Oncorhynchus tschawytscha*).
- Silver salmon, coho (*Oncorhynchus kisutch*).
- Blueback salmon, redfish, sockeye (*Oncorhynchus nerka*).
- Humpback salmon (*Oncorhynchus gorbuscha*).
- Dog salmon (*Oncorhynchus keta*).
- Steelhead trout, hardhead (*Salmo gairdneri*).
- Rainbow trout (*Salmo irideus*).
- Atlantic salmon (*Salmo salar*).
- Landlocked salmon (*Salmo sebago*).
- Blackspotted trouts: Yellowstone Lake trout or cutthroat trout (*Salmo lewisi*); Tahoe trout (*Salmo henshawi*).
- Scotch sea trout (*Salmo trutta*). Introduced species.
- Loch Leven trout (*Salmo trutta levenensis*). Introduced species, propagated in limited numbers for observation.
- Lake trout, Mackinaw trout, longe, togue (*Cristivomer namaycush*).
- Brook trout, speckled trout (*Salvelinus fontinalis*).

THE SMELTS (ARGENTINIDÆ):
- American smelt (*Osmerus mordax*).

THE GRAYLINGS (THYMALLIDÆ):
- Montana grayling (*Thymallus montanus*).

THE MACKERELS (SCOMBRIDÆ):
- Common mackerel (*Scomber scombrus*).

THE BUTTERFISHES (STROMATEIDÆ):
- Butterfish, dollarfish, harvestfish (*Poronotus triacanthus*).

THE BASSES, SUNFISHES, AND CRAPPIES (CENTRARCHIDÆ):
- Crappie (*Pomoxis annularis*).
- Strawberry bass, calico bass (*Pomoxis sparoides*).
- Rock bass, red-eye, goggle-eye (*Ambloplites rupestris*).
- Warmouth, goggle-eye (*Chænobryttus gulosus*).
- Smallmouth black bass (*Micropterus dolomieu*).
- Largemouth black bass (*Micropterus salmoides*).
- Bluegill bream, bluegill sunfish (*Lepomis incisor*).
- Other sunfishes, chiefly *Eupomotis gibbosus*.

THE PERCHES (PERCIDÆ):
- Pike perch, wall-eyed pike, yellow pike, blue pike (*Stizostedion vitreum*).
- Yellow perch, ring perch (*Perca flavescens*).

THE SEA BASSES (SERRANIDÆ):
- Striped bass, rockfish (*Roccus lineatus*).
- White perch (*Morone americana*).

THE CODS (GADIDÆ):
- Cod (*Gadus callarias*).
- Haddock (*Melanogrammus æglifinus*).
- Pollock (*Pollachius virens*).

THE FLOUNDERS (PLEURONECTIDÆ):
- Winter flounder, American flatfish (*Pseudopleuronectes americanus*).

CRUSTACEANS:
- American lobster (*Homarus americanus*).

The fishes rescued from overflowed lands in the Mississippi Basin and returned to the original streams were as follows:

THE CATFISHES (SILURIDÆ):
- Spotted cat, blue cat, channel cat (*Ictalurus punctatus*).
- Horned pout, bullhead, yellow cat (*Ameiurus nebulosus*).

THE SUCKERS AND BUFFALOFISHES (CATOSTOMIDÆ):
- Smallmouth buffalofish (*Ictiobus bubalus*).
- Common buffalofish (*Ictiobus cyprinella*).
- Black buffalofish (*Ictiobus urus*).

THE MINNOWS AND CARPS (CYPRINIDÆ):
- Carp (*Cyprinus carpio*).

THE PIKES AND PICKERELS (ESOCIDÆ):
- Pike (*Esox lucius*).
- Pickerel (*Esox reticulatus*).

THE BASSES, SUNFISHES, AND CRAPPIES (CENTRARCHIDÆ):
- Crappie (*Pomoxis annularis*).
- Rock bass, red-eye, goggle-eye (*Ambloplites rupestris*).
- Warmouth, goggle-eye (*Chænobryttus gulosus*).
- Largemouth black bass (*Micropterus salmoides*).
- Smallmouth black bass (*Micropterus dolomieu*).
- Bluegill bream, bluegill sunfish (*Lepomis incisor*).
- Other sunfishes, chiefly *Eupomotis gibbosus*.

THE PERCHES (PERCIDÆ):
- Yellow perch, ring perch (*Perca flavescens*).

THE SEA BASSES (SERRANIDÆ):
- White bass (*Roccus chrysops*).

SUMMARIZED STATEMENT OF DISTRIBUTION.

The following table shows the number of fish and eggs actually distributed during the fiscal year 1916, or, in other words, the output of the hatcheries, with all losses in transportation deducted:

SUMMARY, BY SPECIES, OF THE DISTRIBUTION OF FISH AND EGGS DURING THE FISCAL YEAR ENDED JUNE 30, 1916.

Species.	Eggs.	Fry.	Fingerlings, yearlings, and adults.	Total.
Catfish			2,545,777	2,545,777
Carp			4,336,832	4,336,832
Buffalofish			563,815	563,815
Shad	1,097,000	77,644,545		78,741,545
Alewife		200,000		200,000
Whitefish	74,180,000	316,975,000		391,155,000
Lake herring		76,000,000		76,000,000
Silver salmon	198,500	8,684,334	1,469,507	10,352,341
Chinook salmon	20,622,340	57,250,714	22,982,655	100,855,709
Blueback salmon	3,000,000	57,964,920	32,442,748	93,407,668
Humpback salmon		19,179,124	3,144,584	22,323,708
Dog salmon		21,500,944	1,000,000	22,500,944
Steelhead trout	1,079,000	870,600	3,811,058	5,760,658
Rainbow trout	1,489,900	243,800	2,831,747	4,565,447
Atlantic salmon		1,709,815		1,709,815
Landlocked salmon	486,000	357,968	105,777	949,745
Scotch sea trout			509	509
Blackspotted trout	1,427,000	1,370,310	2,481,228	5,278,538
Loch Leven trout			105,500	105,500
Lake trout	7,326,054	36,414,323	278,100	44,018,477
Brook trout	635,000	5,057,650	7,576,817	13,269,467
Grayling	3,500,000	1,868,000		5,368,000
Smelt	36,000,000	15,000,000		51,000,000
Mackerel		1,946,000		1,946,000
Butterfish		392,000		392,000
Crappie			3,122,332	3,122,332
Rock bass			165,149	165,149
Smallmouth black bass		762,710	65,169	827,879
Largemouth black bass		471,300	1,357,768	1,829,068
Sunfish		33,000	1,635,881	1,668,881
Pike and pickerel			43,436	43,436
Pike perch	222,160,000	214,533,280	3,460	436,696,740
Yellow perch	27,500,000	195,491,000	183,111	223,174,111
Striped bass		10,071,000		10,071,000
White perch	25,000,000	97,350,000		122,350,000
White bass			4,950	4,950
Cod		318,681,000		318,681,000
Pollock		1,107,460,000		1,107,460,000
Haddock		22,170,000		22,170,000
Flatfish		1,532,947,000		1,532,947,000
Lobster		128,700,000	3,525	128,703,525
Total	425,700,794	4,339,300,337	92,261,435	4,847,262,566

ALLOTMENTS OF FISH AND EGGS TO STATE FISH COMMISSIONS, FISCAL YEAR 1916.

State and species.	Eggs and fry.[a]	Fingerlings, yearlings, and adults.	State and species.	Eggs and fry.[a]	Fingerlings, yearlings, and adults.
Alabama: Black bass		1,000	Kentucky:		
California: Chinook salmon	19,622,340		Pike perch	*9,600,000	
Colorado:			Rainbow trout		16,000
Blackspotted trout	160,000		Smallmouth black bass	*7,500	
Brook trout		1,500	Maine:		
Delaware:			Brook trout	100,000	
Black bass		375	Lake trout	50,000	
Shad	*400,000		Landlocked salmon	300,000	
Illinois:			Maryland: Brook trout	50,000	
Black bass		5,010	Massachusetts:		
Brook trout	25,000	300	Pike perch	25,000,000	
Carp		249,000	Shad	1,097,000	
Catfish		62,900	Yellow perch	15,000,000	
Crappie		35,390	Michigan:		
Pickerel		500	Lake trout	3,000,000	
Pike perch	20,000,000		Landlocked salmon	25,000	
Rainbow trout	50,000	9,750	Pike perch	26,235,000	
Sunfish		6,240	Smelt	10,000,000	
Yellow perch		1,600	Minnesota:		
Indiana: Pike perch	15,000,000		Lake trout	200,000	
Iowa: Pike perch	25,000,000		Landlocked salmon	25,000	
			Steelhead trout	250,000	

[a] Fry are indicated by an asterisk, thus (*); all others are eggs.

ALLOTMENTS OF FISH AND EGGS TO STATE FISH COMMISSIONS, FISCAL YEAR 1916—Con.

State and species.	Eggs and fry.[a]	Finger-lings, yearlings, and adults.
Montana:		
Blackspotted trout	200,000	
Brook trout	50,000	
Catfish		940
Grayling	2,300,000	
Pickerel		565
Rainbow trout	320,000	
Sunfish		625
Yellow perch		475
Nebraska: Pike perch	1,500,000	
New Hampshire:		
Brook trout	50,000	
Lake trout	100,000	
Landlocked salmon	25,000	
Rainbow trout	100,000	
Steelhead trout	93,000	
New Jersey:		
Landlocked salmon	10,000	
Rainbow trout	50,000	
Smallmouth black bass		159
Steelhead trout	93,000	
Yellow perch	10,000,000	
New York: Landlocked salmon	25,000	
North Dakota:		
Pike perch	6,000,000	
Steelhead trout	93,000	
Ohio:		
Pike perch	68,425,000	
Whitefish	68,640,000	
Oregon:		
Blackspotted trout	200,000	
Blueback salmon	3,000,000	
Chinook salmon	1,000,000	
Silver salmon	196,000	
Steelhead trout	*500,000	
Pennsylvania:		
Lake trout	100,000	
Pike perch	3,000,000	
South Dakota:		
Brook trout		50,000
Loch Leven trout		30,000
Pike perch	25,000,000	
Utah:		
Brook trout	100,000	6,000
Lake trout	50,000	
Vermont:		
Catfish		150
Lake trout	201,054	
Landlocked salmon	50,000	
Smelt	15,000,000	
Steelhead trout	150,000	
Washington:		
Brook trout	50,000	
Blackspotted trout	432,000	
Rainbow trout	100,000	
Wisconsin:		
Lake trout	3,500,000	
Whitefish	5,000,000	
Wyoming:		
Blackspotted trout	200,000	
Brook trout	50,000	
Grayling	400,000	
Lake trout	25,000	
Rainbow trout	100,000	
Steelhead trout	200,000	
Total	377,367,394 *10,507,500	478,569

[a] Fry are indicated by an asterisk, thus (*); all others are eggs.

SHIPMENTS OF FISH AND EGGS TO INSULAR POSSESSIONS AND FOREIGN COUNTRIES DURING FISCAL YEAR 1916.

Country and species.	Eggs.	Fingerlings, yearlings, and adults.
Japan: Lobster		200
Porto Rico:		
Black bass		600
Catfish		1,500
Sunfish		1,500
Portugal: Rainbow trout	50,000	
Total	50,000	3,800

DETAILS OF OUTPUT FOR 1916.

The following table shows the work of the different stations in 1916, the periods of operations, and the eggs and fish furnished by each station for distribution. It will be noted that transfers of fish and eggs from station to station are frequent. Such transfers are made in the interest of economy and convenience where the shipments consist of eggs, and give advantageous distribution centers in the case of young fish.

STATIONS OPERATED AND THE OUTPUT OF EACH FOR THE FISCAL YEAR 1916.

Station and period of operation.	Species.	Eggs.	Fry.	Fingerlings, yearlings, and adults.	Total.
Afognak, Alaska:					
Entire year	Blueback salmon		9,307,500	8,900,440	18,207,940
	Humpback salmon		6,736,500		6,736,500
Baird, Cal.:					
Entire year	Brook trout			42,000	42,000
	Chinook salmon		435,000	2,029,354	2,464,354
	Rainbow trout		14,000		14,000
Battle Creek, Cal.—					
Dec.-Apr.	Chinook salmon	750,000	6,155,950	3,508,870	10,414,820
Hornbrook, Cal.[a]—					
Oct.-May	Chinook salmon	15,872,340			15,872,340
	Silver salmon		2,169,050		2,169,050
Mill Creek, Cal.[a]—					
Dec.-Apr.	Chinook salmon	3,000,000	3,350,000	6,400,000	12,750,000
Baker Lake, Wash.:					
Entire year	Blueback salmon		1,875,000		1,875,000
	Silver salmon		277,164		277,164
Birdsview, Wash.[a]—					
Entire year	Blackspotted trout		371,310		371,310
	Blueback salmon		22,420	520	22,940
	Chinook salmon			694,795	694,795
	Humpback salmon			2,515,000	2,515,000
	Silver salmon	2,500		1,455,490	1,457,990
	Steelhead trout	629,000	207,000	800,000	1,636,000
Brinnon, Wash.[a]—					
Oct.-June	Dog salmon		1,285,000		1,285,000
	Silver salmon		608,000		608,000
	Steelhead trout		100,000		100,000
Darrington, Wash.[a]—					
Oct.-Apr.	Chinook salmon		70,000		70,000
	Dog salmon		431,000		431,000
	Humpback salmon		2,278,000		2,278,000
	Silver salmon		580,000		580,000
Day Creek, Wash.[a]—					
Sept.-June	Humpback salmon		300,000		300,000
	Silver salmon		106,000		106,000
Duckabush, Wash.—					
Sept.-June	Chinook salmon			108,000	108,000
	Dog salmon		11,662,444	1,000,000	12,662,444
	Humpback salmon		1,165,000	400,000	1,565,000
	Silver salmon		620,000		620,000
	Steelhead trout			91,000	91,000
Illabott Creek, Wash.[a]—					
Sept.-June	Chinook salmon		27,950		27,950
	Humpback salmon		757,500		757,500
	Silver salmon		21,800		21,800
Quilcene, Wash.—					
Sept.-June	Chinook salmon		5,130		5,130
	Dog salmon		8,122,500		8,122,000
	Humpback salmon		1,428,500		1,428,500
	Silver salmon		380,220		329,220
Sultan, Wash.[a]—					
Sept.-June	Chinook salmon		108,400		108,400
	Humpback salmon		177,400		177,400
	Silver salmon		3,387,500		3,387,500
	Steelhead trout		34,600		34,600
Battery, Md.:					
Apr.-May	Shad		5,210,000		5,210,000
	White perch	25,000,000	96,500,000		121,500,000
	Yellow perch	25,500,000	33,400,000		58,900,000

[a] For convenience in handling, transfers were made as follows:
Hornbrook to Baird, 18,380 rainbow trout eggs.
Mill Creek to Baird, 2,500,000 chinook salmon eggs.
Birdsview to Craig Brook, 3,500,000; to Green Lake, 3,475,000; to Central Station, 25,000 humpback salmon eggs; to St. Johnsbury, 161,000; to Neosho, 2,000; to Leadville, 98,000; to Seattle, 150,000 steelhead trout eggs.
Brinnon to Duckabush, 113,200 chinook salmon eggs, 607,000 humpback salmon eggs, 9,655,000 dog salmon eggs, 530,000 steelhead trout eggs, 620,000 silver salmon eggs; to Quilcene, 1,500,000 humpback salmon eggs, 2,000,000 dog salmon eggs, 635,000 steelhead trout eggs.
Darrington to Birdsview, 4,000,000 humpback salmon eggs.
Day Creek to Birdsview, 2,519,400 humpback salmon eggs, 82,400 chinook salmon eggs, 492,000 silver salmon eggs, 265,000 steelhead trout eggs.
Illabott Creek to Birdsview, 1,710,000 humpback salmon eggs, 271,000 steelhead trout eggs.
Sultan to Birdsview, 200,000 chinook salmon eggs.

STATIONS OPERATED AND THE OUTPUT OF EACH FOR THE FISCAL YEAR 1916—Continued.

Station and period of operation.	Species.	Eggs.	Fry.	Fingerlings, yearlings, and adults.	Total.
Boothbay Harbor, Me.: Entire year	Cod		5,516,000		5,516,000
	Flatfish		583,707,000		583,707.000
	Lobster		128,500,000	5,423	128,505,423
	Pollock		19,800,000		19,800,000
Bozeman, Mont.:[a] Entire year	Blackspotted trout		835,000		835,000
	Brook trout	50,000		560,350	610,350
	Grayling	3,500,000	1,843,000		5,343,000
	Rainbow trout	320,000		361,750	681,750
	Steelhead trout			19,000	19,000
Yellowstone, Wyo.[a]— July-June	Blackspotted trout	1,427,000	175,000		1,602,000
Bryans Point, Md.:[a] Apr.-May	Alewife		200,000		200,000
	Shad	1,097,000	58,232,700		59,329,700
	Yellow perch		137,101,000		137,101,000
Cape Vincent, N. Y.: Entire year	Brook trout		784,000		784,000
	Lake herring		76,000,000		76,000,000
	Lake trout		5,553,186		5,553,186
	Landlocked salmon		7,000		7,000
	Pike perch		50,000,000		50,000,000
	Rainbow trout		43,000	9,000	52,000
	Whitefish		12,900,000		12,900,000
	Yellow perch		13,600,000		13,600,000
Central Station, Washington, D. C.: Entire year	Brook trout		14,000		14,000
	Humpback salmon		15,000		15,000
	Lake trout		13,500		13,500
	Pike perch		3,100,000		3,100,000
	Rainbow trout		10,000		10,000
	Shad		850,000		850,000
	Yellow perch		2,600,000		2,600,000
Clackamas, Oreg.:[a] Entire year	Brook trout			54,273	54,273
	Chinook salmon		5,523,000	990,124	6,513,124
	Rainbow trout			49,900	49,900
	Steelhead trout			22,314	22,314
Applegate, Oreg.[a]— Apr.-June	Chinook salmon		563,500		563,500
	Rainbow trout	325,000			325,000
	Silver salmon	196,000	488,950		684,950
	Steelhead trout	450,000		2,091,265	2,541,265
Big White Salmon, Wash.— Oct.-May	Chinook salmon		18,845,784	1,086,691	19,932,475
Little White Salmon, Wash.[a]— Oct.-May	Chinook salmon		18,306,000	5,593,974	23,899,974
Rogue River, Oreg.— Entire year	Blackspotted trout			20,938	20,938
	Chinook salmon	1,000,000	1,952,000	1,550,037	4,502,037
	Silver salmon			9,153	9,153
	Steelhead trout		500,000	491,626	991,626
Upper Clackamas, Oreg.[a]— Entire year	Chinook salmon		1,878,400	1,016,000	2,894,400
	Steelhead trout			180,600	180,600
Willamette, Oreg.— July-June	Shad		3,316,845		3,316,845

[a] For convenience in handling, transfers were made as follows:
Bozeman to Northville, 25,000; to Leadville, 100,000 grayling eggs.
Yellowstone to Birdsview, 403,000; to Leadville, 1,926,000; to Spearfish, 771,000 blackspotted trout eggs.
Bryans Point to Central Station, 3,670,000 yellow perch eggs; 979,000 shad eggs.
Clackamas to Upper Clackamas, 2,000,000 chinook salmon eggs.
Applegate to Saratoga, 10,000; to Bozeman, 20,000; to Duluth, 50,000; to Rogue River, 418,480.
Little White Salmon to Big White Salmon, 9,186,000 chinook salmon eggs.

STATIONS OPERATED AND THE OUTPUT OF EACH FOR THE FISCAL YEAR 1916—Continued.

Station and period of operation.	Species.	Eggs.	Fry.	Fingerlings, yearlings, and adults.	Total.
Cold Springs, Ga.: Entire year	Black bass			229,500	229,500
	Catfish			1,982	1,982
	Sunfish			37,900	37,900
	Warmouth bass			250	250
Milltown, Ga.—Apr.-June	Black bass			76,500	76,500
Craig Brook, Me.:[a] Entire year	Atlantic salmon		509,815		509,815
	Brook trout			936,410	936,410
	Humpback salmon		2,960,000	229,584	3,189,584
	Scotch sea trout			509	509
Upper Penobscot, Me.—Apr.-May	Atlantic salmon		1,200,000		1,200,000
Duluth, Minn.:[a] Entire year	Brook trout			376,000	376,000
	Lake trout	3,326,054	14,390,000	211,000	17,927,000
	Pike perch		3,800,000		3,800,000
	Steelhead trout		29,000	15,500	44,500
	Whitefish		18,575,000		18,575,000
Edenton, N. C.: Entire year	Black bass		18,300	15,975	34,275
	Rock bass			2,800	2,800
	Shad		9,765,000		9,765,000
	Sunfish			11,750	11,750
	White perch		850,000		850,000
Weldon, N. C.—Apr.-May	Striped bass		10,071,000		10,071,000
Erwin, Tenn.: Entire year	Black bass			3,310	3,310
	Brook trout			326,550	326,550
	Carp			227	227
	Rainbow trout			626,100	626,100
	Rock bass			15,800	15,800
	Smallmouth black bass			740	740
	Sunfish			7,850	7,850
Gloucester, Mass.:[a] Entire year	Butterfish		392,000		392,000
	Cod		120,890,000		120,890,000
	Flatfish		200,680,000		200,680,000
	Haddock		22,170,000		22,170,000
	Lobster		200,000		200,000
	Mackerel		1,946,000		1,946,000
	Pollock		1,087,660,000		1,087,660,000
Green Lake, Me.: Entire year	Brook trout		994,000		994,000
	Humpback salmon		3,036,224		3,036,224
	Lake trout		46,637		46,637
	Landlocked salmon	225,000	237,000	32,256	494,256
	Smelt	36,000,000	15,000,000		51,000,000
Grand Lake Stream, Me.:[a]— Entire year	Landlocked salmon	261,000	119,168	67,730	447,898
Homer, Minn.:[a] Entire year	Black bass		70,000	17,965	87,965
	Buffalofish			375,080	375,080
	Carp			309,845	309,845
	Catfish			322,581	322,581
	Crappie			704,185	704,185
	Pike			18,126	18,126
	Pike perch		3,550,000	2,660	3,552,660
	Rock bass			200	200
	Sunfish			604,411	604,411
	Yellow perch		690,000	105,921	795,92

[a] For convenience in handling, transfers were made as follows:
Craig Brook to Upper Penobscot, 1,770,000 Atlantic salmon eggs.
Duluth to Green Lake, 53,230; to St. Johnsbury, 50,000; to Spearfish, 551,440; to Leadville, 25,000 lake trout eggs.
Gloucester to Boothbay Harbor, 115,533,000 pollock eggs.
Grand Lake Stream to St. Johnsbury, 25,000; to Cape Vincent, 10,000; to Craig Brook, 25,000; to Wytheville, 10,000; to Green Lake, 43,696 landlocked salmon eggs.
Homer to San Marcos, 1,585 crappie; 1,851 catfish.

STATIONS OPERATED AND THE OUTPUT OF EACH FOR THE FISCAL YEAR 1916—Continued.

Station and period of operation.	Species.	Eggs.	Fry.	Fingerlings, yearlings, and adults.	Total.
La Crosse, Wis.:					
Entire year	Black bass			50,830	50,830
	Brook trout			78,500	78,500
	Buffalofish			4,300	4,300
	Carp			23,000	23,000
	Catfish			697,675	697,675
	Crappie			142,600	142,600
	Pike			5,800	5,800
	Pike perch		5,280,000	800	5,280,800
	Rainbow trout			77,000	77,000
	Sunfish			143,000	143,000
	Yellow perch			16,200	16,200
Leadville, Colo.: [a]					
Entire year	Blackspotted trout			1,861,440	1,861,440
	Brook trout	480,000	433,000	2,476,800	3,389,800
	Lake trout			25,000	25,000
	Rainbow trout			220,000	220,000
Louisville, Ky.:					
Entire year	Black bass			6,550	6,550
	Rainbow trout			16,000	16,000
	Rock bass			6,650	6,650
	Smallmouth black bass			7,350	7,350
	Sunfish			9,550	9,550
Mammoth Springs, Ark.: [a]					
Entire year	Black bass		185,000	27,700	212,700
	Catfish			2,000	2,000
	Rock bass			108,184	108,184
	Smallmouth black bass		341,500	8,353	349,853
	Sunfish		33,000	131,000	164,000
Friars Point, Miss.:					
July–December	Black bass			7,829	7,829
	Buffalofish			180	180
	Carp			110	110
	Catfish			4,704	4,704
	Crappie			17,365	17,365
	Sunfish			95	95
Manchester, Iowa: [a]					
Entire year	Brook trout			932,272	932,272
	Pike perch		2,900,000		2,900,000
	Rainbow trout	494,900		249,250	743,650
	Rock bass			4,600	4,600
	Sunfish			16,000	16,000
Bellevue, Iowa [a]—					
August–December	Black bass			103,995	103,995
	Buffalofish			173,700	173,700
	Carp			77,600	77,600
	Catfish			140,250	140,250
	Crappie			1,845,865	1,845,865
	Pike			18,610	18,610
	Sunfish			215,770	215,770
	White bass			4,950	4,950
	Yellow perch			24,050	24,050
North McGregor, Iowa [a]—					
August–December	Black bass			49,575	49,575
	Buffalofish			10,600	10,600
	Carp			10,100	10,100
	Catfish			596,700	596,700
	Crappie			261,000	261,000
	Pike			900	900
	Sunfish			269,800	269,800
	Yellow perch			32,850	32,850

[a] For convenience in handling, transfers were made as follows:
Leadville to Manchester, 500,000; to La Crosse, 100,000; to Clackamas, 100,000; to Baird, 100,000; to Saratoga, 200,000 brook trout eggs.
Mammoth Spring to Quincy, 4,000 rock bass.
Manchester to Leadville, 250,700; to Clackamas, 100,000 rainbow trout eggs.
Bellevue to Wytheville, 530 sunfish; to San Marcos, 21,800 crappie; to Neosho, 1,200; to Quincy, 300 catfish.
North McGregor to Bellevue, 2,200 yellow perch.

STATIONS OPERATED AND THE OUTPUT OF EACH FOR THE FISCAL YEAR 1916—Continued.

Station and period of operation.	Species.	Eggs.	Fry.	Fingerlings, yearlings, and adults.	Total.
Nashua, N. H.: Entire year	Brook trout		249,300	12,000	261,300
	Catfish			354	354
	Rainbow trout		15,300	6,438	21,738
	Smallmouth black bass		2,400		2,400
Neosho, Mo.: a Entire year	Black bass			29,380	29,380
	Catfish			100	100
	Crappie			900	900
	Rainbow trout			203,390	203,390
	Rock bass			4,325	4,325
	Smallmouth black bass		3,310	1,196	4,506
	Sunfish			11,795	11,795
	Yellow perch			310	310
Northville, Mich.: a Entire year	Brook trout		720,000	51,000	771,000
	Grayling		25,000		25,000
	Lake trout	4,000,000			4,000,000
	Rainbow trout		161,500	28,500	190,000
	Smallmouth black bass.		288,000	38,125	326,125
Alpena, Mich.— Apr.-May	Lake trout		3,500,000		3,500,000
	Whitefish		30,000,000		30,000,000
Charlevoix, Mich.— Apr.-May	Lake trout		9,408,000		9,408,000
	Whitefish		30,000,000		30,000,000
Detroit, Mich. a— Dec.-June	Pike perch	31,735,000	12,600,000		44,335,000
	Whitefish	5,000,000	20,000,000		25,000,000
Sault Ste. Marie, Mich.— Apr.-May	Lake trout		3,500,000		3,500,000
	Whitefish		30,000,000		30,000,000
Orangeburg, S. C.: Entire year	Black bass			135,000	135,000
	Shad		772,000		772,000
Put in Bay, Ohio: a Entire year	Pike perch	165,425,000	68,300,000		233,725,000
	Whitefish	69,180,000	175,500,000		244,680,000
	Yellow perch	2,000,000			2,000,000
Quinault, Wash.: Entire year	Blueback salmon		13,840,000	2,665,788	16,505,788
	Chinook salmon		29,600	4,810	34,410
	Silver salmon		96,650	4,864	101,514
Quincy, Ill.: a Entire year	Black bass			80,450	80,450
	Carp			3,915,950	3,915,950
	Catfish			779,431	779,431
	Crappie			150,411	150,411
	Pike perch		1,650,000		1,650,000
	Sunfish			127,080	127,080
	Yellow perch			1,375	1,375
St. Johnsbury, Vt.: a Entire year	Brook trout	105,000	1,303,900	95,156	1,504,056
	Lake trout		3,000	14,190	17,190
	Landlocked salmon			3,991	3,991
	Rainbow trout			33,000	33,000
	Smallmouth black bass.		3,000	8,364	11,364
	Steelhead trout			55,265	55,265
	Yellow perch			3,305	3,305

a For convenience in handling, transfers were made as follows:
Neosho to Bellevue, 3,450 rock bass; 1,200 catfish; to Erwin, 596,816; to Clackamas, 106,000 rainbow trout eggs.
Northville to Central Station, 15,000; to Cape Vincent, 1,659,200; to Sault Ste. Marie, 8,500,000; to Charlevoix, 4,408,000; to Alpena, 3,500,000 lake trout eggs.
Detroit to Central Station, 1,120,000; to Sault Ste. Marie, 30,000,000; to Alpena, 30,000,000; to Charlevoix, 30,000,000 whitefish eggs; to Duluth, 18,750,000 pike perch eggs.
Put in Bay to Cape Vincent, 15,000,000; to Central Station, 500,000; to Detroit, 25,880,000; to Duluth, 25,000,000 whitefish eggs; to Homer, 4,000,000; to La Crosse, 6,000,000; to Quincy, 2,000,000; to Manchester, 3,000,000 pike perch eggs.
Quincy to Neosho, 7,400 crappie, 1,000 catfish; to White Sulphur, 250 sunfish.
St. Johnsbury to Central Station, 20,000; to Holden, 409,900 brook trout eggs; to Holden, 37,600 rainbow trout fry.

STATIONS OPERATED AND THE OUTPUT OF EACH FOR THE FISCAL YEAR 1916—Continued.

Station and period of operation.	Species.	Eggs.	Fry.	Fingerlings, yearlings, and adults.	Total.
St. Johnsbury, Vt.—Con.					
Holden, Vt.—					
Entire year	Brook trout		528,000	7,600	535,600
	Lake trout			14,100	14,100
	Landlocked salmon			1,800	1,800
	Rainbow trout			13,000	13,000
	Steelhead trout			33,888	33,888
Swanton, Vt.—					
Mar.-June	Pike perch	25,000,000	63,753,280		88,753,280
	Yellow perch		8,100,000		8,100,000
San Marcos, Tex.:					
Entire year	Black bass			370,925	370,925
	Crappie			891	891
	Rock bass			11,505	11,505
	Sunfish			23,110	23,110
	Warmouth bass			450	450
Saratoga, Wyo.:					
Entire year	Brook trout			181,256	181,256
Spearfish, S. Dak.:					
Entire year	Blackspotted trout			614,250	614,250
	Brook trout			527,400	527,400
	Lake trout			16,525	16,525
	Loch Leven trout			105,500	105,500
	Rainbow trout			101,200	101,200
	Steelhead trout			10,600	10,600
Tupelo, Miss.:					
Entire year	Black bass		198,500	131,725	330,225
	Crappie			85	85
	Sunfish			30,100	30,100
White Sulphur Springs, W. Va.:					
Entire year	Black bass			1,015	1,015
	Brook trout			792,850	792,850
	Rainbow trout			251,600	251,600
	Smallmouth black bass.		114,000		114,000
Woods Hole, Mass.[a]					
Entire year	Cod		192,275,000		192,275,000
	Flatfish		748,560,000		748,560,000
Wytheville, Va.:[a]					
Entire year	Black bass			31,550	31,550
	Brook trout			151,600	151,600
	Landlocked salmon		4,800		4,800
	Rainbow trout	350,000		610,759	960,759
	Rock bass			11,335	11,335
	Smallmouth black bass.		45,500	1,200	46,700
	Sunfish			1,290	1,290
Yes Bay, Alaska:[a]					
Entire year	Blueback salmon	3,000,000	32,920,000	20,876,000	56,796,000
	Humpback salmon		325,000		325,000
Total output		425,700,794	4,330,287,387	93,360,738	4,848,348,919
Loss in transit			987,050	99,303	1,086,353
Net output		425,700,794	4,329,300,337	92,261,435	4,847,262,566

[a] For convenience in handling, transfers were made as follows:
Woods Hole to Gloucester, 25,769,000 cod eggs.
Wytheville to Bellevue, 7,500; to Cold Springs, 3,000 rock bass; to Louisville, 250,000; to Nashua, 100,000; to Central Station, 35,000; to Cape Vincent, 100,000; to St. Johnsbury, 100,000; to White Sulphur, 150,000; to La Crosse, 100,000; to Northville, 200,000 rainbow trout eggs.
Yes Bay to Quinault, 100,000; to Afognak, 15,000,000 blueback salmon eggs.

The eggs hatched at the main stations listed in the foregoing table are in many cases obtained from auxiliary sources, usually temporary stations occupied during the season only or, in some instances, mere camps which are shifted from year to year. In the Great Lakes and off the New England coast collections are made by the Bureau's vessels or boats in favorable localities. The following temporary stations and collecting points furnished eggs of the given species for the main hatcheries during 1916.

LIST OF EGG-COLLECTING STATIONS, FISCAL YEAR 1916.

Station.	Period of operation.	Species handled.
Alaska:		
Eagle Lake	June	Blueback salmon.
Ketchikan Creek	September-October	Humpback salmon.
Seal Harbor	June-October	Blueback salmon.
Uganak	do	Do.
Colorado:		
Antero Reservoir	April-May	Rainbow trout.
Cheesman Lake	do	Do.
Edith Lake	October-November	Brook trout.
Engelbrechts Lakes	do	Do.
Hosselkus Lake	do	Do.
Kelleys Lake	do	Do.
Musgroves Lake	do	Do.
Smiths Ponds	do	Do.
Northfield Lakes	do	Do.
Turquoise Lake	do	Do.
Woodland Park Lake	do	Do.
Maine: Portland	July-October, May-June	Lobster.
Massachusetts:		
Menemsha	January-April	Flatfish.
Waquoit	do	Do.
Michigan:		
Alden	November	Whitefish.
Antrim City	do	Do.
Bay City	April	Pike perch.
Bay Port	November	Whitefish.
Belle Isle	October-November	Do.
Charity Island	do	Do.
Detour	do	Lake trout.
Fairport	do	Do.
Frankfort	do	Do.
Grassy Island	do	Whitefish.
Isle Royal	do	Lake trout and whitefish.
Keweenaw Point	do	Do.
Manistique	do	Do.
Marquette	do	Lake trout and lake herring.
Monroe	April and November	Pike perch and whitefish.
Munising	October-November	Lake trout.
Munoscong	April	Pike perch.
Naubinway	November-December	Whitefish.
Ontonagon	October-November	Lake trout.
St. James	October-December	Lake trout and whitefish.
Jacobsville	October-November	Lake trout.
Minnesota: Grand Marais	do	Do.
Montana:		
O'Dell Creek	March-May	Grayling.
South Meadow Creek	do	Grayling and rainbow trout.
New York:		
Amherst Island	October-November	Lake trout.
Charity Shoals	do	Lake trout and whitefish.
Horseshoe Island	do	Lake trout.
Ogdensburg	April-May	Pike perch.
Old Forge	November	Whitefish.
Pigeon Island	October-November	Lake trout.
Pope Mills	April	Pike perch.
Sodus Point	November-December	Lake herring.
Stony Island	November	Lake trout.
Three Mile Bay	November-December	Lake herring and whitefish.
Ohio:		
Kellys Island	do	Whitefish.
Middle Bass	do	Do.
North Bass	April and November	Pike perch and whitefish.
Port Clinton	do	Do.
Toledo	do	Do.
Rhode Island: Wickford	February-April	Flatfish.
South Carolina:		
Branchville	April	Shad.
Jacksonboro	do	Do.
South Dakota:		
La Plant Lake	October-January	Brook and Loch Leven trout.
Schmidts Lake	October-December	Brook trout.
Vermont:		
Darling Pond	August-December	Do.
Lake Mitchell	do	Do.
Wyoming:		
Clear Creek	July and June	Blackspotted trout.
Columbine Creek	do	Do.
Cub Creek	do	Do.
Lake Camp	do	Do.
Pelican Creek	do	Do.

DETAILS OF DISTRIBUTION OF FISH AND EGGS, BY STATES, WATERS AND SPECIES, DURING THE FISCAL YEAR 1916.

CATFISH.

Disposition.	Fingerlings, yearlings, and adults.
Alabama:	
Abbeville, Clendinen Mill Pond	75
Andalusia, Lime Pond	100
Fort Payne, Big Wills Creek	300
Monroe's pond	100
Goodwater, McWhorter's pond	100
Ironton, Chehawhaw Creek	300
Jude, Town Creek	300
Roanoke, Waldrep's pond	100
Three Notch, Thornton's pond	100
Tyson, Marlette's pond	100
Arizona:	
Cochise, Burney's pond	400
Douglas, Johnson's pond	400
Prescott, Lake Watson	400
San Simon, Stenzel's pond	400
Arkansas:	
Bellefonte, Woodland Pond	100
Stephens, Jenkin's pond	160
Colorado:	
Arlington, Moseley's pond	600
Denver, Mud Lakes	200
Florida: Wauchula, Whittington's pond	150
Georgia:	
Box Springs, King Mill Creek	100
Stringfellow's pond	100
Bullochville, Walden's pond	100
Burwell, Turkey Creek	125
Columbus, Massey's pond	100
Ram Pond	200
Hillsboro, Wynen & King Pond	35
Lineville, Lake Mary Scott	150
Lithonia, Weekes's pond	50
Redan, Baboshela Pond	50
Thomson, Smith Cotton Mill Pond	100
Washington, Little River	622
Illinois:	
Belvidere, Kishwaukee River	2,000
Freeport, Yellow Creek	10,400
Irving, Wilson's pond	200
Marshall Heath's pond	200
Meredosia, Illinois River	[a] 775,500
Peotone, Cowing's pond	100
Polo, Pine Creek	3,000
Rockford, Rock River	700
Vermont, Oakdale Pond	200
Indiana:	
Brazil, Lambert's pond	100
Chrisney, Jacob's pond	100
Connersville, Green Mound Pond	200
Delaware, Wildmere Lake	100
Sunman, Brauer Pond	200
Forthofer Pond	200
Robinson Pond	200
Weisburg, Gutzwiller's pond	200
Wellsboro, Way Dredge Creek	300
Iowa:	
Bellevue, Mississippi River	[a] 97,500
Davenport, Upper Pond	200
Eldora, Iowa River	600
Exira, Edgeville Lake	1,670
Gravity, Maple Lawn Pond	333
Lime Springs, Upper Iowa River	6,000
Manchester, Maquoketa River	2,590
North McGregor, Mississippi River	[a] 583,000
Peru, Emerson's pond	333
Steamboat Rock, Iowa River	600
Winfield, Pierce's pond	333
Winterset, Sawyer's pond	333
Kentucky:	
Cadiz, Hammond's pond	50
La Grange, Sugar Grove Lake	100
Paducah, Terry's pond	50
Stanford, Lovell's pond	100
Louisiana:	
Athens, Jackson's pond	1,000
Jennings, Canalside Pond	1,000
McManus, Five Pines Pond	100
Maryland:	
Bowie, Mirror Lake	150
Buena Vista Springs, Lake Royer	800
Cumberland, Potomac River	300
Town Creek	300
Wills Creek	300
Taneytown, Goulden's pond	1,200
Massachusetts:	
Clinton, Clamshell Pond	200
Cochiance Pond	200
Fitchburg, Whalom Lake	400
Greenfield, Dam No. 2	200
Horseshoe Pond	200
Lancaster, Big Pond	200
Michigan:	
Battle Creek, Mud Lake	200
Belding, Kiddville Pond	150
Charlotte, Long Lake	300
Gaylord, Long Lake	300
Jackson, Portage Lakes	300
Vandercook Lake	300
Wolf Lake	300
Jonesville, Courtright Lake	300
Half Moon Lake	300
Lake, Crooked Lake	150
Lakeview, Tamarack Lake	150
Town Line Lake	150
Marengo, Rice Creek	150
Richland, Gull Lake	300
Long Lake	150
Scottville, Grey's pond	100
Sidnaw, Booth Lake	500
Elsner Lake	500
Twin Lake, North Lake	400
Vanderbilt, Round Lake	400
Minnesota: Homer, Mississippi River	[a] 314,402
Mississippi:	
Aberdeen, Smith Lake	375
Amory, Minor's pond	50
Liberty, Causey's pond	100
Macon, Noxubee River	75
Osyka, Gladhurst Pond	70
Oxford, Callaway's pond	50
Pontotoc, Johnson's pond	100
Patterson Lake (A)	100
Patterson Lake (B)	200
Shannon's pond	100
Tunnell's pond	100
Rienzi, Pearce's pond	50
Trantham's pond	60
Tibbee Station, Willow Pond	125
Vicksburg, Phillip Pond	50
Missouri:	
Everton, Meierhof's pond	60
Mansfield, Lake Crystal	300
Miller, Willow Spring Pond	100
Mill Spring, College Lake	31
Neosho, Turkey Creek	100
Nevada, Simon's pond	100
Norwood, Farm Pond	120
Pleasant Mill, Kellog Lake	200
Lake Blanch	200
Tucker Smith Lake	200
Pamona, Lake Pippin	120
Purcell, Bradford's pond	100
Montana:	
Chinook, Massey's pond	300
Forsythe, Yellowstone River	305
Glendive, Yellowstone River	200
Havre, Milk River	300
Miles City, Yellowstone River	375

[a] Rescued from overflowed lands and restored to original waters.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

CATFISH—Continued.

Disposition.	Fingerlings, yearlings, and adults.
Nebraska: Verdon, Harden's pond	333
New Hampshire:	
Bartlett, Little Sawyer Pond	354
Hinsdale, Connecticut River	400
New Mexico:	
Carlsbad, Black River	200
Carrizozo, Willow Pond	300
Cimarron, Antelope Valley Lake	400
Des Moines, Corrumpa Creek	400
Dulce, Dulce Lake	600
Elida, Jippy Pond	200
Folsom, Preston Lake	400
Kenna, Daisy Dell Pond	200
Kimmons's pond	200
La Lande, Fields's pond	200
Montoya, Laguna Luciano	300
Taiban, Singing Water Pond	200
Tucumcari, Blue Water Pond	300
Charcoal Pond	300
Willard, Sandusky's pond	200
New York:	
Addison, Canisteo River	375
Bath, Lake Salubria	375
Millerton, Indian Pond	375
Rudd Pond	375
North Carolina:	
Burlington, Loch Corinne	200
Quaker Pond	200
Greensboro, Todd Pond	100
Gulf, Taylor Pond	100
North Wilkesboro, Henderson's pond	100
Reeves's pond	100
Ruffin, Vivian Lake	100
Taylorville, Adams's pond	100
North Dakota:	
Litchville, Catfish Pond	100
Oakes, Snow Pond	100
Ohio:	
Cincinnati, Klotter's pond	200
Columbiana, Southside Lake	100
Geauga Lake, Geauga Lake	300
Jefferson, Lee's pond	200
Russells Point, Lewistown Lake	400
Washington Court House, Sugar Creek	200
Oklahoma:	
Ardmore, Harrison Pond	174
Clinton, Terry's pond	100
Todd's pond	100
Colbert, Long Pond	400
Erick, Holmberg's pond	150
Granite, Lake Tanlouse	100
Hollis, Salt Fork Lake	100
Mill Creek, Brewer's pond (A)	100
Brewer's pond (B)	100
Mooreland, Jenisch Lake	150
Norge, Hog Creek Pond	150
Pocassett, Bray's pond	150
Schulter, Sullivan's pond	200
Tangier, Bosserman's pond	100
Waukomis, Kid Magnet Creek	150
Woodward, Stengelmeir Lake	150
Pennsylvania:	
Benroy, Mill Creek	300
Gap, Pequea Creek	300
Johnstown, Quemahoning Lake	450
Wilmore Pond	450
Jonestown, Little Swatara Creek	300
Lebanon, Mount Gretna Lake	300
Storer Mill Lake	300
Weidman Lake	300
Monocacy, Lewis's pond	300
Montrose, Bixby Pond	200
Oran Station, Dunn Lake	200
Point Marion, Monongahela River	300
Reading, Angelina Lake	300
Antietam Lake	300
Bechtel's pond	300
Manatawny Creek	300
Pennsylvania—Continued.	
Reading—Continued	
Socany Creek	300
Tulpehocken Creek	600
Wyomissing Creek Dam	300
Richmond, Dunkle's pond	200
Rockwood, Calender Run	300
Rohrestown, Little Conestoga Creek	300
Royersford, Stony Run	300
Porto Rico: San Juan, Carite Reservoir	1,500
South Carolina:	
Abbeville, Water Oak Pond	100
Campobello, Atkin's pond	100
Chester, Grassy Run	600
Greer, Wards Creek	100
Hodges, McIlwain's pond	100
Nickel's pond	200
Honea Path, Clinkscale's pond	100
Leesville, Hare's pond	100
Liberty, Youngs Lake	100
Monetta, Cato's pond	200
Perry, Poole's pond	100
Piedmont, Grove Creek	100
Pomaria, Cannon Creek Lake	300
Springfield, Dead Swamp Pond	200
Trenton, Buck Branch Pond	100
South Dakota:	
Custer, Sylvan Lake	450
Faith, Beaverdam Creek	100
Newell, Silver Lake	250
Presho, Clear Lake	25
Warner's pond	25
Wall, Mackerel Lake	357
Tennessee:	
Godwin, Shore's pond	85
Nunnelly, Mud Pond	85
Texas:	
Athens, Dunn's pond	46
Harris's pond	46
Wood's pond	46
D'Hanis, Leinweber's pond	25
Mineola, Rock Ford Club Lake	60
Mount Calm, Bower's pond	46
Navasota, Foster's pond	60
Palestine, Spring Park Lake	60
Waxahachie, Ellis Club Lake	100
Vermont: West Danville, Joes Pond	150
Virginia:	
Berryville, Shenandoah River	150
Blackwood, Powells River	300
Faber, Cove Creek	150
Gate City, Big Moccasin Creek	150
Harrisonburg, Custer Mill Pond	300
West Virginia:	
Kerens, Leading Creek	600
Newburg, Meadow Lake	300
Sinclair's pond	300
Phillippi, Tygarts Valley River	600
Simpson, Wendell Lake	300
Terra Alta, Sucker Run	300
Wellsburg, Buffalo Creek	600
Wisconsin:	
Baraboo, Baraboo River	1,200
Beaverdam, Beaverdam Lake	5,200
Birchwood, Bennett Lake	500
Big Chitac Lake	500
Huss Lake	500
Knudson Lake	500
Lohyed Lake	500
Fond du Lac, Lake De Neveu	600
La Crosse, Mississippi River	[a] 680,000
Manitowoc, Kastbaums Lake	1,200
Owen, Brick Creek Pond	310
Wyoming:	
Lusk, Spring Creek Reservoir	333
Newcastle, Beaver Pond	250
Total	2,545,777

[a] Rescued from overflowed lands and restored to original waters.

Details of distribut on of fish and eggs, fiscal year 1916—Continued.

CARP.

Disposition.	Fingerlings, yearlings, and adults.
Illinois:	
Irving, Wilson's pond	100
Jacksonville, County Home Pond	250
Meredosia, Illinois River	[a]3,915,600
Iowa:	
Bellevue, Mississippi River	[a]77,500
North McGregor, Mississippi River	[a]10,100
Minnesota: Homer, Mississippi River	[a]309,845
Mississippi:	
Gloster, Bass Lake	30
Houlka, William's pond	40
Vicksburg, Philip Pond	40
New Mexico: Carlsbad, Black River	100
North Carolina: Concord, Coddle Creek	67
Virginia: Meadow View, Sisk's pond	160
Wisconsin: La Crosse, Mississippi River	[a]23,000
Total	4,336,832

[a] Rescued from overflowed lands and restored to original waters.

BUFFALOFISH.

Iowa:	
Bellevue, Mississippi River	[a]173,700
North McGregor, Mississippi River	[a]10,600
Minnesota: Homer, Mississippi River	[a]375,080
Mississippi:	
Aberdeen, Bream Lake	45
Moon Lake	45
Smith Lake	45
Wisconsin, La Crosse, Mississippi River	[a]4,300
Total [b]	563,815

[a] Rescued from overflowed lands and restored to original waters.
[b] Lost in transit, 45 fingerlings.

SHAD.

Disposition.	Fry.[a]
Delaware: Delaware City, Delaware River and Bay	400,000
District of Columbia: Highway Bridge, Potomac River	350,000
Georgia: Savannah, Ogeechee River	300,000
Maryland:	
Accokeek Creek, Potomac River	3,009,000
Broad Creek, Potomac River	1,716,000
Bull Cove, Potomac River	2,125,900
Laurel, Patuxent River	500,000
Mill Creek, Chesapeake Bay	444,000
Piscataway Creek, Potomac River	11,855,200
Pomonkey Creek, Potomac River	8,019,400
Swan Creek, Chesapeake Bay	3,031,000
Wild Duck, Chesapeake Bay	1,335,000
North Carolina:	
Edenton, Albemarle Sound	7,423,000
Chowan River	200,000
Edenton Bay	375,000
North Carolina—Continued.	
Fayetteville, Cape Fear River	240,000
Jacksonville, New River	215,000
Maysville, Whiteoak River	240,000
Oregon: Willamette, Willamette River	3,316,845
South Carolina:	
Branchville, Edisto River	282,000
Jacksonboro, Edisto River	490,000
Lockhart, Broad River	270,000
Virginia:	
Dogue Creek, Potomac River	3,934,900
Fairy Landing, Potomac River	1,607,400
Little Hunting Creek, Potomac River	14,342,400
Occoquan Creek, Potomac River	5,612,300
Pohick Creek, Potomac River	950,000
Swan Creek, Potomac River	5,059,600
Total [b]	77,644,545

[a] In addition 1,097,000 shad eggs were sent to the Massachusetts State Fish Commission at Palmer, Mass.
[b] Lost in transit, 502,000 fry.

ALEWIFE.

Disposition.	Fry.
Maryland: Bryans Point, Potomac River	200,000

Details of distribution of fish and eggs, fiscal year 1916—Continued.

WHITEFISH.

Disposition.	Fry and eggs.[a]
Michigan:	
Antrim City, Lake Michigan	6,000,000
Atwood Reef, Lake Michigan	11,500,000
Belle Isle Park, Detroit River	13,500,000
Cat Head Reef, Lake Michigan	6,000,000
Deckerville, Lake Huron	1,500,000
Detour, Lake Huron	12,000,000
Elk Rapids, Elk Lake	1,500,000
Escanaba, Lake Michigan	2,000,000
Fort Wayne, Detroit River	5,000,000
Harbor Springs, Lake Michigan	5,000,000
Manistique, Lake Michigan	6,000,000
Marquette, Lake Superior	3,750,000
Monroe, Lake Erie	10,000,000
Munising, Lake Superior	750,000
Naubinway, Lake Michigan	3,000,000
North Point, Lake Huron	17,000,000
Scarecrow Island, Lake Huron	13,000,000
Tobens Harbor, Lake Superior	1,800,000
Whitefish Bay, Lake Superior	7,000,000
Wrights Island, Lake Superior	1,050,000
Minnesota:	
Duluth, Lake Superior	65,000
Grand Marais, Lake Superior	2,130,000
Grand Portage, Lake Superior	1,140,000
Susie Island, Lake Superior	1,140,000
Two Harbors, Lake Superior	3,750,000
New York:	
Chaumont, Chaumont Bay	850,000
Fullers Bay, Lake Ontario	1,100,000
New York—Continued.	
Grenadier Island, Lake Ontario	3,700,000
Lake Pleasant, Pleasant Lake	500,000
Plattsburg, Lake Champlain	1,250,000
Long Lake West, Little Tupper Lake	*300,000
Point Peninsula, Lake Ontario	1,500,000
Port Henry, Lake Champlain	1,250,000
Rouses Point, Lake Champlain	1,250,000
Three Mile Bay, Three Mile Bay	500,000
Youngstown, Lake Ontario	1,000,000
Ohio:	
Catawba Island, Lake Erie	10,500,000
Isle St. George, Lake Erie	30,000,000
Kellys Island, Lake Erie	30,000,000
Marblehead, Lake Erie	20,000,000
Middle Bass, Lake Erie	20,000,000
Port Clinton, Lake Erie	20,000,000
Put in Bay, Lake Erie	20,000,000
State fish commission	*68,640,000
Sandusky, Lake Erie	5,000,000
Toledo, Lake Erie	10,000,000
Pennsylvania: Philadelphia, Fairmont Park aquarium	*240,000
Wisconsin:	
Cornucopia, Lake Superior	3,000,000
Delafield, State fish commission	*5,000,000
Total	316,975,000 *74,180,000

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

LAKE HERRING.

Disposition.	Fry.
New York:	
Chaumont, Chaumont Bay	2,300,000
Dutch Point, Lake Ontario	6,500,000
Fox Island, Lake Ontario	13,000,000
Fullers Bay, Lake Ontario	5,000,000
Galloo Island, Lake Ontario	13,000,000
Grenadier Island, Lake Ontario	7,500,000
New York—Continued.	
Grimshaw Bay, Lake Ontario	8,000,000
Point Peninsula, Lake Ontario	11,600,000
Three Mile Bay, Three Mile Bay	3,000,000
Trout Bay, Lake Ontario	6,100,000
Total	76,000,000

SILVER SALMON.

Disposition.	Fry and eggs.[a]	Fingerlings.
California: Hornbrook, Klamath River	2,169,050	
New York: New York, Aquarium	*2,500	
Oregon:		
Applegate, Applegate Creek	488,950	
Bonneville, State fish commission	*196,000	
Rogue River, Elk Creek		4,994
Rogue River		4,159
Washington:		
Baker Lake, Skagit River	277,164	
Birdsview, Grandy Creek		400,000
Skagit River		1,055,490
Brinnon, Wolcotts Slough	608,000	
Washington—Continued.		
Darrington, Hatchery Creek	580,000	
Day Creek, Skagit River	94,000	
Tingley Creek	12,000	
Duckabush, Duckabush River	620,000	
Illabott, Illabott Creek	21,800	
Quilcene, Big Quilcene River	264,220	
Little Quilcene River	65,000	
Quinault, Quinault Lake	96,650	4,864
Sultan, Elwell Creek	2,881,000	
Skykomish River	506,500	
Total	8,684,334 *198,500	1,469,507

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

CHINOOK SALMON.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.	Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
California:			Washington—Continued.		
Baird, McCloud River..	435,000	2,029,354	Birdsview, Grandy Creek........	....	270,000
Battle Creek, Battle Creek..............	6,155,950	3,508,870	Skagit River...........	....	424,795
Mill Creek, Mill Creek..	9,750,000	....	Darrington, Hatchery Creek.............	70,000	....
San Francisco, State fish commission.....	*750,000	....	Duckabush, Dosewallops River..........	....	9,000
Sisson, State fish Commission............	*18,872,340	....	Duckabush River....	....	99,000
Oregon:			Illabott, Illabott Creek.	27,950	....
Applegate, Applegate Creek	563,500	....	Little White Salmon, Little White Salmon River..........	18,306,000	5,593,974
Clackamas, Clackamas River...............	5,523,000	990,124	Quilcene, Big Quilcene River............	5,130	....
Medford, State fish commission............	*1,000,000	....	Quinault, Quinault Lake..............	29,600	4,810
Rogue River, Elk Creek	336,000	1,264,037	Sultan, Elwell Creek...	108,400	....
Rogue River..........	1,616,000	286,000			
Upper Clackamas, Clackamas River...	1,878,400	1,016,000	Total...............	63,650,714 *20,622,340	16,582,655
Washington:					
Big White Salmon, Big White Salmon River	18,845,874	1,086,691			

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

BLUEBACK SALMON.

Disposition.	Fry and eggs.[a]	Fingerlings.	Disposition.	Fry and eggs.[a]	Fingerlings.
Alaska:			Washington:		
Afognak, Ahuyon Creek	967,000	5,860,440	Baker Lake, Skagit River..............	1,875,000	....
Letnik Lake..........	8,340,000	3,040,000	Birdsview, Grandy Lake............	22,420	....
Yes Bay, Hatchery Creek..............	10,675,000	18,676,000	Skagit River..........	....	520
Lake McDonald......	9,000,000	2,200,000	Quinault, Quinault Lake..............	13,840,000	2,665,788
Yes River............	13,245,000	....			
Oregon: Bonneville, State fish commission....	*3,000,000	....	Total..............	57,964,920 *3,000,000	32,442,748

HUMPBACK SALMON.

Alaska:			Washington:		
Afognak, Ahuyon Creek	4,707,000	....	Birdsview, Grandy Creek.............	....	1,415,000
Letnik Lake..........	2,029,500	....	Skagit River.........	....	1,100,000
Ketchikan, Ketchikan Creek..............	325,000		Darrington, Bennetts Slough............	2,000,000	....
District of Columbia:			Hatchery Creek.......	278,000	....
Washington, Potomac River...............	15,000	....	Day Creek, Tingley Creek.............	300,000	....
Maine:			Duckabush, Duckabush River.........	1,165,000	400,000
Bangor, Penobscot River...............	320,000	....	Illabott, Illabott Creek.	757,500	....
Calais, St. Croix River..	731,710	....	Quilcene, Big Quilcene River............	1,328,500	....
Dennysville, Dennys River...............	510,840	....	Little Quilcene River............	100,000	....
East Machias, East Machias River.........	738,935		Sultan, Elwell Creek...	177,400	....
Ellsworth, Union River	144,515	....			
Orland, Orland River..	2,220,000	229,584	Total...............	19,179,124	3,144,584
Pembroke, Pennamaquan River.........	510,840	....			
South Penobscot, Wrights Pond......	420,000	....			
Warren, St. George River...............	399,384	....			

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

DOG SALMON.

Disposition.	Fry and eggs.[a]	Fingerlings.
Washington:		
Brinnon, Wolcotts Slough	1,285,000	
Darrington, Bennetts Slough	431,000	
Duckabush, Duckabush River	11,662,444	1,000,000
Washington—Continued.		
Quilcene, Big Quilcene River	7,062,500	
Little Quilcene River	1,060,000	
Total	21,500,444	1,000,000

STEELHEAD TROUT.

Disposition.	Fry and eggs.[a]	Fingerlings.
Connecticut: Mystic, Morgan Pond		1,000
Maine:		
Dover, Buttermilk Pond		3,500
Piscataquis River		1,500
Michigan:		
Bergland, Cascade Creek		1,000
Calumet, Montreal River		250
Central, Little Gratiot River		500
Montreal Meadows Pond		250
Trap River		500
Crystal Falls, Paint River		1,000
Delaware, Agate River		500
Iron River, Ice Lake	5,000	
Ishpeming, Barnhart Creek	2,000	
Mandan, Seward Creek		500
Silver Creek		500
Phoenix, Buffalo River		500
Minnesota:		
Knife River, MicMac Lake		1,500
Nigadoo Brook		500
Nippissiquit Lake		1,500
Schauff Lake		1,000
Tettegouche Lake		1,500
Peterson, Diamond Creek		500
St. Paul, State fish commission	*250,000	
Montana:		
Pony, Mason Lake		4,000
Waterloo, Jefferson River		9,000
New Hampshire:		
Bristol, Newfound Lake		10,000
Pike, Lake Tarleton		3,575
Warren, State fish commission	*93,000	
New Jersey: Hackettstown, State fish commission	*93,000	
New York:		
Raquette Lake, Kareoso Lake	*100,000	
Riverside, Schroon Lake		15,000
North Dakota: St. John, State fish commission	*93,000	
Oregon:		
Applegate, Applegate Creek		2,091,265
Butte Creek, State fish commission	500,000	
Clackamas, Clackamas River		109,500
Clear Creek		30,000
Delf Creek		11,900
Eagle Creek		29,200
Eby Springs Creek		5,000
Lemon Creek		1,000
Oregon City, Clear Creek		11,314
Spring Branch		5,000
Rogue River, Elk Creek		414,977
Oregon—Continued.		
Rogue River, North Fork		71,850
Union Creek		5,000
South Dakota:		
Big Stone City, Big Stone Lake		5,200
Fruitdale, U. S. Reclamation reservoir		5,400
Vermont:		
Conicut, Lake Tarleton		12,000
Long Pond		1,500
Edgewater, Niggerhead Pond		500
Ely, Fairlee Lake		5,000
Middle Brook		3,000
Fair Haven, Sunset Lake		10,000
Greensboro, Caspian Lake		4,000
Hardwick, Nichols Pond		4,000
Nichols Pond Brook		2,000
Orleans, Willoughby River		4,000
Roxbury, State fish commission	*150,000	
St. Johnsbury, Sleepers River		190
South Chittenden, Chittenden Dam		8,388
Washington:		
Birdsview, Grandy Creek		800,000
Skagit River	147,000	
Brinnon, Dosewallops River	100,000	
Duckabush, Duckabush River		91,000
North Bend, State fish commission	*100,000	
North Yakima, Bumping Lake	10,000	
Naches River	10,000	
Satus Creek	10,000	
Pomeroy, Alpowa Creek		2,000
Pataha Creek		4,000
Sultan, Elwell Creek	34,600	
Tacoma, American Lake	10,000	
Gravelly Lake	10,000	
Steilacoom Lake	10,000	
Wisconsin:		
Brule, Brule River		1,500
Donaldson, Black Oak Lake		2,000
Gordon, Eau Claire River	6,000	
Rice Lake, Miller Creek	5,000	
Red Cedar River	5,000	
Solon Springs, Moose River	6,000	
Wyoming: Laramie, State fish commission	*200,000	
Total	870,000 *1,079,000	3,811,058

a Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

RAINBOW TROUT.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
Alabama:		
Birmingham, Mountain Lake		4,000
Hillsboro, Dobbins's pond		2,000
Guntersville, Smith's pond		4,000
Jasper, Long's pond		3,000
Leesburg, Spring Creek		6,000
Arizona:		
Apache, Cave Creek		1,000
Safford, Fry Canyon Creek		250
Jacobson Canyon Creek		250
Marijilda Canyon Creek		500
San Simon, Carr's pond		250
Reservoir No. 2		250
Skull Valley, Ferguson Canyon Creek		1,250
Roberts's pond		500
Wilcox, Boyle Lake		250
Winslow, Oak Creek, East Fork		1,000
Arkansas:		
Cave Springs, Loch Lono		500
Clear Creek, Johnson's pond		200
Harrisburg, Town Pond		100
Harrison, Mill Creek		1,960
Hot Springs, Borman's pond		500
Kensett, Dickey's pond		950
Mill Creek, Brown's pond		200
Olvey, Britton Pond		100
Springdale, Clear Creek		4,000
California:		
Colton, Cedar Springs Pond	2,000	
McFarland, McFarland Reservoirs	2,000	
Oakland, Smith's pond	2,000	
Point Reyes Station, Lime Gulch Creek	*25,000	
Rosamond, Lakeview Pond	2,000	
Oakmore Pond	2,000	
Union Mills, Club Ponds	4,000	
Colorado:		
Almont, Taylor River, Lower		3,000
Antero, Antero Reservoir		5,000
South Platte River		6,000
Aspen, Hallam Lake		1,000
Lower Maroon Lake		3,000
Weller Lake		2,000
Boulder, Boulder Creek		3,000
Jim Creek		3,000
Left Hand Creek		3,000
Middle Boulder Creek		3,000
South Boulder Creek		3,000
Buffalo, Buffalo Creek		1,500
Lake Cheesman		15,000
Wigwam Creek		5,000
Carbondale, Corthell's pond		500
Thomas Lake		2,000
Cebolla, Cebolla Creek		9,500
Gunnison River		9,500
Gunnison River, Lower		9,500
West Elk Creek		2,850
Colorado—Continued.		
Colorado Springs, Bison Creek		1,000
Creede, Rio Grande River		2,000
Cripple Creek, Edward Frye Pond		1,000
Gillett Reservoir		4,000
Pleasant Valley Ranch Pond		1,000
Rule Creek Pond		2,000
Debeque, Leon Lake		2,500
Delta, Wier Lake		5,000
Denver, Bear Creek		6,000
Jefferson Park Ponds		2,000
Divide, Lashbaugh Lakes		3,000
Frisco, Jay Bird Pond		2,000
Georgetown, Naylor Creek		5,000
Gunnison, Gunnison River	*27,000	
Hartsel, South Platte River		5,000
Hot Springs, Cotton Creek Lake		500
Wild Cherry Creek Lake		1,000
Lake George, Turkey Creek		4,000
Lyons, St. Vrain Creek		5,000
Marble, Beaver Lake		5,000
Crystal River		5,000
Yule Creek		5,000
Mayfield Spur, Burrow Creek		1,000
Moffat, Middle Creek		2,000
Nast, Chapman Lake		1,000
Deadman Lake		2,000
Prospect, Lillie Lake		5,000
Salida, Foos Creek		1,000
Sapinero, Curecanti Creek		3,000
South Platte, South Platte River		4,000
Stonington, Arbor Pond		500
Tabernash, Cabin Creek		5,000
Fraser River		5,000
Victor, No. 2 Reservoir		2,000
Walsenburg, Lily Lake		500
Westcliffe, Venable Lake		500
Weston, Russell Lake		6,000
Woodland Park, West Monument Creek		2,000
Georgia:		
Ayersville, Dicks Creek		4,000
Bremen, Buck Creek		4,000
Clarkesville, Laprade Creek		2,000
Soquee Creek		1,000
Cleveland, Chestatee River		5,000
Copperhill, Fightingtown Creek		5,000
Lakemont, Lake Rabun		6,000
Mathis, Cliff Creek		3,000
Temple, Wrens Pond		1,500
Idaho:		
Deary, Lermo's pond		1,000
Greer, Wells's pond		1,000
Lakeport, Payette Lake		3,750
Samuels, Samuels Lake		2,500
Shoshone, Silver Creek, headwaters		2,500
Willow Creek		1,250

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

RAINBOW TROUT—Continued.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
Idaho—Continued.		
Spirit Lake, Spirit Lake		7,500
Twin Falls, Coulee Pond		1,250
Russell Pond		1,250
Weiser, Crane Heights Pond		2,500
Illinois:		
Spring Grove, State fish commission	*50,000	9,750
Waukegan, Scidmore's pond		500
Indiana:		
Attica, Spring Brook	4,000	
La Grange, Graveyard Run	6,000	
Michigan City, Grienke Run	3,000	
Township Run	3,000	
Iowa:		
Anamosa, Buffalo Creek, headwaters		3,000
Cedar Rapids, Applicant	*1,000	
Postville, Livingood Brook		2,500
Yellow River		2,500
Kentucky:		
Bowling Green, Brushy Fork Creek		300
Jennings Creek		300
Camp Nelson, Hickman Creek		1,000
Harlan, Clover Fork		3,000
Martin Fork		3,000
Poor Fork		3,000
South Union, Clear Fork Creek		400
Clear Creek		6,000
Maryland:		
Cowenton, Floral Springs Lake		100
Cumberland, Rocky Gap Creek		3,000
Dorsey, Montevideo Branch		200
Frostburg, Casselman River		2,000
Piney River		1,500
Puzzley Run		1,500
Savage River		1,500
Youghiogheny River		1,500
Glencoe, Piney Run		100
Hagerstown, City Park Lake		300
Marsh Run		7,000
Willow Lawn Creek		300
Halethorpe, Gibson's pond		100
Lonaconing, Bear Creek		4,000
Black Lick Creek		4,000
Blue Lick Creek		2,500
Chaney Run		4,000
Mud Lick Creek		2,500
Midland, Elk Lick Creek		1,500
Oakland, Big Bear Creek, North Fork		3,000
Muddy Creek		9,000
Principio, Principio Creek		200
St. James, Long Brothers Pond		1,000
Silver Spring, Sligo Branch		2,800
Towson, Hickory Lot Brook		300
Long Quarter Brook		300
Maryland—Continued.		
Westernport, Stony Run		4,000
Massachusetts:		
Forge Village, Forge Pond	800	
Georgetown, Maple Pond		800
Great Barrington, Prospect Lake		5,600
Lancaster, Cumberry Pond	1,200	
Lowell, Long Pond	800	
North Littleton, Knopps Pond	800	
Spectacle Pond	800	
South Deerfield, Savage's pond		1,600
Westfield, Borden Brook Lake		2,400
Westford, Long Sought For Pond	800	
Michigan:		
Buchanan, McCoys Creek	8,000	
Sampson Creek	5,000	
Wagner Creek	8,000	
Charlevoix, Pine Lake		5,000
Dexter, Huron River	10,000	
Fennville, Spring Ridge Pond	1,000	
Gaylord, Sturgeon River	25,000	
Grayling, Tillula Lake	15,000	
Highland, Dunham Lake		4,000
Whalen Lake		4,000
Montrose, Glen Lake	4,000	
Mount Pleasant, Chippewa River		4,700
Owosso (applicant)	*200,000	
West Olive, Stone Creek	3,000	
Wingleton, Pere Marquette River		10,500
Minnesota:		
Harmony, Big Springs Creek		500
Partridge Creek		500
Sanden Creek		500
Willow Creek		1,000
Lake City, Tuppers Pond		2,000
Peterson, Camp Hazzard Creek		500
Pine Creek		500
Preston, Big Spring Creek		1,000
Camp Creek		1,300
Dauschee Creek		1,300
Gribbens Creek		800
North Branch		1,300
Partridge Creek		1,800
Rice Creek		800
Root River, South Branch		1,300
Trout Run Creek		800
Watson Creek		1,300
Willow Creek		1,300
Rushford, Austin Creek		1,000
Big Spring Creek		1,000
Campbell Creek		1,000
Collidge Creek		1,000
Daley Creek		1,000
Diamond Creek		1,000
Enterprise Creek		1,000
Ferguson Creek		1,000
Gribbens Creek		1,000
Harvey Creek		1,000

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

RAINBOW TROUT—Continued.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
Minnesota—Continued.		
Rushford, Hemmingway Creek		1,000
Iverson Creek		1,000
Looney Valley Creek		2,000
Mead Creek		1,000
Nepstad Creek		1,000
Overland Creek		1,000
Pine Creek (A)		1,000
Pine Creek (B)		1,000
Trout Run Creek		1,000
Witse Creek		1,000
St. Charles, Ferguson Creek		500
Nichols Creek		500
Rush Creek		500
Trout Run Creek		500
Whitewater River		500
St. Cloud, Little Rock Creek		3,500
Little Watab River		1,050
Three Mile Creek		1,050
Missouri:		
Ash Grove, Coppage Lake		10,000
Birchtree, Johnny Hollow Creek		5,000
Bourbon, Blue Spring Branch		16,000
Bunker, Black River, West Fork		1,000
Sinking Creek		6,700
Crane, Crane Creek		700
Elk Springs, Elk River		1,320
Fanning, Elm Spring Lake		1,000
Goodman, McAntire Lake		16,000
Greer, Greer Spring Pond		1,000
Jaudon, East Creek		5,000
Joplin, Jenkins Creek		1,000
Jones Creek		11,000
Kansas City, Tiffany Pond		100
Lisle, Lisle Lake		3,000
Mansfield, Colonel Palmer Pond		225
James River and tributaries		16,000
Monet, Little Flat Creek		16,000
Spring River		2,000
Neosho, Cedar Creek		1,700
Hickory Creek		15,750
Indian Creek		6,000
Spring Creek		120
White Oak Creek		650
Newburg, Little Piney Creek		3,750
Mill Creek		675
Noel, Elk River, tributary of		20,000
Ridgley, Shoal Creek		250
Rolla, Little Pine Creek		1,000
St. Joseph, State fish commission	*152,400	
Salem, Current River		16,000
Seneca, Cave Creek		200
Lost Creek		2,000
Springfield, Mahans Creek		2,200
Vale, Little Blue Creek		8,000
Verona, Spring River		1,000
Wayne, Roaring River		2,000
Montana:		
Alder, Ruby River		9,000
Anaconda, Barker Lake		3,000
Montana—Continued.		
Becket, McDonald Creek		4,000
Belgrade, Bull Creek		3,000
Cottonwood Creek		3,000
East Gallatin River		4,500
West Gallatin River		7,500
Billings, Elk Lake		3,000
Bozeman, Bridger Creek		2,000
Cherry Creek		2,000
Dudley Creek		2,000
East Rainbow Lake		2,000
Mystic Lake		3,000
Pine Creek		2,000
South Taylor Creek		2,000
Spring Hill Creek		2,000
Story Lake		2,250
West Bear Creek		2,000
Butte, Delmo Lake		5,000
French Gulch Creek		8,000
Cardwell, Cold Spring Swamp		2,000
Craneville, Crane Creek		2,000
Crystal Spring Pond		1,000
Darby, Beaver Tail Creek		1,000
Lake Como		1,000
Trapper Creek		2,000
Deer Lodge, Little Blackfoot River		5,000
Dell, Bear Creek		2,500
Deadman Creek		3,000
Nicholia Creek		4,500
Teddy Creek		3,000
Dillon, Rattlesnake Creek		4,500
Floweree, Qu'Appelle Creek		2,500
Glangary, Otten's Pond		1,000
Grass Range, Elk Creek		4,000
Hedges, East Coulee Creek		4,000
Hilger, Deer Creek		3,000
Moccasin Creek		1,000
Hobson, Acly Creek		1,000
Nicolson Pond		1,000
Springdale Beaver Pond		1,000
Kalispell, Big Fork Creek		6,250
Flathead Lake		6,250
Lost Creek		6,000
Stillwater Creek		8,000
Wolf Creek		6,000
Lewistown, Little Wolverine Pond		1,000
Marshall Lake		1,000
Spring Creek Pond		1,000
Libby, Granite Creek		2,500
Leigh Lake		2,500
Parmenter Creek		1,250
Pipe Creek		2,500
Lodge Grass, Little Big Horn River		600
Madison Valley, State fish commission	*320,000	
Manhattan, Baker Creek		1,500
Rigley Creek		4,500
Martinsdale, Spring Creek		6,000
Trout Lake		4,000
Miles City, Tongue River		8,000
Missoula, Belmont Creek		2,000
Blackfoot River		4,000

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

RAINBOW TROUT—Continued.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
Montana—Continued.		
Missoula, Gold Creek		2,000
Johnson Creek		1,000
Twin Creek		1,000
Union Creek		1,000
Monida, Odell Creek		3,000
Red Rock Creek		6,000
Norris, Cedar Creek		10,000
Lake Irene		16,000
Park City, Linger's pond		1,000
Pony, South Willow Creek		6,000
Watt Lake		6,000
Red Rock, Sager Creek		6,000
Spring Branch		3,000
Rossfork, Crooked Creek		1,000
Roy, Ford Creek		3,000
Sappington, Antelope Pond		1,000
Jefferson River		13,500
Lake Jefferson		1,000
Silver Star, Weingart's pond		3,000
Somers, Finley Lake		4,000
Stevensville, Mill Creek		4,000
North Burnt Fork Creek		3,000
Sweet Grass, Price Lake		1,000
The X Lake		1,000
Troy, Kilbrennan Lake		1,250
Whitehall, Mayflower Pond		1,000
Nebraska:		
Chadron, Beaver Creek		3,000
Bordeaux Creek		4,000
Dead Horse Creek		4,000
Little Bordeaux Creek		4,000
Spring Creek		2,675
Crawford, White River		2,400
Nevada:		
Deeth, Mountain View Pond		250
Golconda, Humboldt River		1,000
New Hampshire:		
Bristol, Able Brook		800
Brayley Brook		800
Cockermouth River		800
Fowler River		800
Hazleton Brook		800
Pemigewassee River	1,600	
Smith River		800
Tilton Brook		800
Whittermore Brook	800	
Woodman Brook	800	
Canaan, Andrews Brook	800	
Orange Brook	800	
Greenfield, South Brook	800	
Keene, Branch Brook	1,600	
Lancaster, Little Pond	800	
Nashua, Snow Quarry Pond	500	
Newbury, Lake Sunapee		838
Pike, Lake Tarleton	1,600	
Warren, State fish commission	*100,000	
New Jersey:		
Hackensack, Coles Brook		200
Hackettstown, State fish commission	*50,000	
Pennington, Trap Rock Creek		200
Red Bank, Boar Bura Pond		800
New Jersey—Continued.		
River Edge, Zabriskies Brook		200
Whitings, Cedar Crest Pond		200
New Mexico:		
Glorietta, Spirit Lake		2,000
Las Vegas, Ortiz Lake		4,000
Magdalena, San Mateo Canyon		1,000
Santa Fe, Tesuque River		3,000
Taos Junction, Pueblo Lake		2,000
Valdez Pond		1,000
New York:		
Bayside, Palmetto Lake		200
Benson Mines, Star Lake	5,000	
Cambridge, Owl Creek		5,000
Cortland, Grout Brook	2,000	
Deposit, Oquaga Creek		1,500
Sky Lake	4,000	
Fulton, Windmill Creek	4,000	
Great Bond, Black Creek	4,000	
Hubbard Creek	4,000	
New York, Aquarium	*7,500	9
Oriskany, Oriskany Creek	4,000	
Pawling, School Pond		200
Phoenicia, Esopus Creek	4,000	
Preble, Bennett Hollow Brook	3,000	
Tioughnioga River	3,000	
Scarsdale, Franck's pond		100
Sherburne, Swamp Brook	2,000	
Shushan, Battenkill River		8,000
Spring Valley, Frederick's pond	1,000	
Syracuse, Butternut Creek		3,400
Chittenango Creek		2,800
Hitchcock Brook		700
Limestone Creek		3,400
Nine Mile Creek		3,500
Onondaga Creek		3,900
West Nyack, Sloan Pond		200
Whitney Point, Nanticoke Creek	3,000	
North Carolina:		
Asheville, Bee Tree Creek		3,000
Flat Creek		4,000
Rheems Creek and tributaries		6,000
Biltmore, Cane Creek		5,000
Black Mountain, Lang Branch		2,000
Swananoa River, Left Fork		2,000
Swananoa River, North Fork		4,000
Swananoa River, Sugar Fork		3,000
Boonford, Big Crabtree Creek		7,000
Brevard, Kings Creek		2,000
Burnsville, Bowline Creek		4,000
Cherryfield, Cherryfield Creek		2,000

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

RAINBOW TROUT—Continued.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
North Carolina—Contd.		
Doughton, Brush Creek		4,000
Brush Creek, Laurel Fork		2,000
Elkland, Horse Creek		50,000
Meat Camp Creek and tributaries		1,250
New River		5,000
Elk Park, Jones Creek		4,000
Flat Rock, Fall Creek		2,000
Franklin, Buck Creek		1,000
Cullasaja River		4,000
Watauga Creek		3,000
Greensboro, Beech Pond		900
Minnie Branch		2,000
Hendersonville, Big Henry Creek		4,000
Kanuga Lake		4,000
Little Hungry Creek		4,000
Hominy, Stony Fork Creek		3,000
Hot Springs, Spring Creek		5,000
Spring Creek, Meadow Fork		3,000
Kannapolis, Kannapolis Pond		2,000
Lake Toxaway, Lake Toxaway		10,000
Montezuma, Kaintuck Creek		12,000
Morrisville, Lynn's pond		3,000
Sorrell's pond		2,000
Mortimer, Harpers Creek, Forks of		5,000
Murphy, Bell Creek		3,500
Davis Creek		3,000
North Wilkesboro, Bobs Creek		3,000
Buffalo Creek		3,000
Elk Creek		3,000
Laytown Creek		6,000
Masters Branch		2,000
Pegs Branch		2,000
Ready Branch		2,000
Vanda Branch		2,000
Winkler Creek		2,000
Yadkin River, Stony Fork		3,000
Old Fort, Jarretts Creek		9,000
Rooring River, Mathis's pond		1,000
Ronda, Mathis's pond		1,000
Runion, Big Creek		3,000
Hickeys Fork Creek		4,000
Little Laurel Creek		4,000
Selica, Cathey Creek		4,000
Spruce Pine, Harrison's pond		2,000
Thurmond, Big Elkin Creek, tributary of		2,250
Mitchell River		2,000
Royal City Creek		2,000
Tryon, Pacolet River		4,000
Tuckerdale, Little Horse Creek		1,250
Tuxedo, Green River		12,000
Rock Creek		2,000
Warrensville, New River, North Fork		1,500
Waynesville, Brier Ridge Creek		4,500
Jonathan Creek		4,000
Love Creek		6,000
Mill Creek		6,000
Reuben Creek		6,000
North Carolina—Contd.		
Waynesville, Riddle Cove Creek		3,750
Taylor Creek		3,750
Turner Creek		3,000
Willetts, Scotts Creek		4,000
North Dakota:		
Mott, Schaff's lake		300
Ohio:		
Belleville, Gatton's pond	1,000	
Honey Creek	4,000	
Wade's lake	1,000	
Castalia, Trout Stream	5,000	
Mansfield, Baker Creek	10,000	
Honey Creek	10,000	
Parry Lake	2,000	
Reynolds Run	4,000	
Styerts Creek	10,000	
Switzer Run	5,000	
Taggart Creek	6,000	
New Carlisle, Silver Lake		2,500
Ravenna, Barrell Run	3,000	
Rock Creek	3,000	
Oregon:		
Clackamas, Mill Creek		4,000
Gresham, Little Rock Creek		5,900
Silverton, Abaqua Creek		5,000
Butte Creek		4,000
Pennsylvania:		
Altoona, Mill Run		600
Sandy Run		2,000
Ashcom, Clear Creek		3,000
Cove Creek		5,000
Bedford, Cove Creek		5,000
Shovers Run		5,000
Bellwood, Bells Gap Run		600
Logan Springs Run		175
Benton, Coles Creek		1,000
Fishing Creek		2,600
Johnson Run		400
Little Fishing Creek		1,500
West Creek		1,500
Blain, Fowlers Run		600
Sheaffers Run		600
Cedar Hollow, Valley Creek		6,000
Chester, Ridley Creek		2,000
Clearfield, Alex Branch		1,100
Alder Run		450
Bald Hill Run		950
Bee Hollow Run		1,250
Big Lick Run		1,600
Big Montgomery Creek		1,600
Big Moose Creek		1,600
Big Trout Run		2,050
Billotts Run		150
Bird Run		800
Black Thicket Run		800
Boson Run		800
Brower Run		800
Butler Run		950
Carnes Run		1,600
Carrs Run		800
Cherry Run		800
Chestnut Run		800
Christs Run		150
Cold Creek		1,900
Condriot Run		150
Crooked Run		950
Debeck Run		800
Deer Creek		300
Deloy Run		150

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

RAINBOW TROUT—Continued.

Disposition.	Fry and eggs.	Fingerlings, yearlings, and adults.
Pennsylvania—Contd.		
Clearfield, Dixon Run		1,750
Doctors Fork Run		800
Dolsa Run		800
Dry Hollow Run		950
Dunlap Run		300
Elder Run		800
Fern Branch Run		150
First Hollow Run		150
Flegal Run		800
Fork Run		950
Garden Draft Run		800
Graham Run		950
Graham Hollow Run		800
Grapevine Run		800
Griffin Run		800
Gum Swamp Run		800
Hamton Run		800
Haney Run		800
Harvey Branch		300
Hollow Bend Run		300
Hoobler Spring Run		950
Horn Shanty Run		300
Hubler Run		800
Irwin Run		950
Jerry Run		800
Jones Run		800
Judy Run		150
Knepp Run		800
Koozer Run		150
Krepps Hollow Run		800
Kurtz Run		800
Kyler Run		150
Laurel Run		1,600
Laying Rock Run		800
Londers Run		800
Lick Run		450
Little Deer Creek		300
Little Lick Run		800
Little Moose Creek		800
Little Trout Run		300
Lower Buck Run		300
Maines Run		300
Mignor Run		300
Millstone Run		800
Molasses Run		800
Moravian Run		1,900
Morgan Run		450
Moses Run		300
Mosquito Run		800
Norris Branch		300
Ogden Run		950
Orr Run		800
Ost Haney Run		800
Patchell Run		800
Pine Hollow Run		150
Pine Swamp Run		800
Pitch Pine Run		950
Raccoon Run		300
Rankin Run		150
Rattlesnake Run		950
Red Run		800
Reeds Run		950
Right Branch		800
Robert's Run		950
Rock Run		800
Rock Hollow Run		950
Rocky Branch Run		300
Ross Run		800
Rosser Run		800
Sam Reed Run		800
Sandbar Run		800
Sanborn Run		300
Sanders Run		800
Sand Spring Run		800
Sandy Run		1,100
Pennsylvania—Contd.		
Clearfield, Sankey Run		800
Schucker Run		800
Selfridge Run		150
Shaws Run		800
Shope Run		800
Silvis Run		150
Singletree Run		800
Smith Run		800
Spence Run		300
Spring Run		800
Spruce Island Run		300
Stone Run		1,600
Stone Hammer Run		800
Stone Quarry Run		800
Stoney Battery Run		800
Stum Lick Run		150
Sulfridge Run		800
Sutton Run		800
Tar Hollow Run		800
Tarkill Run		1,600
Tate Run		800
Thompson Run		800
Thompson Reed Run		800
Topples Run		300
Upper Buck Run		300
Wallace Run		800
Walnut Hollow Run		800
Welder Swamp Run		800
Wilson Run		800
Witchhazel Run		800
Wolf Run		800
Woodland Run		950
Woods Run		800
Yeasie Run		150
Coalport, Barrett Run		1,500
Bear Run		1,500
Kutruff Run		1,500
Noel Run		1,200
South Witmer Run		1,800
Wilson Run		1,800
Coatesville, Broad Run		200
Two Log Run		200
Coudersport, Baker Run		1,200
Bell Run		1,800
Bishop Creek		300
Byam Hollow Run		900
Card Creek		1,800
Cherry Springs Branch		1,800
Cobb Hollow Run		1,800
Crystal Springs Pond		175
Darien Run		900
Dingman Run		175
Dry Run		300
Dwight Run		300
Elk Lick Creek		1,800
Elm Flat Run		1,800
Fishing Creek		1,800
Fishing Creek, East Branch		1,800
Fisk Hollow Run		1,800
Heth Run		1,800
Indian Run		900
Judd Run		175
Lanegar Creek		1,800
Lehman Run		175
Lent's pond		175
Little Moores Run		1,800
Lyman Run		2,700
Matteson Run		900
Mill Creek		300
Moores Run		1,975
Neefe Run		1,800
Nelson Run		175
North Hollow Run		1,800
Peet Run		1,800

Details of distribution of fish and eggs, fiscal year 1916—Continued.

RAINBOW TROUT—Continued.

Disposition.	Fry and eggs.	Fingerlings, yearlings, and adults.
Pennsylvania—Contd.		
Coudersport, Pine Run		900
Prosers Run		1,975
Prouty Creek		3,000
Prouty Creek, East Branch		900
Prouty Creek, West Branch		1,800
Reed Run		1,975
Rees Run		175
Sartwell Creek		1,800
Sinnemahoning Creek, South Branch		2,700
South Branch		300
South Hollow Run		900
South Woods Branch		1,800
Steer Run		175
Sunken Creek		1,800
Tannery Hollow Run		900
Toles Run		175
Trout Run		1,800
Wambold Run		175
White Chopping Run		1,800
Cresco, Bushkill Creek		3,000
Laurel Run		1,500
Stony Creek		1,500
Cresson, Conemaugh Creek, North Branch		3,000
Curry, Beaver Creek		2,000
Denver, Hill Run		1,500
Dudley, Trough Creek		2,400
Easton, Durham Creek		300
Martins Creek		200
Ebensburg, Connory Run		1,800
Noles Run		900
Everett, Brush Creek		4,000
Burke Spring Run		1,000
Cave Creek		3,000
Culvert Run		1,000
Deer Lick Run		1,000
Elbow Run		2,000
Juniata River, Raystown Branch		4,000
Oregon Run		1,500
Roaring Run		2,400
Tarkill Run		1,000
Tunnill Run		1,000
Wooden Bridge Run		1,000
Fairfield, Marshall Run		1,600
Toms Creek		2,400
Fishing Creek, Fishing Creek		4,000
Flinton, Dutch Run		1,800
Wire Rock Run		1,200
Flowing Spring, Canoe Creek		600
Gaines Junction, Chaffee Run		1,000
Elk Run		3,000
Johnson Run		1,000
Knowlton River		1,000
Phoenix Creek		3,000
Thompson Hollow Run		1,000
Gallitzin, Beaverdam Creek		2,000
Gannister, Piney Creek		600
Gap, Livingstone Run		4,000
Garden, Valley Creek		6,000
Gillentown, Black Moshannon Creek		600
Heckland Run		300
Glen Mawr, Muncey Creek		2,500
Pennsylvania—Contd.		
Hamburg, Peerless Pond		100
Hulls, Big Hollow Run		500
Birch Run		1,000
Black Stump Run		500
Camp Run		500
Gravel Lick Run		500
Horton Run		1,000
Jamison Run		1,000
Johnson Run		1,000
Mud Lick Branch		500
Sinnemahoning Creek, East Fork		1,500
Stony Lick Run		1,000
Vag Hollow Run		1,000
Williams Run		500
Huntingdon, Stone Creek		600
Stone Creek, East Branch		600
Hyner, Abes Fork Run		3,000
Irvona, Hockenberry Run		1,800
Jamison City, Big Run		400
Blackberry Run		400
Grassy Hollow Branch		400
Gwin Branch		400
Ted Run		400
Johnstown, Alwine R		100
Baker Run		1,000
Beaverdam Run		100
Bens Creek		1,600
Bens Creek, North Fork		100
Bens Creek, South Fork		100
Big Mill Creek		1,000
Blue Hole Run		100
Bobs Creek		100
Brush Creek		100
Card Machine Run		100
Clear Run		100
Clear Shade Run		1,600
Coxes Creek		100
Cub Run		100
Dalton Run		1,100
Deeters Creek		100
Drakes Run		100
Elk Lick Run		100
Figart Run		1,600
Fishing Run		100
Glade Run		100
Henaaries Creek		2,100
Hills Creek		100
Hinckston Run		100
Hoozer Run		100
Johns Mills Run		200
Jones Run		100
Kellers Run		100
Laurel Run (A)		1,600
Laurel Run (B)		100
Laurel Run (C)		100
Laurel Hill Run		100
Little Pine Run		100
Mill Creek		100
Millers Run		100
Negro Glade Run		100
Picking Run		100
Piney Run (A)		100
Piney Run (B)		100
Rachel Run		100
Red Run		100
Roaring Run		100
Salt Lick Run		1,100
Shaffer Run		100
Shannon Run		100

Details of distribution of fish and eggs, fiscal year 1916—Continued.

RAINBOW TROUT—Continued.

Disposition.	Fry and eggs.	Fingerlings, yearlings, and adults.
Pennsylvania—Contd.		
Jamison City, Solomons Run		1,000
Stuart Run		1,000
Sugar Run		1,000
Three Spring Run		1,000
Tub Mill Run		1,000
Whites Creek Run		1,000
Wildcat Creek		100
King of Prussia, Valley Creek		6,000
Kinzers, Bethania Creek		4,000
Lancaster, Little Marsh Run		2,000
Leesport, DeTurk's pond		200
Lemont, Spring Creek		7,000
Lewistown, Lingle Run		350
New Lancaster Valley Creek		350
Treasler Valley Creek		600
Lloydell, Beaver Run		1,800
Conemaugh River, South Fork		2,400
Lykens, Powells Creek		20,000
Mackeysville, Brookside Run		1,000
Fishing Creek		2,500
Mahanoy City, Lakeside Lake		200
Meadville, Gravel Run		1,250
Little Sugar Creek		1,250
Meyersdale, Big Pine Run		600
Big Spring Run		600
Bittner Run		300
Brush Creek		600
Durst Run		300
Elk Lick Creek		600
Flaugherty Creek		600
Glade Run		300
Kendall Run		300
Little Pine Run		300
Miller Run		300
Savage Run		300
Sechler Run		300
Snoot Run		300
Tub Mill Run		600
Ware Run		300
Mill Creek, Saddlers Creek		3,000
Mill Hall, Fishing Creek		1,500
Mill Lane, Valley Creek		3,000
Morrisdale, Enigh Run		2,000
Little Run		2,000
Moravian Run		3,000
North Run		2,000
Mount Union, Black Log Creek		2,000
Boohers Gap Run		2,000
Carter Run		4,000
Lower Licking Creek		3,000
Munster, Winterset Run		300
Narvon, Little Conestoga Creek		2,000
Shirks Run		2,000
New Centerville, Valley Creek		6,000
Norristown, Meadow Brook Lake		100
Oil City, Hemlock Run		1,250
Porcupine Run		1,250
Osceola Mills, Coal Run		5,000
Paddy Mountain, Penns Creek		600
Paoli Road, Valley Creek		3,000
Pennsylvania—Contd.		
Phillipsburg, Ardells Run		1,200
Benners Run		1,200
Black Bear Run		1,200
Black Moshannon Creek		2,400
California Run		1,200
Clover Run		1,200
Forge Run		1,800
Moravian Run		1,800
Morgan Run		1,200
Pine Run		1,200
Rock Run		1,200
Six Mile Run		1,200
Slate Run		1,200
Smays Run		1,200
Spruce Run		1,200
Sterling Run		1,200
Tom Tit Run		1,200
Phoenixville, Powder Mill Run		1,200
Picture Rocks, Greggs Run		600
Laurel Run		600
Muncey Creek		600
Planebrook, Valley Creek		3,000
Pocono Lake, Tobyhanna Creek		300
Tunckhannon Creek		200
Portage, Beaverdam Creek		1,000
Cedar Creek		1,000
Pottsville, Dieter Creek		400
Prompton, Prompton Creek		400
Punxsutawney, Little Sandy Creek, branch of		1,250
Ralston, Basid Creek		300
Miners Run		300
Rock Run		300
Winslow Creek		300
Reading, Mengel's pond		200
Reese, Cave Run		1,000
Ringtown, Girard Pond		2,500
Roaring Springs, Beaver Creek		600
Rockwood, Laurel Hill Creek		3,600
Rossiter, Strait Branch		2,000
Royersford, Gunpowder Run		3,000
Johnson Run		3,000
Paddys Run		3,000
Pigeon Creek		6,000
Royal Springs Run		2,000
Stony Run		3,000
Sand Patch, Spring Run		1,500
Sandy Lake, Plum Lake		250
Shrewsbury, Deer Creek		8,000
Slate Run, Little Slate Run		9,000
Smithfield, Victor Run		300
Spring City, Rock Run		400
Stillwater, Fishing Creek		400
Sunbury, Shipman's pond		200
Tryonville, Muddy Creek		1,250
Unionville, Benners Run		2,000
De Witts Run		2,000
Waterville, Otter Run		800

Details of distribution of fish and eggs, fiscal year 1916—Continued.

RAINBOW TROUT—Continued.

Disposition.	Fry and eggs.	Fingerlings, yearlings, and adults.
Pennsylvania—Contd.		
Watsontown, White Deer Creek		400
Waynesboro, Kaufmans Run		400
West Chester, Radley Run		2,000
West Hickory, Berlin Branch		1,200
Bobs Creek		1,600
Darling Branch		1,200
East Hickory Creek		1,800
Frog Run		800
Hazelton Run		800
Hickory Creek		1,800
Piney Run		1,050
Wharton, Bailey Run		300
Williamsburg, Yellow Springs Run		300
Williamsport, Big Bear Creek		300
Windber, Beaver Run		2,000
Biscuit Run		2,000
Bobs Creek		2,000
Butler Run		2,000
Cane Run		2,000
Little Paint Creek		2,000
Otter Run		2,000
Roaring Fork Run		2,000
Sandy Run		2,000
Shingle Run		2,000
Wrightsville, Crystal Run Pond		400
Youngdale, McElhattan Run		5,000
South Carolina:		
Creston, Lake View		3,000
Landrum, Sunnyside Pond		1,000
Pickens, Cedar Creek		3,000
Little Laurel Creek		2,000
Mauldin's pond		1,000
Thompson River		4,000
Whitewater River		5,000
River Falls, Devils Fork Creek		2,250
Gap Creek		2,250
Walhalla, Whitewater River		5,000
South Dakota:		
Bellefourche, Sundquist Lake		500
Buffalo Gap, Beaver Creek		1,000
Custer, Doll's pond		500
French Creek		3,600
Deerfield, Horse Thief Creek		1,000
Elmore, Wildcat Creek		500
Englewood, Whitewood Creek		1,000
Fruitdale, Stearn's pond		500
Hermosa, Battle Creek		2,000
Hill City, Horse Creek		2,000
Newton Fork Creek		2,000
Slate Creek		4,500
Spring Creek and branches		19,000
Sunday Gulch Creek		1,000
Hot Springs, Beaver Creek		4,200
Iron Creek, Spearfish Creek		500
Jordan, Rosedale Lake		525
Martin, Lake Creek		2,100
Meckling, Wold's pond		1,000
South Dakota—Contd.		
Rapid City, Cottonwood Lake		2,500
Lockhart Pond		1,000
Murphy Pond		1,500
Rapid Creek, tributaries of		2,000
Rounds Pond		1,500
Schamber Pond		1,000
Scott Pond		1,000
Spearfish Authier's pond		1,000
Choodies Gulch Creek		1,000
Franklin Creek		400
Higgins Gulch Creek		1,000
Hitzell's pond		1,000
Lindley Branch		500
Spring Creek		500
Sturgiss, Bear Butte Creek		1,000
Whitewood, Peterson Pond		1,000
Smith Pond		500
Tennessee:		
Apison, Miller's pond		2,000
Bristol, Susong Creek		5,000
Doe, Doe Creek		6,000
Ducktown, Tumbling Creek		10,000
Elkmont, Little River		24,500
Little River, East Prong		15,500
Pigeon River		13,000
Erwin, Higgins Creek		5,250
North Indian Creek		48,650
Toney Run		1,500
Forks, Little River, Middle Prong		10,000
Garber, Little Cherokee Creek		5,000
Greenville, Farnsworth Brook		3,000
Johnson City, Greenbrier Creek		10,000
Rockland Spring Pond		1,000
Sinking Creek		6,000
Knoxville, Little Pigeon River, West Prong		6,000
Mount Pleasant, Cecil Lake		4,000
Oakdale, Brookcroft Creek		4,000
Sevierville, Pigeon River and branches		16,500
Sparta, Officer's pond		2,000
Sunshine, Abrams Creek		5,000
Tallassee, Cheowee Creek		4,000
Unicoi, Birch Log Creek		10,000
Indian Creek		500
Wetmore, Harrison Creek		4,000
Williams Creek		4,000
Utah:		
Cooperton, Dry Fork Creek Ponds		250
Milford, Meadow Springs Pond		250
Salt Lake City, Kesler Farm Pond		250
Vermont:		
Edgewater, Niggerhead Pond		4,000
Marshfield, Winooski River		3,000

Details of distribution of fish and eggs, fiscal year 1916—Continued.

RAINBOW TROUT—Continued.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
Vermont—Continued.		
Randolph, White River, Middle Branch		6,000
Saint Johnsbury, Sleepers River	10,000	
Waterbury, Meeting House Brook		5,000
Thatcher Brook		5,000
Virginia:		
Abingdon, Big Spring Pond		1,000
Appomattox, Appomattox River, South Branch		5,000
Arrington, Cody Creek		300
Buchanan, Beaverdam Run		300
Byllesby, Brushy Creek		12,600
Cascade, Cascade Creek		300
Catawba, Catawba Creek, North Branch		3,000
Covington, Blue Spring Run		300
Falling Springs Branch		300
Roaring Run		150
Eggleston, Sinking Creek		600
Elkton, Naked Creek and tributaries		1,250
Faber, Barrett Pond		200
Bear Branch		2,000
Green Cove, White Top Creek		70,000
Hollins, Carvens Creek		10,000
Horse Pen Branch		10,000
Hot Springs, Cowardin Run		300
Hunters, Snake Den Creek	10,000	
Limeton, Gooney Creek		600
Luray, Chrisman Hollow Creek		500
Hudson Creek		1,000
Yagar Pond		500
Maggie, Johns Creek, Mountain Branch		300
Mechums River, Moorman River		5,000
Monterey, South Strait Creek		5,200
Pembroke, Little Stony Creek		600
Penn Laird, Mill Creek		4,000
Ripplemead, Big Stony Creek		450
Roanoke, Tinker Creek		2,000
Rural Retreat, Cripple Creek		2,500
Shenandoah, Naked Creek		1,000
Washington:		
Aberdeen, Delazine Creek		2,000
East Hoquiam River		2,000
Johns River		3,000
Little North River		3,500
Stevens Lake		1,000
Wishkah River		3,500
Chewelah, Platt's pond		2,000
Colville (applicant)	*101,000	
Everett (applicant)	*100,000	
Naches, Johncox's pond		3,000
Washington—Continued.		
Napavine, Onalaska Lake		6,000
Northport, Deep Creek		2,000
Deep Creek Lake		1,000
Nigger Creek		2,000
Onion Creek		2,000
Pepon Lake		1,000
Republic, Fairy Lake		2,000
Sprague, Lake Colville		5,000
Vancouver, Little Washougal River	*100,000	
Lewis River, East Fork		4,000
Washougal River		3,000
Wilbur, Lake McGinnis		2,500
West Virginia:		
Albright, Dougherty Creek		3,500
Muddy Creek		3,500
Beard, Locust Creek		3,400
Bismark, Difficult Creek		8,000
Burdette Creek, Meadow River		1,000
Jenningston, Laurel Fork Creek		12,000
Martinsburg, Baker Lake		3,000
Midvale, Long Run		450
Mullens, Mullens Pond		1,000
Petersburg, Potomac River, South Branch		10,000
Renick, Droop Pond		400
Rowlesburg, Wolf Creek		3,000
Sweet Springs, Sweet Springs Creek		5,000
Ten Mile, Snyder's pond		200
Terra Alta, Browning's pond		2,000
Joes Run, tributary of		1,000
White Oak Run		4,500
Wisconsin:		
Antigo, Kennedy Creek		700
Spring Creek		700
Thompson Lake		350
Arcadia, Beaver Creek		350
Elk Creek, North Branch		350
Elk Creek, South Branch		350
Glencoe Creek, North Branch		350
Glencoe Creek, West Branch		350
Irish Valley Creek		350
Lewis Valley Creek		350
North Creek		350
Tamarack Creek		350
Ashland, Fish Creek		3,000
Onion River		2,000
Sioux River		2,000
Siskowit River		2,000
Athens, Black Creek		1,050
Augusta, Browns Creek		1,000
Coon Gut Creek		1,000
Thompson Creek		2,000
Barneveld, Bruners Creek		1,000
Macks Trout Creek		1,000
Mickelson Creek		1,000
Moyer Creek		1,000
Park River		1,000
Trainer Creek		1,000
West Blue Mounds Creek		2,000

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

RAINBOW TROUT—Continued.

Disposition.	Fry and eggs.	Fingerlings, yearlings, and adults.
Wisconsin—Continued.		
Black River Falls, Squaw Creek Pond		470
Blue Mounds, Boley Creek		1,000
Dolontry Creek		1,000
McKinley Creek		1,000
Rusti Creek		1,000
Topper Creek		1,000
Cable, Namakagon River		2,000
Colfax, Eighteen Mile Creek		500
Haoughly Creek		500
Larsen Creek		500
Dodgeville, Johnstown Creek		2,000
Smiths Pond		1,000
Dousman, Scuppernong Creek		1,000
Eau Claire, Big Rock Creek		1,000
Coon Creek		1,000
Little Rock Creek		1,000
Michel Creek		1,000
West Creek		1 000
Elmwood, Big Missouri Creek		700
Galena, Hinz Creek		2,000
Glen Flora, Main Creek, North Fork		700
Hawkins, Burgess Creek		2,000
McDermitt Creek		2,000
Main Creek		2,000
Meadow Creek		2,000
Pine Creek		2,000
Hayward, Namakagon River		2,000
Hudson, Greenes Creek		350
Jefferson Creek		700
Willow River, tributary of		350
Hurley, Fifield Creek		1,000
Go Go Gashim River		2,000
Younger Creek		1,000
La Cross, Adams Valley Creek		2,000
Beaver Creek		2,000
Bostwick Valley Creek		2,000
Dutch Creek		3,000
Flemings Creek		2,000
Halfway Creek		3,600
Lewis Valley Creek		2,000
Mormon Cooley Creek		4,400
Sand Creek		2,000
Sand Lake Cooley Creek		2,000
Timber Cooley Creek		2,000
Ladysmith, Little Weirgor Creek		3,000
Manitowoc, Manitowoc River		500
Michicott River		500
West Twin River		500
Merrillan, Arnold Creek		230
Cisna Creek		230
Downy Creek		230
Farka Creek		230
Halls Creek		230
Halls Creek, West Branch		230
Hammond Creek		230
Hunters Creek		230
Olsons Creek		230
Oakwood Pond		230
Visno Creek		230
Millston, Glenns Creek		1,000
Wymine Creek		2,000
Wisconsin—Continued.		
Mosinee, Four Mile Creek		700
Hog Creek		700
Oconomowoc, Battle Creek		2,000
Robinson Creek		2,000
Waterville Creek		2,000
Ontonagon, Union River		2,000
Otis, Berry Creek		2,000
Dunfield Creek		2,000
Garrison Creek		2,000
Hays Creek		2,000
Kane Creek		2,000
Kelly Creek		2,000
Park Falls, Horseshoe Creek		2,000
Scott Creek		2,000
Parrish, Pine Creek		500
Prairie River		1,000
Silver Creek		500
Phelps, Alvoy River		700
Hay Meadows Creek		700
Pound, North Beaver Creek		350
South Beaver Creek		350
Rhinelander, Goodegast Creek		1,000
Hardells Creek		1,000
Jenne Weber Creek		1,000
Lake Creek		1,000
Noisy Creek		1,000
Pine Creek		1,000
Prairie River		1,400
Skunk Creek		1,000
Rice Lake, Big Bear Creek		1,000
Cobb Creek		1,000
Hickey Creek		1,000
Menominee River		2,000
Red Cedar River		2,000
Yellow River		1,000
Richland Center, Ash Creek		2,000
Big Willow Creek		2,000
Big Willow Creek, Mickle Branch		1,000
Byrds Creek		2,000
Sawyer Creek		2,000
Sauk City, Denzer Creek		1,000
Honey Creek		2,000
Honey Creek, tributary of		3,000
Otter Creek		2,000
Sugar Grove Creek		1,000
White Mound Creek		1,000
Saxon, Potatoe River		3,000
Vaughn Creek		3,000
Sheboygan, Spring Farm Creek		500
Sparta, Bailey Creek		1,000
Beaver Creek		1,000
Big Creek		1,000
Brackett Creek		1,000
Clear Creek		1,000
La Crosse River		5,600
La Crosse River, North Fork		3,600
La Crosse River, South Fork		1,800
Little Silon Creek		1,000
Prescott Creek		1,000
Rockwell Creek		1,000
Sargent Creek		1,000
Schlytter Creek		1,000
Shattuck Creek		1,000

Details of distribution of fish and eggs, fiscal year 1916—Continued.

RAINBOW TROUT—Continued.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
Wisconsin—Continued.		
Sparta, Sias Creek		1,000
Silon Creek		2,000
Silver Creek		1,600
Smith Creek		1,000
Soper Creek		1,800
Sparta Creek		1,000
Swamp Creek		1,000
Walworth Creek		1,000
West Creek		1,000
Tomahawk, Avery Creek		2,000
Bearskin Creek		2,000
Champine Creek		1,000
Little Somo River		2,000
Noisy Creek		2,000
Spirit River		2,000
Spirit River, North Branch		2,000
Spring Creek		2,000
Trout Creek		1,000
Trempealeau, Fox Creek		3,000
Holcomb Cooley Creek		3,000
Pine Creek		3,000
Tamarack Creek		3,000
Upson, Erickson Creek		1,000
Potatoe River, North Branch		3,000
Warrens, First Creek		3,000
Waukesha, Wrights Creek, tributary of		1,000
Waupaca, Chain of Lakes		5,000
Wausau, Big Sandy Creek		1,000
Wisconsin—Continued.		
Wausau, Big Trap Creek		1,000
Plover River		1,000
Wautoma, Alder Creek		500
Birch Creek		1,000
Weirgor, Weirgor River		2,000
Wheeler, Big Beaver Creek		700
Moe Creek		350
Wilton, Cook Creek		2,000
Moores Creek		2,000
Wyoming:		
Aladdin, Pearson's pond		500
Beulah, Williams's pond		800
Wilson Pond		500
Dubois, Lava Creek		1,000
Sheridan Creek		2,000
Warm Spring Creek		3,000
Encampment, Encampment River		400
Evanston, Bear River		22,500
Lander, Beaver Creek		2,000
Nipper Lake		1,000
Popo Agie River, North Fork		2,000
Lusk, Rawhide Creek		1,500
Sheridan, Owl Creek, upper forks of	*106,000	
Story, State fish commission	*100,000	
Portugal: Lisbon, Government of Portugal	*50,000	
Total[b]	243,800 *1,489,900	2,831,747

[a] Eggs are indicated by an asterisk, thus (*); all others are fry. [b] Lost in transit, 25,140 fingerlings.

ATLANTIC SALMON.

Disposition.	Fry.
Maine: East Orland, Penobscot River, East Branch	1,709,815

LANDLOCKED SALMON.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
Maine:		
Abbott Village, Sebec Lake	8,000	
Bath, Wattuh Lake	3,000	
Bingham, Rowe Pond	4,000	
Blanchard, Little Bunker Pond	2,000	
Bucksport, Toddy Pond	8,000	
Caribou, State fish commission	*200,000	
Dedham, Manns Brook		15,000
Dexter, Lake Wassookeag	8,000	
Enfield, Cold Stream Lake	6,000	
Farmington, Clear Water Lake	11,000	1,350
Maine—Continued.		
Farmington, Varnum Pond		1,350
Grand Lake Stream, Dobsis Lake	14,168	15,000
Grand Lake	105,000	52,730
Green Lake, Green Lake	15,000	
Harrington, Schoodic Lake	5,000	
Houlton, Drew Lake	6,000	
Jackman, Lake Wood	10,000	
Kineo, Moose River	8,000	
Moosehead Lake	8,000	
Roach River	6,000	
Nicolin, Nicolin Lake	10,000	
North Windham, State fish commission	*100,000	

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

LANDLOCKED SALMON—Continued.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
Maine—Continued.		
Onawa, Midday Pond	2,000	
Otis, Green Lake	25,000	11,540
Patten, Lower Shin Pond	6,000	
Princeton, Farrow Lake	5,000	
Rockland, Chickawakee Lake	4,000	
Seal Harbor, Jordan Pond	5,000	
South Paris, Abbott Pond	4,000	
Hall Pond	4,000	
Virginia Lake		16
Waterville, Britton Lake	6,000	
Wescott, Little Ossipee Lake	8,000	
West Paris, Concord Pond	4,000	
Massachusetts:		
Falmouth, Fresh Pond	3,000	
Jenkins Pond	3,000	
Mares Pond	3,000	
Still River, Brookfield Lake		1,000
Hell Pond		1,000
West Barnstable, Micha Lake		1,000
Michigan: Sault Ste. Marie, State fish commission	*25,000	
Minnesota: St. Paul, State fish commission	*25,000	
New Hampshire:		
Bartlett, Sawyer Pond	3,000	
Bristol, Newfound Lake	6,000	
Canaan, Tewksbury Pond	3,000	
Lebanon, Crystal Lake	3,000	
Nashua, Nashua River	4,000	
Potter Place, Pleasant Lake	2,000	
Warren, State fish commission	*25,000	
New Jersey:		
Hacketstown, State fish commission	*10,000	
New York:		
Arden, Forest Lake	*10,000	
Lake George, Lake George		600
Long Lake West, Doctors Pond	*5,000	
East Charley Pond	1,000	
Little Otter Pond	1,000	
Lily Pad Pond	1,000	
Otter Pond	*5,000	
New York, Aquarium	*1,000	
Port Jervis, Bauer Lake	1,000	
Big Pond	1,000	
Choonzie Lake		400
Raquette Lake, Lake Kora	*5,000	
Syracuse, Skaneateles Lake	2,000	
Thurman, State fish commission	*25,000	
North Carolina: Lake Toxaway, Fairfield Lake	4,800	
Vermont:		
Greensboro, Caspian Lake		701
Hardwick, Nichols Pond		390
Island Pond, Seymore Lake		700
Middlebury, Lake Dunmore		800
Norton Mills, Little Averill Lake		700
Big Averill Lake		700
Orleans, Long Pond		800
Roxbury, State fish commission	*50,000	
Total [b]	357,968 *486,000	105,777

[a] Eggs indicated by an asterisk, thus (*); all others are fry. [b] Lost in transit, 10,000 fry.

SCOTCH SEA TROUT.

Disposition.	Adults.
Maine: East Orland, Alamoosook Lake	509

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BLACKSPOTTED TROUT.

Disposition.	Fry and eggs.[a]	Fingerlings.
Colorado:		
Alamosa, Miners Creek		10,000
Rio Grande River		14,000
Antero, Antero Reservoir		24,000
Aspen, Maroon Lake		14,000
Roaring Fork River, Upper		30,000
Snow Mass Creek		14,000
Biglow, Frying Pan River, North Fork		4,500
Breckenridge, Crystal Lake		14,000
Bryn Mawr, South Platte River		10,000
Buena Vista, Harvard Creek		14,000
North Cottonwood Creek		20,000
South Cottonwood Creek		20,000
Buffalo, Buffalo Creek		10,000
Busk, Windsor Lake		40,000
Cardinal, Barker Lake		48,000
North Boulder Creek, headwaters		20,000
Cebolla, East Elk Creek		20,000
Cliff, Deer Creek		20,000
Corona, Corona Lake		10,000
Creede, Rio Grande River		30,000
Delta, Bear Creek		10,000
Happy Hollow Creek		4,000
Denver, State fish commission	*160,000	
Dillon, Boulder Creek		14,000
Rock Creek		14,000
Upper Cataract Lake		10,000
Durango, Canyon Creek		9,500
Florida River		19,000
Junction Creek		19,000
La Plata River		19,000
Lightner Creek		19,000
Mancos River, East and West Forks		19,000
Mill Creek		9,500
Piedra River		19,000
Pine River		19,000
Vallecito River		12,600
Eldora, Boulder Creek		40,000
Estabrook, Craig Creek		20,000
Fairplay, Pennsylvania Creek		14,000
Rich Creek		10,000
Sacramento Creek		14,000
Tumbling Creek		10,000
Florissant, South Platte River		20,000
Foxton, South Platte River		10,000
Fraser, Ranch Creek		10,000
Granby, Fraser River		20,000
Grand River, North Fork		20,000
Grand River, South Fork		4,000
Indian Creek		10,000
Strawberry Creek		4,000
Supply Creek		10,000
Grand Junction, East Creek		10,000
Kannah Creek		20,000
Grant, Geneva Creek		20,000
Gunnison, Gunnison River		50,000
Gypsum, Sweetwater Lake		50,000
Colorado—Continued.		
Idaho Springs, Fall River		10,000
Lake Edith		15,000
Insmont, South Platte River		10,000
Ivanhoe, Ivanhoe Creek		4,500
Lyle Creek		4,500
Leadville, Big Union Creek		10,000
Empire Creek		10,000
Frying Pan River		9,000
Los Pinos, Webs Lake		10,000
Marble, Beaver Ponds		10,000
Carbonate Creek		10,000
Crystal River, headwaters		24,000
Moffat, California Gulch Creek		10,000
Saguache Park Lake		4,000
Saguache River		4,000
Sheep Creek		10,000
Nast, Chapman Lake		16,000
Frying Pan River		20,500
Frying Pan River, South Fork		4,500
Pagosa Springs, Big Navajo River		20,000
Little Navajo River		14,000
Piedra River, East Fork		14,000
San Juan River, East Fork		14,000
Turkey Creek		14,000
Weminuche Creek and tributaries		52,000
Williams Creek		20,000
Pando, Eagle River		30,000
Parshall Williams Creek, South Fork		14,000
Williams Fork River		20,000
Pine Grove, Pine Creek		10,000
Rollinsville, Middle Boulder Lake		24,000
Rosemont, East Beaver Creek		14,000
Saderland, Gould Creek		14,000
Silverton, Molas Lake		22,000
South Mineral Creek		8,000
Singleton, South Platte River		10,000
Snow Mass, Capitol Creek		14,000
Sulphur Springs, Corral Creek		10,000
Willow Creek		10,000
Thomasville, Engelbrechts Lakes		120,000
Walden, Kelley Lake		7,500
Lake Agnes		7,500
Idaho:		
Enaville, Coeur d'Alene River, North Fork	10,000	
Pine Creek	2,000	
St. Joe River	4,000	
Mountain Home, Fall Creek	6,000	
Lime Creek	4,000	
Rathdrum, Chilco Creek	4,000	
Salmon, Wakapa Lake	4,000	
Wallace, Big Creek	2,000	
Placer Creek	2,000	
Slate Creek	2,000	
Michigan: Detroit, State fish commission	*10,000	

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BLACKSPOTTED TROUT—Continued.

Disposition.	Fry and eggs.[a]	Fingerlings.
Montana:		
Anaconda, California Creek	2,000	....
Cobb Creek	2,000	....
Deep Creek	4,000	....
Dempsey Creek	4,000	....
Dutchman Creek	2,000	....
Fish Trap Creek	4,000	....
Foster Creek	4,000	....
La Marsh Creek	4,000	....
Lost Creek	4,000	....
Mill Creek	2,000	....
Race Track Creek	2,000	....
Seymour Creek	2,000	....
State fish commission	*200,000	....
Warm Spring Creek	2,000	....
Willow Creek	2,000	....
Arlee, Jocko River	2,000	....
Avon, Nevada Creek	4,000	....
Belton, Avalanche Lake	2,000	....
Bowman Lake	4,000	....
Lake McDonald	4,000	....
Logan Lake	2,000	....
McDermott Lake	2,000	....
Reynolds Lake	2,000	....
Bigtimber, Boulder Creek, Upper	6,000	....
Boulder Creek, West Branch	6,000	....
Deer Creek, Lower	6,000	....
Deer Creek, Upper	12,500	....
Blossburg, Dog Creek	4,000	....
Uncle George Creek	2,000	....
Bozeman, Asbestos Creek	5,000	....
South Dry Creek	5,000	....
Butte (applicant)	*200,000	....
Chadbourn, Bangtail Creek	8,000	....
Clyde Park, Brackett Creek	10,000	....
Canyon Creek	8,000	....
Cole Creek	8,000	....
Cottonwood Creek	10,000	....
Rock Creek	10,000	....
Shields River	14,000	....
Columbus, Rosebud River, East and West Forks	9,000	....
Corwin Springs, Cedar Creek	4,000	....
Dalleys, Dalleys Creek	8,000	....
Deer Lodge, Cottonwood Creek	2,000	....
Nevill's pond	2,000	....
Dell, Cabin Creek	8,000	....
Dixon, Jocko Creek	2,000	....
Elliston, Telegraph Creek	2,000	....
Emigrant, Simon Creek	10,000	....
Forest Grove, Flatwillow Creek, North Fork	2,000	....
Flatwillow Creek, South Fork	2,000	....
McCartney Creek	2,000	....
Porter Creek	2,000	....
Garrison, Rock Creek	2,000	....
Willow Creek	2,000	....
Geyser, Arrow Creek	2,000	....
McCarthy Creek	2,000	....
Gilman, Elk Creek	2,000	....
Ford Creek	2,000	....
Smith Creek	2,000	....
Willow Creek	2,000	....
Montana—Continued.		
Glacier Park, Altyn Lake	2,000	....
Gunsight Lake	2,000	....
Upper St. Marys Lake	4,000	....
Gold Creek, Gold Creek	2,000	....
Gregory, Casey Creek Ponds	2,000	....
Heron, Elk Creek	2,000	....
Elk Creek, East Fork	2,000	....
Huson, Nine Mile Creek	4,000	....
Iron Mountain, Cedar Creek	4,000	....
Deep Creek	2,000	....
Dry Creek	4,000	....
Fish Creek	2,000	....
Flat Creek	2,000	....
Fourteen Mile Creek	4,000	....
Johnston Creek	2,000	....
Lost Gulch Creek	2,000	....
Oregon Gulch Creek	2,000	....
Quartz Creek	2,000	....
Thompson Creek	2,000	....
Trout Creek	6,000	....
Josephine, Sixteen Mile Creek	12,000	....
Leonia, Pine Creek	2,000	....
Libby, Cedar Creek	2,000	....
Fisher River	4,000	....
Quartz Creek	2,000	....
Lima, Big Sheep Creek	8,000	....
Lewistown, Beaver Creek	6,000	....
Livingston, Bloom Lake	4,500	....
Cokedale Creek	4,500	....
Elbow Creek	4,500	....
Ferry Creek	4,500	....
Mission Creek	6,000	....
Strickland Creek	4,500	....
Upper Mission Creek	4,500	....
West Boulder River	4,500	....
Yellowstone River	6,000	....
Yellowstone River, Lower	6,000	....
Yellowstone River, Upper	6,000	....
Lodge Grass, Lodge Grass Creek	....	16,500
Soap Creek	....	15,000
Logan, Rea Creek	4,000	....
Lombard, Sixteen Mile Creek	12,000	....
Manhattan, Bull Creek	12,000	....
Camp Creek	12,000	....
Spring Creek	6,000	....
Martinsdale, Mill Creek	8,000	....
Musselshell River, North Fork	12,000	....
Musselshell River, South Fork	4,000	....
Whitetail Creek	8,000	....
Maudlow, Sixteen Mile Creek	12,000	....
Miner, Mill Creek, North Fork	8,000	....
Rock Creek, Upper	8,000	....
Missoula, Bitter Root River	4,000	....
Carlton Lake	2,000	....
Lo Lo Creek	4,000	....
Miller Creek	2,000	....
O'Brien Creek	2,000	....
Rattlesnake Creek	4,000	....
Rodgers Creek	2,000	....
Perma, Lee's lake	2,000	....

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BLACKSPOTTED TROUT—Continued.

Disposition.	Fry and eggs.[a]	Fingerlings.
Montana—Continued.		
Pony, Mason Lake	2,000	
Pray, Mill Creek	12,500	
Mill Creek, South Fork	10,000	
Strawberry Creek	12,500	
Ravalli, Jocko Creek	2,000	
Red Lodge, Lake Scott	6,000	
Rock Creek	7,500	
Rocky Fork Creek	9,000	
Ringling, Sheep Creek	4,000	
Rock Hill, Harrison Lake	2,000	
Saltese, St. Regis River	2,000	
Sidney, Second Hay Creek	4,000	
Springdale, Duck Creek	4,500	
Mendenhall Creek	4,500	
Yellowstone River	7,500	
Stevensville, Bass Creek	6,000	
South Burnt Fork Creek	4,000	
Sweet Grass, Price Lake	2,000	
Toston, Dry Creek	6,000	
Townsend, Boulder Creek	8,000	
North Creek	8,000	
Ray Creek	8,000	
Troy, O'Brien Creek	2,000	
Twin Bridges, Big Hole River	8,000	
Cottonwood Ranch Creek	10,000	
Valier, Dupuyer Creek	4,000	
Lena Lake	2,000	
Sheep Creek	4,000	
Whitehall, Cottonwood Creek	4,000	
Wilsall, Carroll Creek	6,000	
Daisy Dean Creek	12,000	
Elk Creek, North Fork	8,000	
Elk Creek, South Fork	8,000	
Flathead Creek	10,000	
Flathead Creek, South Fork	8,000	
Flathead Creek, West Fork	8,000	
Little Muddy Creek	6,000	
Porcupine Creek	8,000	
Shields River, South Fork	8,000	
Smith Creek	4,000	
New Mexico:		
Buckman, Rito de los Frijoles		15,000
Cimarron, Cimarron River and tributaries		14,280
Domingo, Cochiti Canon		11,900
Embuda, Pueblo River		19,500
Santa Barbara River		19,500
Glorietta, Holy Ghost Creek		8,330
Pecos River		15,470
Winsor Creek		8,330
Las Vegas, Gallinas River		11,900
Rio Gallinas		8,330
Santa Fe, Santa Fe Creek		15,000
Tres Piedras, Rio Vallecitos		21,000
Ute Park, Red River		11,900
Volcano Siding, Rio San Antonio		19,500
New York:		
New York City, Aquarium	*25,000	
Oregon:		
Bonneville, State fish commission	*200,000	
Rogue River, Butte Creek		5,188
Rogue River, North Fork		15,750
South Dakota:		
Bellefourche, Smiley's pond		1,500
Berne, Pettitt's pond		3,000
Beulah, Sand Creek		15,000
Dark Canyon, Lockhart's pond		5,000
Fairburn, French Creek		3,750
Hill City, Spring Creek		30,000
Hot Springs, Beaver Creek		1,500
Imlay, Morse Lake		3,000
Iron Creek, Spearfish Creek		47,000
Merritt, Riley's pond		5,000
Mystic, Little Rapid Creek		12,500
Nemo, Jim Creek		10,000
South Box Elder Creek		10,000
South State Barn Creek		4,000
Pactola, Antlers Lake		2,500
Sherman's pond		10,000
Rapid City, Box Elder Creek		9,000
Box Elder Creek, Lower		6,000
City Springs Creek		5,000
Electric Light Pond		5,000
Fair Ground Lake		5,000
Holley's lake		5,000
Indian School Lake		5,000
Lime Creek		5,000
Minnelusa Creek		1,500
Prairie Creek		4,500
Rapid Creek, Lower		15,000
Schambers Creek		5,000
Scott's pond		1,500
Spring Creek		9,000
Spring Creek, Lower		6,000
Rochford, Klemens Creek		6,000
Little Rapid Creek, North Fork		10,000
Rapid Creek		7,000
Savoy, Spearfish Creek		12,000
Silver City, Bogus Jim Creek		7,500
Jim Creek		10,000
Nugget Creek		7,500
Victoria Creek		7,500
Spearfish, Cross Creek		5,000
Deep Creek		5,000
Lindley Spring Creek		2,000
Pattalochi's pond		5,000
Squaw Creek		4,000
Washington:		
Birdsview, Grandy Creek	216,310	
Burlington, State fish commission	*216,000	
Colfax, Palouse River, North and South Forks	4,000	

[a] Eggs are indicated by an asterisk, thus (*): all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BLACKSPOTTED TROUT—Continued.

Disposition.	Fry and eggs.[a]	Fingerlings.
Washington—Continued.		
Colville, Lake Thomas	2,000	
Darrington, Clear Creek	46,000	
Merritt, Lake Josephine	21,000	
Northport, Big Sheep Creek	2,000	
North Yakima, Bumping River	2,000	
Rattlesnake Creek	4,000	
Satus Creek	4,000	
Seattle, Morse Creek	29,000	
Springhill Pond	3,000	
Spokane, State fish commission	*216,000	
Tacoma, Clarks Creek	15,000	
Crater Lake	30,000	
Vancouver, McMaster's pond	4,000	
Wyoming:		
Beulah, Bonetti Spring Branch		5,000
Crystal Spring Pond		12,000
Dayton, Big Goose Creek, East Fork		4,000
Big Goose Creek, West Fork		4,000
Bruce Creek		2,000
Cedar Creek		2,000
Little Goose Creek		4,000
Mohawk Creek		3,000
Shell Creek		4,000
Willett Creek		3,000
Encampment, Encampment River		9,000
Encampment River, North Fork		15,000
Wyoming—Continued.		
Pinedale, Boulder Creek		7,500
Cross Creek		6,666
Divide Lake		15,000
Dream Lake		6,667
Fremont Lake		22,500
Green River Lakes		16,500
Heart Lake		6,667
Newfork Lake		16,500
Pole Creek Lakes		6,667
Timico Lake		6,666
Trappers Lake		6,667
Sheridan, State fish commission	*200,000	
Sundance, South Miller Creek		6,000
Wolf, Bear Creek		4,000
Black Canyon Creek		4,000
Black Mountain Creek		4,000
Little Tongue River, South Fork		4,000
McLaughlin Creek		3,000
Red Canyon Creek		3,000
Saw Mill Creek		3,000
Soldier Creek		8,000
Walker Creek		8,000
Wolf Creek		9,000
Yellowstone, Clear Creek	40,000	
Natural Bridge Creek	35,000	
Pelican Creek	50,000	
Yellowstone River	50,000	
Total[b]	1,370,310 *1,427,000	2,481,228

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.
[b] Lost in transit, 11,000 fry and 15,400 fingerlings.

LOCH LEVEN TROUT.

Disposition.	Fingerlings.
Minnesota: Rochester, Washspring Creek	700
South Dakota:	
Elmore, Spearfish Creek	2,400
Iron Creek, Spearfish Creek	1,400
Maurice, Spearfish Creek	6,000
Rapid City, Barker Pond	15,000
Savoy, Anderson Pond	1,000
Little Spearfish Creek	11,000
South Dakota—Continued.	
Rough Lock Creek	3,000
State Nursery Pond	30,000
Wyoming:	
Beulah, Crystal Springs Pond	5,000
Sand Creek	20,000
Silver Creek	10,000
Total	105,500

Details of distribution of fish and eggs, fiscal year 1916—Continued.

LAKE TROUT.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
Colorado: Malta, Lower Twin Lake		25,000
Maine:		
Otis, Green Lake	14,637	
Wilton, Wilson Lake	20,000	
Winthrop, State fish commission	*50,000	
Massachusetts:		
Lee, Green Water Pond		1,000
Laurel Lake		1,000
Shaw Pond		1,000
Shirley, Fort Lake	12,000	
Michigan:		
Beaver Island, Lake Michigan	1,833,000	
Belle Isle, Lake Superior	600,000	
Big Rock Reef, Lake Michigan	800,000	
Charlevoix, Lake Michigan	2,825,000	
Crystal Falls, Tobin Lake		10,000
Detour, Lake Huron	1,000,000	
Escanaba, Lake Michigan	150,000	
Fish Island, Lake Superior	2,000,000	
Fishermen's Home, Lake Superior	1,100,000	
Hog Island, Lake Michigan	675,000	
Houghton, Keweenaw Bay	625,000	
Irishman Reef, Lake Michigan	675,000	
Iron River, Iron Lake		15,000
Isle Royale, Lake Superior	600,000	
Lake Ann, Lake Ann		20,000
Long Point, Lake Superior	1,360,000	
Manistique, Lake Michigan	150,000	
Marquette, Lake Superior	1,250,000	
Munising, Lake Superior	475,000	
Nile Mile Point, Lake Michigan	800,000	
North Point, Lake Huron	1,165,000	
Northville, State fish commission	*3,000,000	
Ontonagon, Lake Superior	625,000	
Rock Harbor, Lake Superior	240,000	
Sault Ste. Marie, St. Marys River	200,000	
Scarecrow Island, Lake Huron	2,335,000	
Tobens Harbor, Lake Superior	960,000	
Washington Harbor, Lake Superior	1,200,000	
Whitefish Bay, Lake Superior	2,000,000	
Witbeck, Sun Dog Lake		20,000
Wrights Island, Lake Superior	480,000	
Minnesota:		
Beaver Bay, Lake Superior	230,000	
Bovey, Trout Lake		20,000
Clearbrook, Deep Lake		10,000
Minnesota—Continued.		
Duluth, Lake Superior		72,000
Duluth, State fish commission	*100,000	
French River, Lake Superior	100,000	
Glenwood, State fish commission	*100,000	
Grace Harbor, Lake Superior	575,000	
Grand Marais, Lake Superior	1,000,000	
Grand Portage, Lake Superior	800,000	
Grand Rapids, Pokegama Lake		20,000
Knife River, Lake Superior	600,000	
Standard Rock, Lake Superior	20,000	
Sucker River, Lake Superior	100,000	
Susie Island, Lake Superior	600,000	
Two Harbors, Lake Superior	50,000	
New Hampshire:		
Bristol, Newfound Lake		2,000
Colebrook, State fish commission	*50,000	
Enfield, Mascoma Lake		2,000
Pike, Lake Tarleton		1,800
Warren, State fish commission	*50,000	
New York:		
Brewster, Boyds Lake		900
Calf Island, Lake Ontario	350,000	
Charity Shoals, Lake Ontario	273,000	
Cold Brook, Ashokan Lake	15,000	
Cooperstown, Otsego Lake	13,500	
Fox Island, Lake Ontario	791,000	
Galloo Island, Lake Ontario	546,000	
Grenadier Island, Lake Ontario	1,577,476	
Grimshaw Bay, Lake Ontario	250,000	
Hopewell Junction, Sylvan Lake	8,000	
Long Lake West, Loon Pond	*50,000	
North Creek, Thirteenth Lake	10,000	
Point Peninsula, Lake Ontario	350,000	
Port Henry, Clear Pond	15,000	
Crowfoot Pond	15,000	
Port Jervis, Cahoonzie Lake	8,000	
Little Pond	8,000	
Raquette Lake, Sagamore Lake	*50,000	
Riverside, Schroon Lake	20,000	
Stony Island, Lake Ontario	546,000	
Trout Hole, Lake Ontario	546,000	
White Plains, Rye Lake		1,900
Wilson Bay, Lake Ontario	224,710	

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

LAKE TROUT—Continued.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.	Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
Pennsylvania: Pleasant Mount, State fish commission	*100,000		Vermont—Continued.		
South Dakota:			Roxbury, State fish commission	*201,054	
Fruitdale, U. S. Reclamation Reservoir		525	Wisconsin:		
Rapid City, Electric Light Pond		8,000	Bayfield, State fish commission	*2,500,000	
Fairground Lake		8,000	Brule River, Lake Superior	300,000	
Utah: Murray, State fish commission	*50,000		Donaldson, Black Oak Lake		20,000
Vermont:			Phelps, Long Lake		4,000
Barnet, Harbeys Pond		3,000	Port Wing, Lake Superior	300,000	
Fair Haven, Sunset Lake		985	Sheboygan, State fish commission	*1,000,000	
Hardwick, Nichols Pond		2,000	Wyoming:		
Orleans, Willoughby Lake	3,000	4,990	Laramie, State fish commission	*25,000	
Pittsford, Lake Dunmore		3,000	Total [b]	36,414,323 *7,326,054	278,100

BROOK TROUT

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.	Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
Arizona:			Colorado—Continued.		
Holbrook, Black River		3,000	Buxton, Tomichi River		4,500
Chevalon Canyon Creek		3,000	Carbondale, Thompson Creek		3,000
Little Colorado River		3,000	Cardinal, Lake Nederland		50,000
California:			Cascade, Cascade Creek		8,000
Baird, McCloud River		20,000	Catamount Creek		2,000
Salt Creek		2,000	MacLennan's pond		2,000
Monterey, Little Sur Creek	10,000		Cassells, South Platte River		8,000
San Francisco, La Handa Creek, Upper		10,050	Castles, Taylor Creek		1,500
Truckee (applicant)	*5,000		Cather Springs, Little Fountain Creek		21,000
Colorado:			Cimarron, Cimarron Lake		2,000
Antero, Antero Lake		98,000	Cimarron River		20,000
South Platte River		16,000	Shugart Lake		6,000
South Platte River, Lower		2,000	Van Place Lake		6,000
South Platte River, Upper		4,000	Colona, Burro Creek		2,000
Arkansas Junction, Frying Pan River and tributaries		16,000	Colorado Springs, Cheyenne Creek, South Fork		3,000
Arrow, Williams Fork River		1,000	Mesa Lakes		12,000
Aspen, Castle Creek		4,000	Turkey Creek, headwaters		10,000
Difficult Creek		3,000	Credo, Lower Clear Creek		24,750
East Maroon Creek		3,000	Miners Creek		1,500
Grizzly Creek		3,000	Rio Grande River		25,500
Austin, Lily Pad Lake		15,000	Shallow Creek		1,500
Basalt, Cattle Creek		20,250	Trout Creek		1,500
Kelly's lake		1,500	Crested Bluff, Slate Creek		2,500
Biglow, Frying Pan River, North Fork		4,000	Crossons, South Platte River		12,000
Last Chance Creek		3,000	Del Norte, Los Pinos Creek, North Fork		20,250
Morman Creek		3,000	Delta, Clear Water Lake		15,000
Bilk Creek, Bilk Creek		15,000	Deer Creek		10,000
Black Hawk, Robins Lake		2,000	Dirty George Creek		15,000
Blue Bird Siding, Boulder Creek		4,500	Kiser Creek		16,000
Boulder, Boulder Creek and tributaries		24,000	Leon Lake		6,000
Middle Boulder Creek		15,000	Milk Creek		10,000
Brandon, Brandon Lake		1,600	Surface Creek		22,500
Buena Vista, State fish commission		1,500	Tongue Creek		15,000
			Twin Lakes		6,000
			Ward Creek		31,000
			Youngs Creek		10,000

[a] Eggs are indicated by an asterisk, thus (*); all others are fry. [b] Lost in transit, 2,715 fingerlings.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BROOK TROUT—Continued.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
Colorado—Continued.		
Denver, Bear Creek		26,000
Bredwell Pond		1,000
Jefferson Park Ponds	*50,000	2,000
Troutdale Lake		25,000
Dotsero, Gypsum Lake		16,000
Eagle, Brush Creek		36,000
Edwards, Beaver Creek		15,000
Eagle River		15,000
Lake Creek		25,000
Eldora, Middle Boulder Creek		15,000
Fall Creek, Fall Creek		15,000
Florence, Mile Creek		1,500
Florissant, South Platte River		8,000
Fort Collins, Buckhorn Creek		3,000
Peterson Lake		3,000
Porter Creek		2,000
Rawah Creek		2,000
Stub Creek		2,000
Georgetown, Sherwin Pond		5,000
Glacier Lake, Glacier Lake		4,500
Glenwood Springs, Roaring Fork River		1,500
Granby, Grand River		15,000
Grand River, South Fork		10,000
Grand Junction, Kannah Creek, North Fork		2,000
Lobo Creek		2,000
West Creek		2,000
West Creek, North Fork		2,000
Granite, Sayre Creek		15,000
Twin Lakes		21,000
Grant, South Platte River		6,000
Grousemont, South Platte River		6,000
Gunnison, Gunnison River		5,000
Gypsum, Gypsum Creek		15,000
Idaho Springs, Chicago Creek, West Fork		2,000
Chris Lake		8,000
Lake Edith		10,600
Sherwin Lake		6,000
Slader Lake		4,000
Ivanhoe, Ivanhoe Lake		4,000
Lyle Creek		1,500
Lyle Lake		4,500
Morman Lake		4,500
Jefferson, Rock Creek		4,500
Lake City, Lake Fork River		14,000
Lake San Christobol		12,000
Lake George, Tarryall Creek		4,000
Leadville, Arkansas River, Upper		24,000
Half Moon Creek		15,000
Lake Creek, Lower		13,500
Lower Twin Lake		25,000
Musgrove Lakes		393,000
Smith Lakes	40,000	
Tennessee Creek		16,000
Turquoise Lake		88,000
Twin Lakes Creek		20,000
Twin Peak Pond		2,000
Upper Twin Lake		15,000
Maddox, South Platte River		22,000
Colorado—Continued.		
Mancos, East Mancos Creek		15,000
Marble, Beaver Lake		15,000
Crystal River		26,000
Lily Lake		30,000
Marshall, South Boulder Creek		2,000
Meredith, Jakeman Creek		5,000
Minturn, Gore Creek		20,000
Piney Creek		5,000
Two Elk Creek		10,000
Monte Vista, Upper Conejos River		30,000
Nast, Chapman Lake		6,000
Frying Pan River		10,000
Frying Pan River, North Fork		3,000
Frying Pan River, South Fork		2,000
Ivanhoe Creek		5,000
Norrie, Chapman Creek		3,000
Koch's lake		2,000
Sawyer Lake		4,000
Northgate, Big Government Creek		15,000
Oak Creek, Silver Creek		15,000
Palmer, Monument Creek, North Fork		3,000
Monument Creek, South Fork		2,000
Parshall, Saunders Creek		20,250
Placerville, Saltada Creek		10,000
Red Cliff, Holy Cross Lake		20,000
Notch Mountain Lake		15,000
Turkey Creek		15,000
Ridgeway, Dallas Creek		15,000
Rifle, Miller Creek		15,000
Rollinsville, South Boulder Creek		15,000
Ruedi, Rocky Fork Creek		5,000
Smith Creek		5,000
Saderland, Gould Creek		10,000
Salida, Arkansas River and tributaries		30,000
Little River		10,000
Sapinero, Gunnison River		2,500
Sargents, Gunnison River		10,000
Tomichi River		9,000
Shawnee, South Platte River		6,000
Silver Plume, Clear Creek, Middle Fork		2,000
Sloss, Frying Pan River		10,000
South Platte, Turquoise Lake		70,000
Steamboat Springs, Burgess Creek		15,000
Mad Creek, North Fork		15,000
Walton Creek Lake		15,000
Walton Creek, North Fork		15,000
Willow Creek		15,000
Sunset, Four Mile Creek		6,000
Tabernash, Crooked Creek		10,000
Pole Creek		10,000
Ranch Creek		14,000

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BROOK TROUT—Continued.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
Colorado—Continued.		
Thomasville, Engelbrecht Lakes		303,000
Lime Creek		8,000
Vanadium, Big Bear Creek		15,000
Victor, East Beaver Creek		10,000
Skaguay Lake		10,000
Woodland Park, Beaver Creek		2,500
Fly Casting Club Lakes		2,500
Hay Creek		2,500
Meadow Creek		1,500
Northfield Lake		8,000
Trout Creek		20,000
West Creek		20,000
West Monument Creek		10,000
Connecticut:		
Andover, Skungamaug River and tributaries		400
Bolton, Box Brook		200
Canaan, Sages Ravine Brook	2,000	
Colchester, Eight Mile River		1,500
East Hartford, Howe Brook		200
Hubbard Brook		200
Granby, North Mountain Brook		400
Salmon Brook		400
Hartford, Oregon Pond	2,000	
Norwich, Broad Brook	3,000	
Choat Brook	2,000	
Simsbury, McLean's pond		2,000
South Norwalk, Silver Mine River	2,000	
Waterbury, Mad River	3,000	
Walnut Grove Brook	2,000	
Weekeepeme Creek	3,000	
Woodbury River	3,000	
Westchester, Pine Brook		200
Delaware:		
Houston, Brown Branch		300
Fuller Brook		150
Wilmington, Burris Run		1,000
Georgia:		
Mountain City, Silver Branch		800
Tallulah Falls, Bad Creek		3,600
Idaho:		
Pocatello, Yandall Springs Creek		3,250
Priest River, Spring Creek		500
Rathdrum, Chilco Lake		500
Salmon, Spring Lake		1,500
Spencer, Indian Springs Creek		500
Illinois:		
Galena, Harveys Branch		3,200
Spring Grove, State fish commission	*25,000	300
Indiana:		
Connersville, Lambert Brook		2,000
Delphi, Bridge Creek		3,000
Indiana—Continued.		
Michigan City, Palmer Creek		2,000
Valparaiso, Clear Creek		5,000
Iowa: Hesper, Bear Creek		1,500
Maine:		
Attean, Crocker Pond		2,000
Hatchery Brook		300
Lost Pond		600
Moose Pond		600
Thompson Brook		600
Toby Pond		600
Williams Brook		400
Auburn, State fish commission	*100,000	
Augusta, Lake Cobbosseecontee		725
Belfast, Great Farm Brook		300
Biddeford, Boothby Brook		300
Foxhall Brook		600
Hill Brook		300
Lord Brook		600
Ricker Brook		400
Tapley Brook		500
Bigelow, Mount Bigelow Pond		500
Bigelow, Spring Lake		800
West Carry Pond		800
Bingham, Carry Pond		50,000
Chase Pond		1,000
Echo Pond		1,000
Pleasant Pond		500
Rowe Pond		64,800
Blanchard, Lilly Pond		500
Little Bunker Pond		500
Boothbay Harbor, Adams Pond		400
Boston Ranch, Holeb Lake		2,000
Branch Pond, Branch Pond	50,000	
Bucksport, Craig Pond		1,000
Rocky Pond		2,000
Toddy Pond		2,000
Columbia Falls, Pretty Pond		1,000
Danforth, Grand Lake		1,000
Danville, Middle Range Pond		800
Dedham, Manns Brook	125,000	
Phillips Lake	50,000	
Dennysville, Hobart Brook		500
Dexter, Half Moon Pond		15,000
Howard Brook		6,000
Moors Pond		15,000
Puffer Pond		15,500
Ripley Pond		500
Weymouth Pond		15,000
East Orland, Craig Pond		32,410
Gully Brook		8,400
Patten Pond		15,000
Rocky Pond		15,000
Upper Toddy Pond		15,000
Wardswell Brook		8,000
Ellis Siding, Cathance Lake		600
Ellsworth, Blunts Pond		600
Branch Brook	50,000	
Lower Patten Pond		500
Beech Hill Pond		500
Enfield, Trout Pond		15,400

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BROOK TROUT—Continued.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
Maine—Continued.		
Farmington, streams along Maine Central Railroad		20,000
Franklin, Guagus Pond		500
Narraguagus River		800
Fryeburg, Basin Brook	8,000	
Chandler Brook	6,400	
Charles Brook	6,400	
Dock Brook	12,000	
Elkins Brook	12,000	
Lake Koyar		3,500
Green Lake, Green Lake		3,000
Greenville, Roach River		1,500
Harmony, Grant Brook		10,000
Holeb, Fish Pond Brook		400
Howe Brook, Howe Brook		30,000
Jackman, Attean Lake		30,000
Bassett Pond		12,000
Beattie Pond		12,000
Benjamin Pond		12,000
Berry Pond		12,000
Bickford Pond		12,000
Big Turner Pond		12,000
Bog Brook		6,000
Bog Pond		12,000
Boulder Pond		12,000
Campbell Pond		12,500
Clearwater Pond		10,000
Crocker Pond		300
Damon Pond		300
Enchanted Lake		16,000
Fernold Pond		12,000
First Toby Pond		12,000
Fish Pond		600
Gander Brook		6,000
Grace Pond		12,000
Heald Brook		10,600
Heald Pond		600
Horse Brook		8,000
Horse Shoe Pond		12,000
Indian Pond		12,000
Jim Mack Pond		300
Lake Parlin		16,000
Little Berry Pond		12,000
Little Big Wood Lake		20,000
Little Enchanted Pond		12,000
Little Long Pond		12,000
Little Turner Pond		12,000
Little Wood Pond		12,000
Long Pond		12,000
Lost Pond		12,000
Lowell Pond		12,000
Lower Enchanted Pond		12,000
Moores Pond		12,000
Moose River		31,000
Mud Pond		500
Newton Pond		12,300
Parlin Brook		8,000
Rache Pond		300
Rancourt Pond		300
Sandy Brook		6,500
Second Toby Pond		12,000
Smith Pond		12,000
Snake Pond		12,000
Sply Pond		600
Stony Brook		10,000
Sugar Berth Pond		12,500
Third Toby Pond		12,000
Three Streams Brook		10,000
Turner Pond		500
Twin Island Pond		12,000
Maine—Continued.		
Jackson, Whipple Pond		12,000
Wood Brook		12,500
Kineo, Carry Brook		30,600
Scotean Brook		44,000
Kineo Station, Spencer Pond		1,500
Machias, Bog Lake		1,200
Northwest Pond, Northwest Pond		18,000
Oakland, Messalouskee Lake		2,000
Patten, Davis Pond	20,000	
Portland, Beaver Brook		8,000
Brandy Brook		12,000
Frank Brook		8,000
Gully Brook		8,000
Little River, North Branch		12,000
Nonesuch River		26,000
Piscataqua River		12,000
Red Brook		8,000
Saco, Boothby Brook		8,000
Foxwell Brook		12,000
Fresh Water Brook		14,000
Harmon Brook		8,000
Hill Brook		8,000
Kimball Brook		12,000
Meade Brook		16,000
Running Brook		8,000
Silley Brook		8,000
Tapley Brook		6,000
Wyman Brook		8,000
Schoodic Lake, Schoodic Lake		18,000
Searsport, Swan Lake		1,500
Shirley, Ordway Lake		40,000
Skinner, Barrett Pond		400
Bog Brook		400
Deer Pond		200
Indian Pond		200
Lowell Pond		400
Smith Brook, Smith Brook		15,000
South Paris, Abbott Pond		800
Concord River		1,000
Lake Pennesseewassee		600
Little Pennesseewassee Lake		500
Marshall Pond		800
Shagg Pond		800
Twenty Mile Brook		1,375
Washburn Pond		800
South Penobscot, Wights Pond		1,300
Strong, Trout Lake		600
Waterville, Britton Lake		40,000
West Ellsworth, Patten Pond	75,000	
Westfield, St. John River, Presque Isle Fork	30,000	
West Paris, Little Concord Pond		500
Maryland:		
Arcadia, Piney Run		900
Baltimore, State fish commission	*50,000	
Boring, McGills Run		2,000
Clear Spring, Big Spring Creek		150
Frederick, Rock Creek		4,000

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—**Continued.**

BROOK TROUT—Continued.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
Maryland—Continued.		
Hagerstown, Bear Run		100
Mountain Run		700
Spring Creek		700
Stakes Run		1,400
Lonaconing, Swamp Run		4,500
Lutherville, Zynialani Falls Run		1,000
Mountain Lake Park, Baker Run		1,500
Broad Pond Creek		2,000
Trout Run		1,500
Norrisville, Island Branch		1,000
Oakland, Bear Creek, South Prong		3,000
Edgewood Pond		1,000
Harrington Lake		1,500
Hoyes Run		3,000
Roaring Creek		1,500
Toliver Run		1,500
White Meadow Run		200
Wilson Creek Lake		1,000
Ruxton, Poe's pond		1,000
Stony Run Station, Benson Branch		1,000
Westernport, Stony Run		1,000
Massachusetts:		
East Pepperell, Gulf Brook	2,000	
Foxboro, Sunset Lake	4,000	
Graniteville, Morrison Brook		225
Greenfield, Fiskes Pond		375
Green River		375
Stone Brook		250
Holyoke, Barros Brook		200
Crosby Brook		200
Spruce Corners Brook	2,000	
Huntington, Westfield River, Middle Branch	4,000	
Lancaster, Bowers Brook	2,000	200
Burke Brook	2,000	200
Slate Rock Brook	2,000	
Spectacle Pond	4,000	
Lee, Beartown Brook		200
Beartown Brook, East Branch	8,000	
Beartown Brook, West Branch	8,000	
Clam River		200
East Lee Brook	8,000	200
Hop Brook	8,000	200
Muddy Brook		200
Peggy Brook	8,000	
Powder Mill Brook		200
Tyringham Brook	8,000	
Washington Mountain Brook	8,000	200
Leominster Center, Wickepickee Brook		300
Monson, Conant Brook		300
New Bedford, Bakerville Brook	1,000	
Bread and Cheese Brook	2,000	
Destruction Brook	1,000	
Howland Brook	1,000	
Lee Brook	1,000	
Mouse Mill Brook	1,000	
Shingle Island Brook	2,000	
Massachusetts—Contd.		
North Adams, Hudson Brook		250
McMarana Brook		250
Sherman Brook		125
Northampton, Cable's pond		100
Rocky Hill Brook		300
Westfield River, North Branch		600
North Wilbraham, Silver Street Pond		300
Palmer, Burleigh Brook	2,000	
Lake Goetting		400
Schneider Brook		100
Trout Brook		100
Pittsfield, Clark Brook		200
Fairfield Brook		600
Milton Brook		600
Sackett Brook		600
School House Brook		600
Secum Brook	4,000	
Shaker Brook	200	300
Town Brook		600
Yokum River		600
Shelburne Falls, Apple Valley Brook	2,000	
Avery Brook		250
Bare River		250
Branch Brook		250
Clark Brook		250
Drake Brook		250
King Brook		250
Long Brook		250
Murphy Brook		250
North River		375
Saunders Brook		125
Schneck Brook		125
Taylor Brook		250
Southbridge, Gibbs Brook		200
Hammant Brook		200
Walker Brook		200
South River, Poland Brook	4,000	
South River		400
Still River, Little Hell Pond		200
Topsfield, Brook Trail Pond		800
Webster, Potter Brook	3,000	
West Brimfield, Quaboag River		300
Williamsburg, Shaw Brook	3,500	
Westfield River, branch of	4,500	
Woods Hole, Hollyholm Trout Pond		500
Michigan:		
Alpha, Mastodon Creek		1,500
Au Sable, Elliott Creek	8,000	
Pine River	25,000	
Silver Creek	12,000	
Baldwin, Baldwin and Avery Creeks	20,000	
Balsam, Deer River		3,000
Baraga, Grandville Creek		2,000
Sturgeon River		6,000
Basswood, Paint River		6,000
Bessemer, Black River		3,000
City Pond		1,500
Meyers Creek		1,500
Beulah, Platt River	25,000	

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BROOK TROUT—Continued.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
Michigan—Continued.		
Birmingham, River Rouge		2,700
Bitely, Cedar Creek		3,000
Black River, Black River and tributaries	12,000	
Branch, Weldon Creek	20,000	
Brunswick, Cushman Creek		3,000
Caspain, Flanigan Creek		2,000
Stocks Creek		2,000
Champion, Escanaba River, East Branch		1,500
Escanaba River, Headwaters		3,000
Charlevoix, Island Creek		2,000
McGeagh Creek		2,000
Monroe Creek		2,000
Paddock Creek		2,000
Stovers Creek		2,000
Crystal Falls, Seven Springs Creek		1,500
Detroit, Meadow Brook		2,700
Washtanaw Creek		1,200
Dryden, Belle River	30,000	
East Tawas, Silver Creek	8,000	
Farwell, Littlefield Creek	8,000	
Medcoff Lake	25,000	
Seven Creeks	5,000	
Tobacco River and branches	45,000	
Gaylord, Au Sable River, North Branch	80,000	
Pigeon River	90,000	13,000
Grayling, Au Sable River		3,900
Hale, Smith Creek	8,000	
Hancock, Johns Creek		2,000
Harrietta, Slagel River	15,000	
Herman, Silver Creek		5,000
Hillman, Cold Creek		3,600
Thunder Bay, tributaries of	8,000	
Indian River, Little Pigeon River	12,000	
Iron Mountain, Merriman Creek		3,000
Iron River, McColman Creek		2,000
Morrison Creek		2,000
Ironwood, Montreal River		1,500
Ishpeming, Alder Creek		2,000
Deer Creek		4,000
Green Creek		2,000
Sokoubeck Creek		2,000
Whitefish River, tributary of		2,000
Kalamazoo, Geyger Creek	8,000	
Kenton, Jumbo Creek		1,500
Keweenaw Bay, Carp River		5,000
Lake Linden, MacCullonis Creek		4,000
Spring Creek		1,000
Traverse River		7,000
L'Anse, Carlson Creek		3,000
Michigan—Continued.		
Lovells, Big Creek, East Branch		3,900
Lucas, Clam River	5,000	
Mandan, White Birch Creek		1,500
Marenisco, Alder Creek		1,000
Balsam Creek		1,000
Barrs Creek		2,000
Bear Creek		2,000
Beaver Creek		2,000
Big Coon Creek		2,000
Brady Creek		2,000
Brit Creek		2,000
Browne Creek		2,000
Brush Creek		1,000
Cedar Creek		1,000
Douglas Creek		2,000
Fisher Creek		2,000
Forks Creek		1,000
Fosters Creek		2,000
Fox Creek		2,000
Hazel Creek		2,000
Hoffman Creek		2,000
Honey Creek		2,000
Honeymoon Creek		1,000
Jones Creek		1,000
Kimbal Creek		2,000
Little Coon Creek		2,000
Little Spring Creek		1,000
McKinney Creek		2,000
Monroe Creek		2,000
Nine Mile Creek		2,000
Pigeon Creek		2,000
Sampson Creek		2,000
Shammels Creek		2,000
Slippery Elm Creek		2,000
Sutherland Creek		2,000
Triplett Creek		2,000
Weasel Creek		1,000
Willow Creek		2,000
Marquette, Whetstone Brook		1,500
Mason, Raether Creek		2,000
Matchwood, Mersaw Creek		1,500
Mayville, Hammelton Creek		2,000
Metropolitan, Sturgeon River, West Branch		5,000
Negaunee, Baldwin Kiln Lake		1,500
Birch Creek		1,500
Nirvana, Marquette River and branches	20,000	
Ontonagon, Bear Creek		2,000
Big Iron Creek		4,000
Cranberry River		4,000
Deer Creek		4,000
Duck Creek		5,000
Little Iron Creek		4,000
Mineral River		4,000
Paddy Creek		2,000
Second Creek		4,000
Paynesville, Ontonagon River, Middle Branch		4,500
Pellston, Maple River	100,000	
Phoenix, Beaverdam Pond		1,000
Bruneau River		3,500
Garden City Pond		1,500
Garden City River		5,000
Old Cliff Meadow Pond		1,000

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BROOK TROUT—Continued.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
Michigan—Continued.		
Phoenix, One Mile Farm Creek		1,500
Silver Creek		1,500
Randville, Solberg Creek		2,000
Rose City, Houghton Creek	12,000	
Roscommon, Au Sable River, South Branch		5,000
Ross Siding, Jackson Creek		1,500
Sagola, Sturgeon River, East Fork		8,000
Shelby, Piper Creek	8,000	
Robinson Creek	10,000	
Stony Creek	10,000	
Silverwood, Bear Creek		3,000
Hannah Creek		2,000
Stager, Stager Creek		2,000
Tawas City, Pickett Creek	8,000	
Tobins Harbor, Tobins Harbor		8,000
Toivola, Lake Eva		4,000
Turtle, Ball Creek		1,500
Kings Creek		1,500
Wellington Tank, Jimmie Thomas Brook		1,500
Lemon Creek		1,500
White Cloud, Big Cold Creek		3,000
Wingleton, Bauman and Cedar Creeks	20,000	
Witbeck, Michigan Creek		3,000
Wooster, Mint Creek	2,000	
Minnesota:		
Caledonia, Pine Creek		2,000
Chisholm, Sturgeon Branch		5,000
Clearbrook, Clearbrook Creek	3,000	
Duluth, Amity Creek		2,000
Black Fox Creek		2,000
Eight Mile Creek		2,000
Fisher Creek		3,500
Gooseberry River		5,000
Knife River		5,000
Knife River, East Branch		3,500
Knife River, West Branch		5,000
Lester River		5,000
Lester River, East Branch		3,000
Miller Creek		4,000
Silver Creek		3,500
Storer Creek		3,000
Sucker River, East Branch		4,000
Sucker River, West Branch		5,000
Talmage River		3,500
Tischer Creek		2,000
Harmony, Gregerson Creek		1,050
Hoag Creek		1,050
Highland, Branards 43 Creek		2,000
Gooseberry River, branch of		4,000
Knife River, Beaver Creek		2,000
Cross River		3,000
Gooseberry Creek		3,000
Minnesota—Continued.		
Knife River, Knife River		3,000
Manitou River		2,000
Schauff Lake		3,000
Splitrock River		3,000
Sucker River		3,000
Temperance River		3,000
Two Island Creek		3,000
Palmer, Knife River		4,000
Preston, Sugar Creek		1,050
Trout Creek		1,050
Rochester, Badger Creek		1,050
Brush Creek		1,050
Bear Creek		700
Cascade Creek		1,750
Chester Creek		1,050
Dux Creek		700
Silver Creek		1,050
Trout Creek		1,050
Washspring Creek		2,250
Willow Creek		1,050
St. Charles, Campbell branch		100
Carter Creek		100
Crow Creek		100
Drakes Spring Creek		100
Hemmingway Creek		100
Holtz Spring Creek		100
Logan Branch		100
Pettis Creek		100
Pine Creek		100
Quincy Creek		100
Troy Creek		100
Whitewater River, Middle Branch		100
Whitewater River, South Branch		100
Simpson, Kinney Creek		1,050
Partridge Creek		1,050
Two Harbors, Encampment River		3,000
Gooseberry River		4,000
Silver Creek		4,000
Waldo, Big Stewart River		5,000
Clear Creek		3,000
Little Pine Creek		2,000
Wanless, Spring Lake		2,000
Winona, East Burns Valley Creek		4,500
Gilmore Creek		4,500
Pleasant Valley Creek		4,500
West Burns Valley Creek		4,500
Montana:		
Armstead, Wise River		450
Avon, Trout Creek		2,000
Baker, Little Beaver Creek		750
Bearmouth, Harvey Creek		2,000
Belgrade, Benhardt Creek		2,300
Bull Run		2,000
Cottonwood Creek		3,300
Cowan Creek		2,300
Dry Creek		4,300
East Gallatin River		6,600
Kennedy Creek		3,000
Middle Creek		4,600
Pass Creek		4,300
Reese Creek		3,300
Ross Creek		3,300

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BROOK TROUT—Continued.

Disposition.	Fry and eggs.	Fingerlings, yearlings, and adults.
Montana—Continued.		
Belgrade, Stony Creek		2,000
Storey Creek		300
Thompson Creek		2,300
Belton, Fish Creek		500
Big Timber, Boulder River		1,200
Deer Creek, Upper		1,750
Sweet Grass Creek		1,000
Bozeman, Adkjer Pond		3,000
Baker Creek		3,000
Beaver Creek		300
Bostwick Creek		3,000
Brackett Creek		300
Buck Creek		300
Buffalo Horn Creek		300
Bulin Creek		2,000
Cache Creek		300
Camp Creek		4,000
Carlin Creek		1,000
Cockrell Creek		1,000
Curtiss Creek		2,000
Dailey Creek		300
Deer Creek		300
East Bear Creek		300
Fish Creek		2,000
Greek Creek		300
Heeb Creek		2,000
Hell Roaring Creek		300
Jackel Creek		2,000
Kennedy Creek		2,000
Lansing Creek		2,000
Logger Creek		300
Martin Creek		2,000
Meadow Creek		500
Middle Creek		300
Moose Creek		300
Nixon Creek		4,000
North Cottonwood Creek		300
North Dry Creek		300
North Twin Lake		1,000
Odell Creek		1,000
Olson Creek		300
Ole Olson Lake		300
Pasha Creek		2,000
Pass Creek		300
Porcupine Creek		300
Reese Creek		300
Rocky Creek		300
Ross Creek		300
Sage Creek		300
Sales Creek		300
Sales Lake		300
Sixteen Mile Creek		450
Smith Creek		2,000
Sour Dough Creek		300
South Cottonwood Creek		300
South Meadow Creek		300
South Twin Lake		300
Spanish Creek		300
Specimen Creek		300
Squaw Creek		300
Storey Creek		3,000
Stuckey Creek		2,000
Swan Creek		300
Taylor Creek		1,000
Thompson Creek		2,000
Tice Creek		3,000
Trail Creek		300
West Fork, North Branch		300
West Fork, South Branch		300
Montana—Continued.		
Bozeman, West Rainbow Lake		1,500
Wilson Creek		300
Browning, Cut Bank Creek, North Fork		3,500
Cut Bank Creek, South Fork		3,500
Elk Creek		5,000
Flatiron Creek		3,500
Greasewood Creek		4,000
Livermore Creek		5,000
Milk River, South Fork		4,200
Willow Creek		3,500
Buffalo, Buffalo Creek		500
Butte, Delmo Lake		2,500
Carbella, Upper Rock Creek		7,000
Cardwell, South Boulder River		1,750
Chadbourn, Willow Creek		1,500
Choteau, Teton River		1,000
Columbus, East Rosebud River		1,750
Stillwater River		1,400
Stillwater River, West Fork		1,750
West Rosebud River		2,100
Corwin Springs, Cutlers Lake		500
Harriett Lake		500
Crane, Sixteen Mile Creek		1,800
Dailey's, Big Creek		1,250
Deborgia, Big Creek		500
Deer Creek		1,500
St. Regis River		9,500
Savanac Creek		500
Twelve Mile Creek		5,500
Deer Lodge, Little Blackfoot River		1,000
Little Rock Creek		600
Peterson Creek		600
Race Track Creek		600
Tin Cup Creek		600
Dell, East Creek		1,750
Little Sheep Creek		2,100
Red Rock Creek		2,800
Sage Creek		1,400
Simpson Creek		1,400
Dillon, Beaverhead River		5,000
Black Tare Creek		450
Divide, Divide Creek		300
Moose Creek		450
Drummond, Douglass Creek		1,500
Willow Creek, Upper		2,000
Emigrant, Pine Creek		11,400
Trail Creek		11,400
Florence, Three Mile Creek		1,200
Forest Grove, Hell Creek		3,000
Gardiner, Nez Perce Creek		15,000
Glacier Park, Altyn Lake		3,500
Baring Creek		750
Cataract Creek		750
Cut Bank Creek		25,750
Grinell Lake		3,500
Josephine Lake		3,500
Midvale Creek		500

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BROOK TROUT—Continued.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
Montana—Continued.		
Glacier Park, Red Eagle Creek		1,000
Swift Current Creek, North Fork		750
Two Medicine Lake		2,000
Two Medicine River		1,000
Two Medicine River, Dry Fork		1,000
Glen, Willow Creek		450
Hamilton, Bitter Root River		5,300
Bitter Root River, East Fork		300
Bitter Root River, West Fork		300
Blodgett Creek		300
Lost Horse Creek		300
Roaring Lion Creek		300
Rock Creek		300
Skalkaho Creek		300
Sleeping Child Creek		300
Homestake, Homestake Reservoir		3,000
Lewistown, Bear Creek		4,000
Castle Creek		500
Cottonwood Creek, Upper		2,000
Marcotte Creek		6,500
Meadow Creek		750
Warm Spring Creek		500
Wolverine Creek		500
Libby, Deep Creek		500
Flower Creek		500
Lima, Beaverhead River		5,000
Livingston, Mortimer Creek		4,000
Spring Creek		4,000
Summerland Creek		5,000
Lodge Grass, Rotten Grass Creek		400
Lombard, Sixteen Mile Creek		1,250
Manhattan, McLellan Creek		6,000
Ridgley Creek		6,000
Martinsdale, Spring Creek		8,000
Melrose, Canyon Creek		450
Miner, Miner Creek		1,250
Rock Creek, Lower		1,000
Missoula, Blackfoot River		2,000
Monida, Horse Plains Creek		450
Trail Creek		450
Norris, Power Lake		3,500
Pony, North Willow Creek		3,400
Red Lodge, Dupont Lake		800
Lake DeVenny		800
Lake Martin		800
Rock Creek		1,000
Sunnybrook Lake		600
Red Rock, Red Rock Creek		450
Rimini, "D" Lake		250
Ringling, Parke's pond		1,000
Sixteen Mile Creek		1,800
Roberts, Clear Creek		800
Rossfork, Canyon Creek		2,500
Judith River		1,000
Montana—Continued.		
Roundup, Flatwillow Creek		1,000
Swimming Woman Creek		750
Willow Creek		750
St. Regis, Crystal Lake		1,250
Sappington, Jefferson River		2,100
Somers, State fish commission	* 50,000	
Spire Rock, Pipestone Creek		3,750
Stanford, Surprise Creek		8,000
Stevensville, Bass Creek		1,250
Summit, Summit Lake		750
Twin Bridge, Big Hole River		3,000
Valcour, Five Mile Creek		1,250
Whitehall, White Tail Creek		1,050
White Sulphur Springs, Birch Creek		1,400
Camas Creek		1,400
Checkerboard Creek		1,400
Musselshell River, North Fork		1,750
Newlan Creek		1,750
Smith River, North Fork		1,400
Wilsall, Coal Creek		1,000
Crandall Creek		1,000
Flathead River		2,000
Horse Creek		1,500
North Horse Creek		1,500
Potter Creek		4,000
Wolf Creek, Dearborn Creek, South Fork		1,250
New Hampshire:		
Bartlett, Saco River	5,000	
Berlin, Clement Brook	6,000	
Jericho Brook	10,000	
State Line Brook	6,000	
Success Pond		300
Bethlehem Junction, Gale River and tributaries	10,000	
Bowman, Moose River	10,000	
Bretton Woods, Abenaki Brook	5,000	
Ammonoosuc River	25,000	
Asquam Brook	4,000	
Black Brook	5,000	
Clay Brook	5,000	
Clinton Brook	5,000	
Crawford Brook	5,000	
Deception Brook	5,000	
Jefferson Brook	5,000	
Lake Anderson	15,000	
Lake Carolyn	15,000	
Sebossis Brook	5,000	
Twin Rivers	20,000	
Bristol, Clark Brook	2,000	
Danforth Brook	2,000	
Dick Brown Brook	2,000	
Fowler River	2,000	
Goose Pond	2,000	
Hemlock Brook	2,000	
Newfound Lake	5,000	
Patten Brook	2,000	
Ten Mile Brook	3,000	
Brookline, Withie Brook	300	

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BROOK TROUT—Continued.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
New Hampshire—Contd.		
Canaan, Blake Brook	2,000	
Fairweather Brook	2,000	
Haynes Brook	2,000	
Mascoma River	3,000	
Orange Pond	2,000	
Sargent Brook	2,000	
Cavender, Contoocook River		300
Cherry Mountain, Israel River and tributaries	7,500	
Claremont, Copeland Brook	2,000	
Little Sugar River	4,000	
Colebrook, State fish commission	*50,000	
Dover, Jenkins Brook	2,000	
Enfield, Bicknell Brook		200
Bog Brook		100
Lovejoy Brook		200
Fabyans, Mount Echo Brook	5,000	
Fitzwilliam, Boyce Brook	2,000	
Kemp Brook	2,000	
Lawrence Brook	2,000	
Priest Brook	2,000	
Scott Brook	3,000	
Franklin, Call Brook	2,000	
Gulf Brook	2,000	
Hill Brook	2,000	
Putney Brook	2,000	
Glencliff, Oliverian Brook	6,000	
Gorham, Upper Wild River and tributaries	15,000	
Grafton, Davis Brook	1,000	
Hoyt Brook	4,000	
Orange Brook	2,000	
South Grafton Brook	2,000	
Greenfield, Holt Brook	2,000	
Hoovey Brook	2,000	
Smith Brook	2,000	
Groveton, Stratford Pond	10,000	
Hill, Flanders Brook		200
Keene, White Brook	2,000	
Laconia, Ellsworth Pond		300
Russell Pond		300
Sunapee Lake		600
Lebanon, Bliss Brook		100
Buffalo Bill Brook		100
Great Brook	3,000	200
Hibbard Brook	2,000	200
Marshall Hill Brook		200
Mink Brook		200
Smith Pond	2,000	
Stony Brook	2,000	200
Manchester, Bog Brook		100
Boman Brook		300
Cheney Brook		200
Cold Spring Brook	5,000	300
Dalton Brook	2,000	
Darrah Brook	3,000	200
Gould Brook	2,000	
Hodgdon Brook	2,000	300
Joe English Brook		300
Leaches Brook		100
Mead Brook	2,000	
Patten Brook	4,000	
Pierce Brook	3,000	200
Pulpit Brook	2,000	
New Hampshire—Contd.		
Manchester, Reed Brook	5,000	
Smith Brook	2,000	
South Weare Brook	2,000	
Stark Brook	2,000	
Sweet Water Brook	3,000	
Watts Brook	5,000	300
Whiting Brook	3,000	200
Wiggin Brook		200
Woodward Brook		300
Meredith, Bearcamp River	3,000	
Nashua, Bartemus Brook	2,000	
Naticook Brook	2,000	
Riverside Farm Brook		2,000
Silver Spring Brook	2,000	
Smalls Brook		200
Newport, Cragin Brook	2,000	
Gunnison Brook	2,000	
North Woodstock, Eastman Brook	8,750	
Lost River	12,000	
Middle Pemigewassett River	5,250	
Oliverian, Oliverian Brook	4,000	
Percy, Christine Lake		500
Peterboro, Brookside Pond	2,000	
Pike, Lake Katherine	4,000	400
Portsmouth, Dearborn Brook		200
Peverley Brook Pond		300
Suncook, Bow Brook	3,000	
Deer Brook	2,000	
Langmaid Brook	2,000	
Twin Mountain, Zealand River and tributaries	7,500	
Walpole, Brush Meadow Brook		200
Chandler Brook		300
Great Brook		400
Heywood Brook		200
Lower Cold River		400
Warner, French Brook		2,000
Meadow Brook		2,000
Silver Brook		2,000
Stevens Brook		2,000
Tony Hill Brook		2,000
Warren, Batchelder Brook		200
Berrys Brook		200
Hurricane Brook		300
Patch Brook		200
West Canaan, Morse Brook		200
Westport Independent Pond	1,000	
Wilton, Hodgdon Brook	2,000	
New Jersey:		
Bloomfield, Third River		1,500
Englewood, Closter Brook		900
Norwood Brook		1,200
Maywood, Saddle River		1,500
Mount Arlington, Raritan River, South Branch		150
Oak Ridge, Shelter Rock Lake		3,000

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BROOK TROUT—Continued.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
New Jersey—Continued.		
Red Bank, Bear Bura Pond		300
River Edge, Passaic River, tributary of		600
Whippany, Badgley Brook		600
New Mexico:		
Bernalillo, Jemes River		2,500
Las Huertos Canon		3,750
Cimarron, Cimarron River		9,000
Glorietta, Pecos River		16,000
Las Vegas, Gallinas River		2,500
Raton, Sugarite River		7,750
Sante Fe, Nambe River		8,750
Rito Pacheco		2,750
Santa Fe River		18,750
Tesuque River, Upper		2,750
New York:		
Amsterdam, Union Mills Creek	6,000	
Apulia, Butternut Creek	18,000	
Arena, Forest Lake		500
Auburn, Hemlock Brook	5,000	
Bath, Pleasant Valley Creek	10,000	
Bayshore, Penataquit Creek		150
Benson Mines, Ellis Creek	5,000	
Little River	10,000	
Big Moose, Twitchell Lake		750
Binghamton, Nantikote Creek	6,000	
Page Brook	6,000	
Thomas Brook	8,000	
Buffalo, Brookwood Pond		600
Garden Pond		500
Middle Pond		500
Calcium, West Creek	8,000	
Cambridge, Coulter Brook	5,000	
Crystal Lake	5,000	
Pommanook Creek	4,000	
Carrolton, Nine Mile Creek	4,000	
Catskill, Whippoorwill Creek		3,000
Cobleskill, Charlotteville Creek	6,000	
East Worcester Creek	6,000	
Vintenton Creek	6,000	
Worcester Creek	5,000	
Cold Brook, Bushkill Creek	5,000	
Cortland, Fall Brook	10,000	
Solon Creek	5,000	
Virgil Spring Creek	6,000	
Cuyler, Muller Brook	2,000	
Tripoli Creek	3,000	
Eden Center, Clear Water Pond	4,000	
Ellenville, Rondout Creek	9,000	
Felts Mills, Deer Lick Creek	4,000	
Drake Creek	4,000	
Felts Mills Creek	8,000	
Frenches Creek	2,000	
Leroysville Creek	3,000	
New York—Continued.		
Fulton, Lewis Creek	6,000	
Fulton Chain, Nicks Lake	15,000	
Grand Gorge, Cole Brook	4,000	
Greenwich, Fly Brook	8,000	
Hartshorn Brook	5,000	
Halfway, Carpenter Brook	12,000	
Harrisville, Big Hill Pond	5,000	
Hopewell Junction, Wortlekill Creek	5,000	
Hudson Falls, Spring Brook Pond	2,000	
Kasoag, Indian Camp Brook	5,000	
McConnell Brook	5,000	
Kerhonkson, Metherakonk Creek	4,000	
Kingston, Rondout Creek	10,000	
Lafargeville, Catfish Creek	12,000	
Lake Mahopac, Croton River	10,000	
Lake Placid, Lake Placid	57,000	
Lanesville, Lanesville Creek	5,000	
Livingston Manor, Willowemoc Creek	8,000	
Long Lake West, Bettner Pond	12,000	
Cub Pond	6,000	
Otter Pond	6,000	
Lyons, Ackerman Brook	4,000	
Glenmart Brook	4,000	
Sodus Creek	5,000	
Middleburg, Keyser Kill Creek	6,000	
Millbrook, Little Rest Brook	2,000	
Mount Pleasant, Beaverkill Creek	4,000	
Sawkill Creek	8,000	
New Scotland, Kirklin Creek		6,000
New York, Aquarium	*5,000	
North Ilion, Steeles Creek	8,000	
North Java, Beaver Meadow Creek	2,000	
Beaver Meadow Creek, East Branch	2,000	
Beaver Meadow Creek, South Branch	2,000	
Cavanaugh Creek	2,000	
Dewey Creek and branches	8,000	
Java Lake	6,000	
McGivney Creek	2,000	
McGivney Creek, South Branch	2,000	
South Berg Creek and branches	12,000	
Tonawanda Creek and branches	8,000	
North Lansing, Gulf Creek		1,800
Owego, Owego Creek		400
Patterson, Croton River	10,000	
Mountain Brook		300
Pawling, Swamp River	6,000	

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BROOK TROUT—Continued.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
New York—Continued.		
Phoenicia, Woodland Creek	5,000	
Pine Bush, Veerkeerdeerkill Creek	5,000	
Pleasant Lake, Buck Pond	6,000	
Dead Creek	3,000	
Longfellow Lake	8,000	
Poland, Buttler Lake	8,000	
Port Henry, Courtney Pond	6,000	
Niagara Pond	6,000	
Sand Pond	6,000	
Port Jervis, Black Brook	4,000	
Kenney Brook	6,000	
Mongaup Brook	10,000	
Shinglekill Creek	8,000	
Steinekill Creek	6,000	
Poughkeepsie, Fly Sprout Creek	3,000	
Preble, Graham Brook	4,000	
Steele Brook	5,000	
Ramapo, Torn Brook		3,900
Rhinecliff, Ellerslie Lake		4,500
Richland Junction, Salmon River, North Branch	10,000	
Rome, Fish Creek	10,000	
Mohawk River	18,000	6,000
St. Regis Falls, Dexter Brook	3,000	
East Brook	8,000	
St. Regis River	10,000	
Saratoga Springs, Long Pond		300
Schenectady, Hungerkill Creek		10,000
Schenevus, Elk Creek	5,000	
Selkirk, Onerquethan Creek		10,000
Sherburne, Four Corners Brook	3,000	
Handsome Brook	5,000	
Nigger Hollow Brook	3,000	
Number Six Brook	3,000	
Shawler Brook	3,000	
Smyrna Brook	4,000	
Syracuse, Bear Trap Creek	5,000	
Carpenter Brook	12,000	500
Conklin Brook	3,000	
De Montfrede Brook	12,000	
Elmwood Brook	6,000	
Geddes Brook	13,000	
Judd Brook	6,000	
Lafayette Creek	10,000	
Nine Mile Creek	27,000	
Pebble Hill Brook		600
Poole Brook	4,000	
South Hollow Brook	10,000	
Stony Brook	5,000	
Swamp Brook	12,000	
Washingtonville, Sunnybrook Pond		1,900
Watertown, Black River and tributaries	36,000	
Mill Creek	10,000	
West Port, Bouquette River, South Branch	8,000	
Williamstown, Prince Brook	10,000	
North Carolina:		
Doughton, Brush Creek, Laurel Fork		5,000
Elk Creek		2,000
Edgemont, Sassafras Creek		2,000
Elkland, Howard Creek		2,000
Fontana, Eagle Creek		5,000
Granite, Brown's pond		3,600
Horse Shoe, Mathies Creek		2,400
Lake Toxaway, Beasley Creek		3,600
Flat Creek		4,800
Lakeside Brook		2,400
Owens Mill Creek		3,600
Parker Creek		3,600
Robinson Creek		4,800
Slickum Creek		3,600
Tennessee Creek		4,800
Thompson River		6,000
Tuckaseigee River		4,800
Montezuma, Wautauga River, Boons Fork		5,000
Mount Sterling, Big Creek		8,400
Murphy, Chambers Creek		2,000
Montgomery Creek		1,500
North Wilkesboro, Buffalo Creek, Joes Fork		4,000
Dugger Creek		4,000
Grady Creek		5,000
Laurel Creek		3,000
Little Dugger Creek		3,000
Mason Branch		4,000
Steels Branch		4,000
Old Fort, Catawba River		3,000
Pilot Mountain, Flat Shoals Creek		5,000
Sapphire, Alley Creek		3,600
Waynesville, Taylor Creek		4,200
North Dakota: Bowman, Alkali Creek		500
Ohio:		
Bellefontaine, Rush Creek	20,000	
Stony Creek	20,000	
Mansfield, Cahalls Creek	6,000	
Urbana, Cedar Creek	10,000	
Oregon:		
Clackamas, Clackamas River		1,040
Oregon City, Clear Creek		8,689
Milk Creek		3,000
Salmon River		10,000
Silverton, Silver Creek		5,000
Pennsylvania:		
Altoona, Blair Creek		3,000
Bobs Creek		3,000
Mill Run		3,000
Placks Run		3,000
Austin, Bailey Run		2,000
Bark Shanty Run		1,000
Big Moores Run		2,000
Birch Run		2,000
Cowley Run		2,000
Dry Run		1,000
East Deering Run		1,000
Freeman Run		2,000

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BROOK TROUT—Continued.

Disposition.	Fry and eggs.	Fingerlings, yearlings, and adults.
Pennsylvania—Contd.		
Austin, Hammersley Run		2,000
Jones Run		1,000
Little Moores Run		2,000
Nelson Run		2,000
Portage Creek		1,000
Prouty Run		1,000
South Woods Creek		2,000
Beaver Springs, Swift Run		2,400
Bedford, Beegles Spring Run		600
Diberts Run		600
Bellwood, Sandy Run		3,000
Benton, Marion Creek		150
Blairs Mills, Horse Valley Creek		1,000
Boiling Springs, Boiling Springs Lake		150
Broad Run		150
Indian Peg Run		150
Lutz Run		150
Boswell, Card Machine Run		3,000
Pickings Run		3,000
Quemahoning Creek, North Fork		3,000
Bradford, Chapple Fork Creek		1,500
Sugar Run		1,500
Tuna Creek, East Branch		1,500
Tuna Creek, West Branch		1,000
Willow Creek		1,500
Cassandra, Bens Creek		1,600
Bobbs Creek		1,600
Cedar Hollow, Trout Creek		1,000
Valley Creek, North Branch		2,000
Valley Creek, South Branch		1,000
Chambersburg, Birch Run		4,200
Carbaugh Run		2,100
Conococheague Creek, Upper		7,000
Falling Springs Creek		2,800
Falling Springs Creek, East Branch		2,800
Falling Springs Creek, West Branch		3,500
Hoosic Run		2,800
Trout Run		300
Cherry Run, Penns Creek		300
Cherry Tree, Boiling Spring Run		3,000
Brush Run		1,500
Hazlett Run		3,000
Kiln Run		1,500
Killens Run		1,500
Cheyney Walhalla Run		1,000
Cisna Run, Bixler Run		1,000
Cisna Run		600
Clearfield, Albert Run		1,000
Alder Run		1,000
Amms Run		1,000
Barnett Run		1,000
Baughman Run		1,000
Bear Wallow Run		1,000
Birch Run		1,000
Bish Run		1,000
Bowman Run		2,000
Browns Run		1,000
Pennsylvania—Contd.		
Clearfield, Camppoke Run		1,000
Chase Run		1,000
Crooked Sewer Run		1,000
Dixon Run		1,000
Downey Run		1,000
Dry Hollow Run		1,000
Eberts Run		1,000
Fork Run		1,000
Haines Run		1,000
Hampton Run		1,000
Haney Run		1,000
Horton Hollow Run		1,000
Kephart Run		1,000
Keth Dart Run		1,000
Kline Run		1,000
Lambs Run		1,000
Little Run		1,000
Little Lick Run		1,000
Low Run		1,000
McDonald Run		1,000
Maines Run		1,000
Mease Run		1,000
Merrits Run		1,000
Ogden Run		1,000
Pine Hollow Run		1,000
Pine Swamp Run		1,000
Reed Run		1,000
Sand Run		1,000
Schop Run		1,000
Shaws Run		1,000
Stone Hammer Run		1,000
Stoneville Run		2,000
Stony Battery Run		1,000
Stott Run		2,000
Tarkill Run		1,000
Thompson Run		2,000
Wiser Run		1,000
Witch Hazel Run		2,000
Yearia Creek		2,000
Coatsville, Birch Run		1,000
Cresco, Broadheads Creek		1,800
Bushkill Creek		450
Mill Creek		1,200
Cresson, Clearfield Creek, West Branch		1,500
Curry, Three Spring Run		10,500
Delta, Mount Holly Run		1,500
Denver, Little Muddy Creek		300
Dillsburg, Beaver Creek		1,800
Downingtown, Broad Run		2,900
Fox Run		600
Pine Run		600
Easton, Bushkill Creek		2,400
Ebensburg, Cole Run		400
Covered Bridge Run		600
Evans Run		600
Hallsten Run		200
Highland Lake		400
McCartney Run		800
McGarr Run		200
Moores Woods Run		600
Morris Jones Run		400
Phillips Run		400
Roberts Run		400
Upper Chest Creek		600
Elbell, Cisna Run		1,600
Elizabethville, Forks Creek		1,000
Small Valley Run		1,000

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BROOK TROUT—Continued.

Disposition.	Fry and eggs.	Fingerlings, yearlings, and adults.
Pennsylvania—Contd.		
Ephrata, Kurtzs Pond		150
Reindanbach Run		150
Fairchance, Cave Hollow Run		3,000
Fairfield, Green Run		1,200
Fields Station, Grays Run		1,000
Flowing Spring, Canoe Creek		3,000
Friedens, Beaverdam Creek		3,000
Calander Creek		3,000
Kimberlon Run		3,000
Lick Run		3,000
Miller Run		3,000
Rhodes Creek		3,000
Shingle Run		3,000
Gaines Junction, Big Hollow Creek		1,000
Bloody Run		1,000
Dewey Hollow Run		1,000
Elk Run, West Branch		1,000
Lick Run		1,000
Long Run		1,000
Phoenix Brook		1,000
Remington Run		1,000
Spring Run		1,000
Water Trough Hollow Run		1,000
Wetmore Run		1,000
Galeton, Beach Flat Brook		1,000
Buckceller Run		1,000
Cabin Run		1,000
California Run		1,000
Cushion Creek		1,500
Dry Hollow Creek		1,000
Gale Run		1,000
Germania Branch		1,500
Hopperhouse Run		1,000
Johnson Run		1,000
Judson Run		1,000
Kettle Creek		2,000
Kinsmith Creek		1,500
Little Kittle Creek		1,500
Losey Run		1,000
Lyman Run		1,000
Nine Mile Run		1,500
Painter Run		1,000
Pine Creek		2,000
Sinking Branch		1,500
Slyder Run		1,000
Stoney Run		1,000
Witmore Run		1,000
Work Path Creek		1,000
Gallitzin, Big Laurel Creek		3,000
Garden, Trout Creek		1,000
Valley Creek, North Branch		2,000
Valley Creek, South Branch		1,000
Gillintown, Books Run		1,000
Cooks Run		1,000
Gorton Run		1,000
Halls Run		400
Laurel Run		1,000
McKinney Run		1,000
Pine Run (A)		1,000
Pine Run (B)		1,000
Red Lick Run		1,000
Rock Run		1,000
Rock Run, Left Fork		400
Rock Run, Right Fork		400

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
Pennsylvania—Contd.		
Gillintown, Seven Mile Run		1,000
Sterling Run		1,000
Whites Run		1,000
Glen Mills, Baldwin Run		1,000
Gouldsboro, Lehigh River		750
Harrisburg, Cedar Run		1,400
Henderson, Crow Creek		1,000
Gulph Creek		1,000
Hershey, Spring Creek		300
Hoadleys, Middle Creek	8,000	
Wangum Creek	6,000	
Hopewell, Beaver Creek		1,000
Otts Run		1,000
Potter Creek		1,000
Three Springs Run		1,000
Huntingdon, Detwilers Run		200
Martins Run		200
Jamison City, Brions Run		150
Little Run		150
Meeker Run		150
Pigeon Run		150
Spring Run		150
Sullivans Branch		150
Trout Run		150
Jersey Shore, Aughenbaughs Creek		1,000
Big Run		1,000
Cammal Run		1,000
Larrys Creek and Branches		2,000
Lower Pine Bottom Creek		1,000
McElhattan Creek		2,000
McMurran Run		1,000
Otter Run		1,000
Ranches Run		1,000
Staver Run		1,000
Upper Pine Bottom Creek		1,000
White Deer Creek		2,000
Johnstown, Baker Run		600
Beaver Run		600
Beaverdam Run		600
Bens Creek		600
Bens Creek, Millers Branch		600
Bens Creek, North Fork		600
Bens Creek, South Fork		600
Big Spring Run		600
Blue Hole Run		600
Bobs Creek		600
Bottle Run		600
Breast Works Run		600
Cables Run		600
Calender Run		600
Canfields Run		600
Car Machine Run		600
Clear Run		600
Clear Shade Creek		600
Conemaugh River, South Fork		600
Cub Run		600
Daily Draft Run		600
Dalton Run		600
Glade Run		600
Gray Run		600
Hinkston Run		600
Ingrunt Run		600

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BROOK TROUT—Continued.

Disposition.	Fry and eggs.	Fingerlings, yearlings, and adults.
Pennsylvania—Contd.		
Johnstown, Johns Mill Run		600
Jones Mill Run		600
Kaufmans Run		600
Laurel Run		600
Lick Run		600
Little Mill Creek		600
Little Shade Run		600
Little Solomons Branch		600
Mill Creek		600
Millers Run		600
Millstone Run		600
Mishler Run		600
Negro Glade Run		600
Picking Run		600
Pine Run		600
Plitcher Run		600
Powder Mill Run		600
Quemahoning Creek, North Fork		600
Rachel Run		600
Red Run		600
Roaring Run		600
Runnels Mill Run		600
Salt Lick Run		600
Sandy Run		600
Shaffer Run		600
Shannon Run		600
Shingle Run		600
Solomons Run		600
Stuart Run		600
Sugar Run		600
Three Springs Run		600
Town Line Run		600
Upper Dark Shade Creek		600
Wild Cat Run		600
Julian, DeWitts Run		1,000
Dicks Run		1,000
Red Run		1,000
Smays Run		1,000
Whetstone Run		1,000
King of Prussia, Crow Creek		1,000
Gulph Creek		1,000
Trout Creek		1,000
Kinzers, Meadowbrook Run		1,000
Lakewood, LaBar Brook		1,800
Lamar, Bear Run		200
Cherry Run		300
Fishing Creek		400
Kettle Creek		300
Laurel Run		200
Spring Run		200
Lancaster, Conoqingo Creek, Branch of		1,000
Groffs Dale Run		1,000
Lefever Run		600
Martins Run		1,000
Middle Run		1,000
Larrys Creek, Larrys Creek, Second Fork		2,000
Leaman Place, Keneagy Run		1,000
Lebanon, Hammer Creek		1,000
Indiantown Creek		1,000
Poplar Run		500
Lehighton, Hahn Creek		600
Lemont, Big Spring Run		1,600
Buffalo Run		1,000
Pennsylvania—Contd.		
Lemont, Cedar Creek		1,000
Colyers Gap Run		1,000
Hassons Gap Run		1,600
Laurel Run		1,000
McBrides Gap Run		1,600
Markles Gap Run		1,750
Roaring Run		1,000
Shingletown Run		1,000
Sinking Creek		1,000
Slab Cabin Run		1,000
Spring Run (A)		1,000
Spring Run (B)		1,000
Stone Creek		1,000
Lewistown Junction, Havice Valley Creek		2,000
Honey Creek		1,800
Jacks Creek		2,400
Laurel Run		2,000
New Lancaster Valley Creek		1,800
Treaster Valley Creek		1,200
Lingonier, Furnace Run		4,500
Grove Run		3,000
Laughlinstown Run		3,000
Maginness Run		3,000
Mill Creek		4,500
Penrod Run		3,000
Rock Run		3,000
Lilly, Bare Rock Creek		1,500
Blairs Creek		3,000
McElhattan, Chathams Run		1,000
Hennessy Run		500
Little Chatham Run		500
Marietta, Evans Run		500
Woods Run		1,000
Marsh Hill Junction, Pine Swamp Run		1,000
Shraders Creek		1,000
Mawr Glen, Rock Run		1,000
Meadville, Bramley Run		800
Gravel Run		800
Mercersburg, Blue Spring Run		1,000
Church Hill Run		1,000
Dickeys Run		1,000
Meyersdale, Eichorn Run		3,000
Meadow Run		4,500
Seckler Run		3,000
Middleport, Big Creek		1,800
Mifflin, Macedonia Creek		1,200
Suloff Creek		1,200
Millers, Pine Run		600
Mill Lane, Crow Creek		1,000
Mont Alto, Birch Run		1,800
Carbaugh Run		1,500
Forge Creek		1,800
Little Antietam Creek		1,800
Raccoon Run		1,200
Moscow, Bell Meadow Brook		300
Spring Brook		1,800
Van Brunts Creek		1,200
Mount Hope, Little Chickies Creek		1,000
Mount Union, Drakes Thicket Run		2,000
McClaims Gap Run		2,000
Old Womans Run		3,000
Roberts Run		3,000

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BROOK TROUT—Continued.

Disposition.	Fry and eggs.	Fingerlings, yearlings, and adults.
Pennsylvania—Contd.		
Mount Union, Scrub Gap Run		3,000
Singers Gap Run		3,000
Munster, Connory Run		3,000
Little Hemlock Creek		1,500
Narvon, Hammer Town Run		1,000
New Centerville, Trout Creek		1,000
Valley Creek, North Branch		1,000
New Ringgold, Hiehl Run		600
Nisbet, Benders Run		1,000
Big Run		1,000
Oil City, Horse Creek		800
Pithole Creek		1,200
Orrtanna, Back Run		150
Big Marsh Creek		150
Little Marsh Creek		150
Osceola Mills, Bear Run		2,000
Mountain Branch		3,000
Trout Run		3,000
Paddy Mountain, Panther Run		2,000
Poe Run		2,000
Swift Run		2,000
Paoli Road, Valley Creek, North Branch		1,000
Valley Creek, South Branch		1,000
Patton, Bender Run		1,500
Chest Creek		3,000
Dutch Run		1,500
Killbuck Creek		3,000
Mud Lick Creek		3,000
Risban Run		1,500
Rock Run		1,500
Rogue Harbor Run		1,500
Slate Lick Creek		3,000
Wire Rock Run		3,000
Philipsburg, Alder Run		650
Barkers Run		650
Bark Shed Run		650
Beaver Run		700
Belgers Run		650
Butler Run		650
Coal Spring Run		650
Corbin Run		650
Curry Run		650
Dayton Run		650
Deep Rock Run		650
Echo Run		700
Four Mile Run		650
Hess Run		700
Hutton Run		650
Laurel Run		650
Loop Run		650
McCords Run		650
Nasons Run		650
North Run		650
One Mile Run		650
Potter Run		650
Sensors Run		650
Seven Springs Run		650
Shields Run		650
Splash Run		650
Tomahawk Run		650
Trout Run		650
Twigs Run		650
Turtle Spring Run		650
Vails Run		650
Pennsylvania—Contd.		
Philipsburg, Winburn Run		650
Wolf Run		650
Picture Rocks, Frys Run		1,000
Laurel Run		1,000
Muncy Creek		1,500
Roaring Run		1,000
Pine Grove Furnace, Mountain Creek		1,500
Plane Brook, Trout Creek		1,000
Pocono Lake, Tobyhanna Creek		4,200
Portage, Bobs Creek		3,000
Laurel Creek		1,600
McDunns Creek		1,600
Port Allegany, Coleman Run		1,000
Comes Creek		1,000
Skinner Creek, Coalbed Branch		1,000
Skinner Creek, Left Hand Branch		1,000
Port Matilda, Bear Run		1,000
Bushy Run		1,000
California Run		1,000
Coal Run		1,000
Five Mile Run		1,000
Flat Rock Run		1,000
Laurel Run		1,000
Pine Run		1,000
Shiror Run		1,000
Spring Run		1,000
Spruce Run		1,000
Stony Creek		1,000
Tumbling Run		1,000
Woodring Hollow Run		1,000
Pottsville, Potts Creek		300
Shoeners Run		150
Ralston, Acid Branch		500
Hound Run		500
Miners Sleepy Run		500
Moyers Run		500
Yellow Run		500
Yellow Dog Run		500
Reading, Brindley Run		3,000
Brunnerkill Creek		1,000
Cold Run		3,600
Hopewell Creek		1,000
Little Linden Creek		500
Moselm Creek		300
North Heidelburg Creek		1,000
Peters Creek		500
Plum Creek		300
Six Penny Creek		1,000
Willow Creek		300
Reedsville, Hanie Valley Run		1,600
Honey Creek		300
Kishacoquillas Creek		300
Lingle Run		300
Stone Creek		3,000
Tea Creek		600
Treaster Valley Run		1,600
Ridgway, Bear Creek		2,000
Belmuth Run		1,000
Big Mill Creek		2,000
Ellithorpe Run		1,000
Highland Pond		2,000
Island Run		1,000
Laurel Run		1,000

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BROOK TROUT—Continued.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
Pennsylvania—Contd.		
Ridgway, Mohan Run		1,000
Standing Stone Run		500
Roaring Springs, Cowens Creek		1,300
Lowers Creek		1,400
Maple Run		1,300
Meadow Branch		1,300
Potter Creek		1,300
Roaring Spring Creek		1,300
Snyder Creek		1,300
Three Spring Run		1,300
Rohrerstown, Shenks Run		1,000
Rossiter, Sisseny Run		2,400
Royersford, Birch Run		2,000
Pierson Run		1,000
Rock Run		1,000
Savan, Campbell Run		800
Scranton, Stafford Meadow Brook		1,800
Shrewsbury, Codorus Creek, Branch of		1,500
Deer Creek		1,500
Slate Run, Baldwin Run		1,200
County Line Creek		1,200
Francis Branch		1,200
Lebo Creek		1,200
Little Slate Run		5,200
Slate Run		1,200
Slate Run, Manor Fork		600
Somerset, Ankney Run		3,000
Blue Hole Run		3,000
Brugh Run		3,000
Clear Run		3,000
Fishing Run		3,000
Jones Mill Run		3,000
Kooser Run		1,500
Lohr Run		3,000
Miller Run		3,000
Quemahoning Creek, North Fork		3,000
Shaffer Run		3,000
Trout Run		1,500
Stewartstown, Andersons Run		600
Daniel Leibs Run		900
Gemmills Run		600
Liggit Run		900
Tamaqua, Kramers Run		150
Tionesta, Bates Run		250
Bear Creek		250
Big Coon Creek		250
Council Run		250
Dawson Run		250
Fork Run		250
Jakes Run		250
Jamison Run		250
Johns Run		250
Jug Handle Run		250
Korb Run		250
Lamentation Run		250
Little Coon Creek		250
Little Tionesta Creek		250
Lower Piney Run		250
Peters Run		250
Pigeon Run		250
Prather Run		250
Recks Run		250
Ross Run		300
Sibble Run		250
Tubbs Run		500
Upper Piney Run		250
Vockroth Run		250
West Hickory Creek		250
Pennsylvania—Contd.		
Tobyhanna, Tobyhanna Creek		2,400
Unionville, Halls Run		1,000
Rock Run		1,000
Wallace Run		2,000
Waterville, Bark Cabin Run		600
Buckeye Run		600
Dam Run		1,000
English Run		1,600
Hackett Fork Creek		600
Love Run		600
Otter Run		1,000
School House Run		1,000
Watsontown, Lick Run		1,600
Sand Spring Run		1,600
White Deer Creek and tributaries		2,100
Waymart, Lackawaxen Creek		3,000
Waynesboro, Antietam Creek, East Branch		450
Baileys Lake		150
Gap Run		1,000
Hoovers Run		1,000
Shockey's pond		150
Swift Run		1,500
Vineyard Run		1,000
Westcolang, Westcolang Creek	4,000	
West Hickory, Beaver Creek		250
Camp Run		250
Coalbed Branch		250
Coon Creek		250
Hall Mill Branch		250
Jacks Run		250
Jaybuck Run		250
Klondyke Run		250
Lick Run		250
Little Otter Run		250
Middle Creek		250
Minister Creek		250
Otter Creek		250
Prather Run		250
Queen Creek		250
Rocky Branch		250
Rynd Mill Branch		250
West Nanticoke, Blyth Bum Creek		600
Little Wapwallopen Creek		1,200
Peggy Hunter Creek		600
Philips Creek		600
Shingle Run		1,200
Spayds Creek		600
Wharton, Birch Run		1,000
Wilcox, Eunice Pond		750
Maxine Pond		750
Oil Creek		750
Ray Pond		750
Williamsport, Calehoff Creek		2,100
Laurel Run		1,400
Plunkett Creek		1,400
Shingle Run		700
Snake Creek		1,400
Sugar Camp Creek		1,400
Windber, Beaver Dam Run, Upper		1,800
Berkebile Run		1,800
Big Paint Creek		1,800
Biscuit Spring Run		1,800
Breastworks Creek		1,800
Clear Shade Creek		1,800
Cub Run		2,600

[a] Eggs are indicated by an asterisk, thus (*): all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BROOK TROUT—Continued.

Disposition.	Fry and eggs.	Fingerlings, yearlings, and adults.
Pennsylvania—Contd.		
Windber, Dark Shade Run		900
Glass Run		1,800
Layton Run		800
Mangus Run		800
Moores Run		800
Piney Run		3,400
Roaring Fork Run		1,600
Seeser Run		800
South Fork Creek		1,800
Turkey Run		800
Wentz Run		800
Whitaker Run		800
Youngdale, Johnson Run		1,000
McElhattan Run		1,000
Simox Run		1,000
York, Deer Creek		1,200
Kundard Valley Creek		1,200
Trout Run		1,200
Rhode Island:		
Centerville, Kickemuit Run		200
Woonsocket, Reservoir Run		100
South Carolina: Pickens, Big Laurel Creek		3,600
South Dakota:		
Aladdin, Hay Creek, Middle Fork		20,000
Buffalo Gap, Beaver Creek		15,000
Custer, French Creek		16,000
Deadwood, West Two-bit Creek		200
Elmore, Spearfish Creek		20,375
State fish commission		50,000
Wildcat Creek		375
Galena, Bear Butte Creek		25,000
Trout Creek		8,000
Hanna, Spearfish Creek, East Fork		10,000
Harney Canyon, Spring Creek		20,000
Hill City, Bob Cat Creek		5,000
Chinaman Gulch Creek		6,000
Harney Peak Creek		5,000
Marshall Creek		6,000
Palmer Gulch Creek		8,000
Palmer Gulch Creek, Nelson Fork		5,000
Paterson Creek		5,000
Reno Gulch Creek		8,000
Spring Creek and tributaries		40,000
Keystone, Battle Creek		250
McLaughlin, Oak Creek		20,000
Martin, Stanley Creek		6,000
Maurice, Spearfish Creek		1,500
Squaw Creek		8,000
Mystic, Antler Lake		8,000
Castle Creek		800
Deer Creek		10,000
Lime Kiln Creek		15,000
Little Rapid Creek		15,000
Nugget Creek		10,000
Slate Creek		15,000
Nemo, Bear Butte Creek		2,000
Box Elder Creek		2,400
Jim Creek		400
Smith Creek		400

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
South Dakota—Contd.		
Nemo, South Box Elder Creek		800
Oreville, Bear Gulch Creek		6,000
Spring Creek		20,000
White Horse Gulch Creek		6,000
Pringle, Carroll Creek		10,000
Rapid City, Indian School Lake		10,000
Schamber Creek		5,000
Sickler Pond		5,000
Rochford, Peterson Pond		5,000
Rapid Creek		800
Rapid Creek, North Fork		800
Riley Pond		4,000
Spearfish, Driskill Ponds		2,000
Falsebottom Creek		15,000
Spring Creek		200
Victoria, Spearfish Creek		25,000
Webster, Big Spring Creek		200
Chickapaw Creek		200
Tennessee:		
Elkmont, Jakes Creek		4,000
Erwin, Foster Mill Creek		5,250
Morristown, Taylor Creek		7,200
Rogersville, Berry's pond		1,000
Utah:		
Charleston, Willow Farm Lake		500
Ogden, Canyon Creek		3,500
Salt Lake City, Ogden River		8,050
Springville, Provo River		6,000
State fish commission	* 100,000	
Vermont:		
Arlington, Battenkill River		500
Cold Brook		125
Dyer Brook		125
Green River		250
Hopper Brook		125
Lye Brook		250
Mill Brook		125
Reid Brook		125
South Fork Brook		125
Ted Hollow Brook		125
Warm Brook		250
Barnet, Aiken Brook	3,000	
East Peacham Brook	5,000	
Harvey Brook	3,000	
Roy Brook	3,000	
Sucker Brook	4,000	
Barre, Brookfield Branch	8,000	
Emerson Brook	4,000	
Esthemus Brook	8,000	
Jail Brook	3,000	
Labrador Brook	6,000	
Spicer Brook	4,000	
Bennington, Basin Brook		125
Bickford Hollow Brook		250
Big Hell Hollow Brook		250
Big Pond		150
Bourne Brook		250

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BROOK TROUT—Continued.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
Vermont—Continued.		
Bennington, Bowles Brook		125
Dewey Brook		125
Dunville Brook		250
Furnace Brook		125
Marshall Brook		125
Mill Brook		125
Perry Thompson Brook		125
Rake Branch		125
Redfield Brook		125
Reservoir Brook		125
Roaring Branch		125
Rockwood Branch		125
South Brook		125
Still Brook		125
Walloomsac River		125
Waters Brook		125
Woodford City Brook		125
Yaw Pond Brook		125
Brattleboro, Mill Brook		200
Bristol, Baldwin Brook	5,000	
Durfee Brook	2,000	
Dyke Brook	3,000	
Hewitt Brook	2,000	
Norton Brook	2,000	
Paine Brook	2,000	
Concord, Pond Brook	5,000	
Cuttingsville, Brown Brook	2,000	
Depot Brook	3,000	
Plumley Brook	5,000	
Smith Brook	3,000	
Danville, Brown Brook	3,000	
Crane Brook	2,000	
Haviland Brook	2,000	
Heath Brook	2,000	
Langmaid Brook	2,000	
Mineral Spring Brook	2,000	
Palmer Brook	2,000	
Poole Brook	2,000	
Spaulding Brook	5,000	
Stone Brook	2,000	
Sucker Brook	2,000	
Thompson Brook	2,000	
Tice Brook	2,000	
Wells Brook	2,000	
Whyman Brook	5,000	
Williams Brook	2,000	
Derby Line, Tomofobia River		400
East Berkshire Nelson Pond	2,000	
East Dorset, Battenkill River		250
East Putney, Slab Hollow Brook		10,000
Edgewater, Bill Young Brook		3,000
Gosland Brook		2,000
Kelley Brook		2,000
Niggerhead Ledge Brook		2,000
Nigger Head Pond Brook		3,000
Niggerhead Pond		300
Ely, Ompompanoosac Creek		2,000
Enosburg Falls, Cold Hollow Brook	5,000	
Ladd Trout Brook	3,000	
Mineral Spring Brook	3,000	
Pat Brady Brook	3,000	
Tyler Creek, Bakersfield Branch	6,000	
Vermont—Continued.		
Greensboro, Caspian Lake	3,000	
Lamoille River	20,000	
Long Pond	3,000	
Stannard Brook	3,000	
Taylor Brook	3,000	
Greensboro Bend, East Greensboro Brook	3,000	
Groton, Darling Pond	63,000	3,000
Hardwick, Abutment Brook		2,000
Alder Brook	3,000	
Ayer Brook	2,000	
Bailey Brook		4,000
Bell Brook	2,000	
Buffalo Road Brook	2,000	
Bunker Brook	2,000	
Cate Brook	2,000	
Collier Brook	2,000	
Cooper Brook	2,000	
Currier Brook		2,000
Eaton Brook	2,000	
Foss Brook	2,000	
High Trestle Brook	2,000	
Laundry Brook	2,000	
Marshall Brook	2,000	
Nichols Pond Brook	2,000	
Norris Brook	2,000	
Paine Brook	4,000	
Porter Brook	3,000	
Smith Brook	2,000	
Tucker Brook	3,000	
Warren Brook	2,000	
Holden, Barnard Brook	10,000	
Bassetts Brook	2,000	
Clarke Brook	3,000	
Clover Vale Brook	5,000	
Coburn Brook	6,000	
Doolan Brook	2,000	
Durkee Brook	5,000	
Elliott Brook	6,000	
Furnace Brook	32,000	
Furnace Brook, South Branch	6,000	
Furnace Brook, West Branch	6,000	
Leonard Brook	5,000	
North Branch	6,000	
Phalen Brook	2,000	
Randall Brook	6,000	
Sand Spring Brook	3,000	
Spofford Brook	3,000	
Valley View Brook	5,000	
Hyde Park, Boardman Brook	10,000	
Hyde Pond	4,000	
Inwood, Newman Brook	3,000	
Randall Brook	3,000	
Sutton Brook	3,000	
Warden Brook	3,000	
Island Pond, Carroll Brook	4,000	
Castonguay Brook	4,000	
Cold Spring Brook	3,000	
Dallof Brook	6,000	
Fraser Brook	4,000	
Langer Brook	6,000	
Mill Brook	5,000	
Nulhegan River	15,000	
Ossogochi Creek	5,000	
Pherrins River	8,000	
Pine Brook	4,000	
Rosebrooks Brook	3,000	
Stott Brook	5,000	

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BROOK TROUT—Continued.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
Vermont—Continued.		
Lanesboro, Osmoore Pond	10,000	
Peacham Pond	10,000	
Ludlow, Branch Brook	2,000	
Mayo Brook	4,000	
Lyndon, Hawkins Brook	5,000	
Line Brook	2,000	
Notch Brook	2,000	
Sheldon Brook	2,000	
Sky Farm Brook	2,000	
Lyndonville, Dish Mill Brook	4,000	
Flowers Brook	3,000	
Keach Brook	2,000	
Willow Pond		600
Manchester, Battenkill River		250
Battenkill River, West Branch		8,000
Bourne Brook		250
Cold Spring Brook	2,000	
Dorset Brook		6,000
Gray Brook	3,000	
Jinks Brook	6,000	
Lucas Brook	3,000	
Matture River	15,000	
Norman Brook	2,000	
Prentis Brook	4,000	
Rogers Brook	4,000	
West Branch Brook		250
Marshfield, Beaver Pond	10,000	
Doctortown Brook	6,000	
Mark Mears Brook	4,000	
Niggerhead Brook	6,000	
Niggerhead Pond	3,000	
Middlesex, Long Brook		5,000
Riley & Benton Brook		2,000
Morrisville, Bedell Brook	3,000	
Boardman Brook	3,000	
Bugbee Brook	2,000	
Campbell Brook	5,000	
Clement Smith Brook	3,000	
Coppermine Brook	4,000	
Darling Brook	3,000	
Elmore Brook	3,000	
Fletcher Brook	6,000	
Green River Brook	10,000	
Hatch Brook	2,000	
Hazen Brook	3,000	
McFall Brook	8,000	
Potash Brook	2,000	
Rider Brook	4,000	
Shippy Brook	2,000	
Small Brook	4,000	
Upper Terrell Brook	12,000	
Newport, Miller Brook	3,000	
North Duxbury, Ridley Brook		4,000
North Ferrisburg, Meader Brook	2,000	
Norton Mills, Forest Brook	4,000	
Forest View Brook	2,000	
Lewis Lake	15,000	
Little Averill Brook	2,000	
Little Averill Lake	15,000	450
Morrill Brook	5,000	
Norton Lake	20,000	
Nulhegan Brook	15,000	
Norwich, Lake Mitchell		2,600
Vermont—Continued.		
Orleans, Dewey Brook	3,000	
Dunham Brook	4,000	
Dutton Brook	3,000	
Gallup Brook	5,000	
Long Pond	12,000	
Willoughby River	10,000	
Plainfield, Kingsbury Brook	3,000	3,000
Pigeon Pond	10,000	
Randolph, Adams Brook	3,000	
Annis Brook	3,000	
Ayers Brook		300
Bass Brook	2,000	
Bear Hill Brook		3,000
Beedle's pond		2,000
Blanchard Brook	2,000	
Bowman Brook	3,000	
Chandler Brook	3,000	
Clough Brook	3,000	
Fishers Brook	2,000	
Guild Brook	2,000	
Gulf Brook	3,000	
Howard Hill Brook	3,000	
Lake Mafeba		150
Lower Ayers Brook	5,000	
Mann Brook		2,000
Meadow Brook	3,000	
Morse Brook	2,000	
Mud Pond	10,000	
Ocha Brook	3,000	
Poverty Lane Brook		3,000
Riford Brook	4,000	
Roods Brook		2,000
Roxbury Brook	3,000	
Soper Brook		2,000
Spears Brook	3,000	
Upper Ayers Brook		2,000
Readsboro, Deerfield River, West Branch	10,000	
Estey Brook	4,000	
Howe Brook	3,000	
Lamb Brook	3,000	
Mullett Brook	4,000	
Searsbury Brook	3,000	
South Branch	9,850	
Yaw Pond Brook	4,000	
Richmond, Fay Conner Brook		2,000
Rutland, Billings Brook		200
Blanchard Brook		100
Brown Brook	2,000	
Cold River	4,000	
East Creek		300
Eddy Brook	3,000	
Fenton Brook	5,000	
Hewett Brook		200
Killington Brook	4,000	
Kiln Brook	5,000	
Little Brook		100
Lord & Lincoln Brook	5,000	
McDevitts Brook	2,000	
Osgood Brook		200
Parker Brook	2,000	
Picnic Brook		100
Pike Brook	3,000	
Schoolhouse Brook	2,000	
Shelden Brook	5,000	
Wheeler Brook	3,000	
St. Johnsbury, Adams Brook	2,000	
Albesir Brook	2,000	
Bacon Brook	2,000	
Bennett Brook	2,000	

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BROOK TROUT—Continued.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
Vermont—Continued.		
St. Johnsbury, Blodgett Brook (A)	2,000	
Blodgett Brook (B)	2,000	
Bonett Brook	2,000	
Bundy Brook	2,000	
Carpenter East Brook	2,000	
Carpenter West Brook	2,000	
Cary Brook	2,000	
Chesterfield Brook	3,000	
Clifford Brook	4,000	
Cold Brook	2,000	
Curtis Brook		200
East Branch Brook	2,000	
Fairbanks Brook	2,000	
Gage Brook	2,000	
Hemingway Brook	2,000	
Harris Brook	2,000	
Hastings Brook	3,000	
Hawkins Brook	5,000	
Houghton Brook	4,000	
Joyce Brook	2,000	
Lawrence Brook	2,000	
Lime Brook	2,000	
Lurchin Brook	2,000	
Lyster Brook	2,000	
Meecham Brook	2,000	
Miles Brook	2,000	
Morrill Brook	4,000	
Niles Brook	2,000	
North Brook	2,000	
North Church Brook	2,000	
Oram Stevens Brook	2,000	
Palmer Brook	2,000	
Paquin Brook	2,000	
Pierce Brook	2,000	
Pope Brook	6,000	
Pumpkin Hill Brook	4,000	
Rickaby Brook	2,000	
Roberts Brook	2,000	
Shattuck Brook	2,000	
Shaw Brook	2,000	
Sleepers River	26,000	
Spaulding Brook	2,000	
Stanton Brook	2,000	
Tafts Brook	3,000	
Walter Andric Brook	4,000	
Wards Brook	2,000	
Watermans Brook	2,000	
Wells Brook	2,000	
West Brook	2,000	
Willow Pond	10,000	
Wright Brook	2,000	
Shaftsbury, Lake Shaftsbury		300
Sharon, Lake Mitchell	50,000	1,000
South Royalton, Alco Pond	8,000	
South Ryegate, Bailey Pond	2,000	
Long Pond	34,400	
Scott Brook	11,000	
Springfield, Commissary Brook		3,000
Garretts Brook		5,000
Joe Boss Brook		3,000
Scirable Brook		3,000
West Springfield Brook		3,000
Sutton, Bailey Brook	3,000	
Bundy Brook	2,000	
Butterfield Brook	3,000	
Sanborn Brook	3,000	
Willard Brook	2,000	
Swanton, Dian Brook		256
Vermont—Continued.		
Taftsville, Babcock Brook	6,000	
Beaver Brook	6,000	
Walden, Roger's pond	8,000	
Wardsboro, Little Whetstone Brook		500
Wait Brook		500
Waterbury, Blushhill Brook		2,000
Gosnett Hill Brook		2,500
Guild Brook		2,500
Henry Hill Brook		2,000
Ricker Mountain Brook		2,500
Wells River, Club Ponds	20,000	
West Burke, Burnham Brook	2,000	
Clark Brook	6,000	
Eaden Brook	6,000	
Mud Pond	6,000	
Reed Brook	2,000	
Twombly Brook	2,000	
West Hartford, Little Brook		300
Rockland Brook	2,000	
Sherburne Warren Brook	2,000	
West Paulett, Indian River	20,000	
Wilmington, Beaver Brook	5,000	
Cold Brook	5,000	
Graves Brook	4,000	
Windsor, Mill Brook		15,000
Wolcott, East Elmore Branch	8,000	
Pond Brook		200
Woodstock, Bridgewater Hollow Brook		200
Burligan Brook		100
Curtis Brook		200
Earl Brook		100
Five Corners Brook	8,000	
Gulf Brook	10,000	
Happy Valley Brook	4,000	
Marsh Brook		100
North Branch	10,000	
Ottaquechee River	6,000	
White Brook		100
Wyman's pond		200
Virginia:		
Abingdon, Herald Creek		100
Bedford, Stony Creek		3,000
Big Island, Hunting Creek		5,500
Harrisonburg, North River, North Fork		5,000
Hot Springs, Muddy Run		3,000
Hunters, Snake Den Creek	14,000	
Mechum River, Moorman River		1,000
Monterey, Potomac River, South Branch		2,500
New Market, Pitt Spring Creek		1,600
Potts Valley, Big Stoney Creek		3,000
Rockfish, Stony Creek		3,500
Woodstock, Little Stoney Creek		2,400
Sand Spring Creek		1,600

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BROOK TROUT—Continued.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
Washington:		
Albion, Bryan's pond		500
Coppock's pond		500
Rice's pond		500
Everett, Lake Stevens		3,000
State fish commission	*50,000	
Four Lakes, Beaver Lake		3,000
Patshuk Lake		1,000
Round Lake		2,000
Salmon House Lake		1,000
Swan Lake		2,000
Tohomish Lake		3,000
Waucoma		2,000
Pomeroy, Tucannon River		2,750
Snoqualmie (applicant)	*50,000	
Tacoma, Ipsut Creek		6,000
Vancouver, Cedar Creek		3,000
Little Washougal River	*50,000	
Washougal River, North Fork		544
West Virginia:		
Albright, Elsies Run		3,000
Alexander, Buckhannon River, East Fork		4,000
Bismarck, Difficult Run		4,800
Stony River		6,000
Cass, Cheat River, Shaffers Fork		162,000
Hancock, Springvale Run		200
Horton, Big Run		9,000
Gandy Creek		6,000
Grants Run		3,000
Greenbrier River, Headwaters		6,000
Seneca Creek		4,000
Swallow Rock Run		3,000
Keyser, Block House Run		3,000
Marlington, Swago Creek		2,000
Midvale, Cassity Creek		600
Rainelle, Big Clear Creek		4,000
Richwood, Cherry River		4,000
Stony Bottom, Elk Lick Run		1,600
Terra Alta, Snowy Creek, North Fork		4,500
Snowy Creek, South Fork		4,500
Spring Run		1,500
White Sulphur Springs, Howard Creek		8,500
Wisconsin:		
Alma, Johns Valley Creek		1,050
Little Waumandee Creek		1,050
Trout Run		1,050
Waumandee Creek		1,050
Wolf Creek		700
Alma Center, Arno Creek		1,500
Buttke Creek		1,500
Jack Creek		1,500
Judkins Creek		1,500
North Branch Creek		3,000
Sisney Creek		1,500
Wisconsin—Continued.		
Alma Center, Stockwell Creek		3,000
Town Creek		1,500
Trempeleau River		4,500
Trempeleau River, South Branch		1,500
Amberg, Little South Branch		1,200
Antigo, Eau Claire River, East Branch		200
Eau Claire River, West Branch		200
Lily River		100
Arcadia, American Valley Creek		100
Bills Valley Creek		700
Borst Valley Creek		100
Eagle Valley Creek, East Branch		100
Eagle Valley Creek, West Branch		100
French Creek		100
Holcomb Coolie Creek		100
Kreher Creek		100
Meyers Valley Creek		100
Newcomb Valley Creek		100
Pine Creek		100
Wolf Creek		100
Ashland, Cedar Creek		800
Day Creek		800
Hassard Creek		800
North Branch		800
Pine Creek		1,600
Spring Creek		800
Trout Creek		800
Whittlesey Creek		2,400
Athalstane, Little Eagle Creek		900
Athens, Rib River		700
Wood Creek		700
Augusta, Beef River, North Branch		1,950
Bridge Creek		1,950
Diamond Valley Creek		1,300
Hathaway Creek		650
Hay Creek		1,950
Sand Creek		1,300
Whippoorwill Creek		650
Barneveld, Clavahu Run		1,500
Eveland Run		1,500
Harris Brook		1,500
Jalos Branch		1,500
Lanpop Run		1,500
Loyd Creek		3,000
Meadow View Brook		1,500
Moyers Run		1,500
Walnut Hollow Creek		1,500
Williams Creek		1,500
Willow Creek		1,500
Beaver Dam, Shaw Creek		2,000
Bennet, Middle River		2,400
Big Falls, Killin Brook		300
Black River Falls, Allen Creek		600
Babcock Creek		300
Bacon Creek		300
Clear Creek		600
Douglas Creek		300
French Creek		600
Hoffman Creek		600

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BROOK TROUT—Continued.

Disposition.	Fry and eggs.	Fingerlings, yearlings, and adults.
Wisconsin—Continued.		
Black River Falls, Kenyon Creek		600
Kusek Creek		300
Larkin Creek		1,300
Lewis Creek		300
Morrison Creek		300
Perry Creek		600
Pine Creek		600
Ranch Creek		300
Roaring Creek		600
Robinson Creek		600
Sand Creek		300
Slosser Creek		600
Snow Creek		600
Spring Creek		300
Squaw Creek		300
Stenalson Creek		600
Stony Creek		600
Tank Creek		600
Trout Creek		300
Twin Creek		600
Van Hessett Creek		600
Visno Creek		600
Blair, Bear Creek		1,500
Beaver Creek		3,000
Beaver Creek, North Branch		3,000
Beaver Creek, South Branch		1,500
Bergs Creek		1,500
Durham Creek		1,500
Edwins Creek		1,500
Engebretson Creek		1,500
Everson Creek		1,500
Fly Creek		1,500
French Creek		3,000
Halvorson Creek		1,500
Hegle Creek		1,500
Herried Creek		1,500
Joe Creek		1,500
Johnson Creek		1,500
Kittleson Creek		1,500
Lakes Creek		1,500
Little Bear Creek		1,500
Mattison Creek		1,500
Nordhus Creek		1,500
Olson Creek		1,500
Peterson Branch		1,500
Quarney Branch		1,500
Rat Coulie Creek		1,500
Samson Creek		1,500
Sheppard Creek		1,500
Skulley Creek		1,500
Sletto Creek		1,500
Strums Creek		1,500
Teppen Creek		1,500
Trump Creek		1,500
Upper Beaver Creek		3,000
Vossee Creek		1,500
Welch Creek		1,500
Bloomer, Beaver Creek		50
Big Pine Creek		50
Birch Creek		50
Bitney Creek		50
Bobs Creek		50
Conry Creek		50
Crank Creek		50
Crisman Creek		50
Duncan Creek		50
Gravonder Creek		50
Hay Creek		50
Heineman Creek		50
Little Hay Creek		50
McCann Creek		50
Marquet Creek		50
Wisconsin—Continued.		
Bloomer, O'Neil Creek		50
O'Neil Creek, West Fork		50
Otter Creek		50
Pine Creek		50
Popple Creek		50
Sand Creek		50
Stevens Creek		50
Ten Mile Creek		50
Trout Creek		50
Blue Mounds, Aavang Creek		1,500
Austin Creek		1,500
Camp Creek		1,500
Frames Creek		1,500
Garfort Creek		1,500
Kester Creek		1,500
Ryans Creek		1,500
Walnut Hollow Creek		1,500
Brokaw, Silver Creek		2,700
Camp Douglas, Fountain Creek		1,000
Carter, Oconto River, North Branch		200
Colfax, Hay Creek		100
Otter Creek		100
Coloma, Wadee Creek		900
Crandon, Web Creek		600
Deer Park, Willow River, South Fork		700
Dodgeville, Conley Branch		1,500
Davies Creek		1,500
Jones Branch		1,500
Knudson Creek		1,500
Middleberry Branch		1,500
Rock Branch		3,000
Theobold Branch		1,500
Williams Creek		1,500
Willow Creek		1,500
Donaldson, Little Tamarack Creek		900
Pickerel Creek		900
Portage Creek		664
Spring Creek		498
Tamarack Creek		1,200
Dausman, Meadow Spring Creek		1,500
Potters Creek		3,000
Eagle, Jericho Creek		3,000
Scuppernong Creek		3,000
Eau Claire, Aunie Creek		50
Apple Creek		50
Bear Grass Creek		800
Beaver Creek		800
Bessie Creek		50
Black Creek		50
Brick Creek		50
Butternut Creek		50
Charles Creek		50
Clear Creek, North Branch		800
Clear Creek, South Branch		800
Coon Creek, North Branch		800
Cranberry Creek		800
Dale Creek		50
Dushane Creek		800
Elm Creek		50
Evergreen Creek		50
Five Mile Creek		800
Fly Creek		50
Hazelnut Creek		50
Hobart Creek		800

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BROOK TROUT—Continued.

Disposition.	Fry and eggs.	Fingerlings, yearlings, and adults.
Wisconsin—Continued.		
Eau Claire, Lily Creek		50
Little Beaver Creek		800
Little Elk Creek		800
Little Niagara Creek		800
Nine Mile Creek		800
Park Creek		800
Pebble Creek		50
Pipe Creek		50
Rest Creek		50
Rocky Creek		800
Sandie Creek		50
Seven Mile Creek		800
Sherman Creek		800
South West Creek		50
Taylor Creek		800
Twig Creek		50
Wallace Creek		800
Walnut Creek		50
Wheaton Creek		800
Willow Creek		50
Wolf Creek		50
Eleva, Adams Creek		650
Big Creek		1,300
Bollinger Creek		650
Little Creek		650
Rock Creek		650
Rosman Creek		1,300
Tollefson Creek		650
Trout Creek		1,300
Elkhart Lake, Mullet River		100
Elk Mound, Chesapeake Creek		100
Elk Creek		1,050
Paulson Creek		100
Peterson Creek		100
Elmwood, Cady Creek		1,050
Decker Creek		350
Gilbert Creek		1,050
Little Missouri River		1,050
Night Creek		1,050
Plum Creek		1,050
Porter Creek		700
Elroy, Seymore Creek		1,000
Fountain City, Bohris Valley Creek		1,050
Eagle Valley Creek		1,050
Pipers Valley Creek		1,050
Schaups Valley Creek		1,050
Galesville, Bear Creek		1,000
Beaver Creek, Branches of		2,000
Corrigans Creek		1,000
Dutch Creek		1,000
French Creek		2,000
Grants Creek		1,000
Hardies Creek		1,000
Tamarack Creek		2,000
Gays Mills, Bacon Creek		3,000
Glen Flora, Bear Creek		700
Deer Tail Creek		700
Josie Creek		700
Main Creek		700
Skinner Creek		700
Grand Marsh, White Creek		2,000
Grand Rapids, Chester Creek		100
Seven Mile Creek		3,100
Spring Branch		100
Two Mile Creek		100
Wakley Creek		100
Green Bay, Bairds Creek		100
Beaver Dam Creek		498
Wisconsin—Continued.		
Hawkins, Burgess Creek		1,600
Main Creek		2,400
Pine Creek		1,600
Stony Brook		800
Hillsboro, Baptist Creek		500
Cedar Creek		500
Happy Hollow Creek		500
Little Brook		500
Oldfelts Creek		4,000
Trout Run		500
Warner Creek		500
Hixton, Beaver Creek		1,500
Curran Creek		700
Ellingson Creek		1,500
Hagen Creek		1,500
Hoffman Creek		1,500
Holmes Creek		700
Judkin Creek		350
Larson Creek		350
Lowe Creek		700
Olson Creek		1,500
Pigeon Creek		1,500
Pine Creek		700
Sly Creek		700
Steinseth Creek		1,500
Tank Creek		700
Thompson Branch		350
Trempealeau River, North Branch		1,050
Trempealeau River, South Branch		1,050
Iron Belt, Potatoe River, North Branch		3,200
Kendall, Brainard Creek		1,000
Davis Creek		2,000
Foxes Creek		2,000
Wildse Creek		1,000
Kewaunee, Kewaunee River		200
Spring Creek		200
Kilbourn, Corming Creek		1,500
Gilmore Creek		1,500
Gulch Creek		1,500
Hulbert Creek		1,500
Plainville Creek		1,500
La Crosse, Big Creek		8,000
Burns Creek		3,000
Chipmunk Coulee Creek		9,000
Coon Creek		1,500
Rose Creek		1,000
Sand Creek		500
Sand Lake Coulee Creek		500
Seiler's pond		300
McCord, Omloff Creek		160
Sanderson Creek		900
Manitowoc, Fisher Creek		332
Kriwanek Creek		332
Point River		332
Marathon, Kennedy Creek		100
Mattoon, Red River, West Branch		600
Mellen, Browns Creek		1,600
Cleveland Creek		800
Delene Creek		2,400
Earl Creek		1,600
Fox Creek		800
Happy Creek		1,600
Kings Creek		800
Little Beaver Creek		1,600

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BROOK TROUT—Continued.

Disposition.	Fry and eggs.	Fingerlings, yearlings, and adults.
Wisconsin—Continued.		
Mellen, Mellen Creek		1,600
Mirror Creek		1,600
Silver Creek		1,600
Willow Creek		1,600
Menomonie, Adams Creek		1,592
Anderson Creek		1,500
Annis Creek		1,592
Asylum Creek		1,500
Beaver Creek		93
Big Beaver Creek		1,500
Big Elk Creek		3,000
Big Hay Creek		1,500
Big Meadow Creek		1,500
Big Missouri Creek		1,500
Big Otter Creek		1,500
Biss Creek		1,500
Blair Creek		1,500
Boland Creek		1,593
Bubbling Spring Creek		1,590
Cady Creek		1,500
Clack Creek		1,500
Connors Creek		1,500
Coon Creek		1,500
Cranberry Creek		1,500
Crosby Creek		1,590
Dahl Creek		1,500
Drowley Creek		1,500
Dushane Creek		1,502
EauGalle River		4,500
Eddy Creek		1,500
Eighteen-Mile Creek		1,502
Elk Creek		93
Enems Creek		1,500
Galloway Creek		1,500
Gilbert Creek		3,093
Hall Creek		1,500
Hay Creek		1,592
Hay River, North Fork		3,000
Hay River, South Fork		3,000
Hobbs Creek		1,092
Honey Creek		1,000
Iron Creek		1,000
Irving Creek		1,093
Jesse Creek		1,092
Johns Creek		1,000
Johnson Creek		1,093
Kings Creek		1,093
Knights Creek		1,093
Lindsay Creek		1,000
Little Beaver Creek		1,000
Little Elk Creek		1,000
Little Missouri Creek		1,000
Little Otter Creek		1,000
Little Sand Creek		1,000
Losby Creek		1,000
Louis Creek		1,000
Lower Pine Creek		2,000
Lynch Creek		1,000
McArthy Creek		1,093
Maves Creek		1,000
Miller Creek		1,000
Mud Creek		1,000
Otter Creek		93
Owen Creek		1,000
Palmer Creek		1,000
Parker Creek		1,000
Popple Creek		1,000
Proper Creek		1,092
Quarders Creek		1,500
Quelling Creek		1,592
Wisconsin—Continued.		
Menomonie, Rock Creek		1,500
Rush Creek		1,593
Sand Creek		1,593
Shafer Creek		1,593
Simondsons Creek		1,593
Smith Creek		1,500
Spring Creek		1,500
Stoner Creek		1,500
Styers Creek		1,500
Thums Creek		1,593
Tiffany Creek		1,500
Torgerson Creek		1,500
Trout Creek		1,500
Upper Pine Creek		1,500
Valley View Creek		1,593
Vance Creek		1,500
Varney Creek		1,592
Washburn Creek		1,500
Wilson Creek		4,592
Wilson Creek, North Branch		1,500
Wolfs Creek		1,500
Merrillan, Gearing Creek		4,500
Halls Creek		900
Van Herset Creek		600
Millston, Covey Creek		650
Matchett Creek		1,300
Mattison Creek		650
Mile Creek		300
Pigeon Creek		1,300
Polly Creek		300
Pongratz Creek		650
Robinson Creek		1,300
Robinson Creek, South Fork		650
Silver Creek		650
Stony Creek		650
Trout Creek		650
Mondovi, Bennett Valley Creek		1,500
Cooks Creek		1,500
Davis Creek		3,000
Elk Creek		4,500
Farrs Creek		1,500
Gilman Valley Creek		3,000
Hadley Creek		1,500
Pratt Creek		3,000
Rast Creek		1,500
Spildies Creek		1,500
Turner Valley Creek		1,500
Ulbergs Creek		1,500
Neenah, Klinkes Spring Creek		100
Sorensons Creek		100
New Lisbon, Hoton Creek		2,000
Macomber Creek		1,200
White Creek		1,200
Norwalk, Coals Valley Creek		1,000
Otis, Beade Creek		650
McCloud Creek		1,950
Ox Bone Creek, Upper		1,950
Prairie River		3,250
Silver Creek		1,300
Smith Creek		1,950
Park Falls, Aucker Creek		800
Beaver Creek		800
Butternut Creek		800
Cooledge Creek		800
Deer Creek		800
Dyerimple Creek		800

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BROOK TROUT—Continued.

Disposition.	Fry and eggs.	Fingerlings, yearlings, and adults.
Wisconsin—Continued.		
Park Falls, Flood Creek		800
Gibson Creek		800
Hamilton Creek		800
Hartle Creek		800
Hilgart Creek		800
Little Betsey Creek		800
Mensie Creek		800
Meyers Creek		800
Miller Creek		800
Muncy Creek		800
Neuman Creek		800
Nine Mile Creek		800
Passner Creek		800
Patterson Creek		800
Pinkerton Creek		800
Rabbit Creek		800
Saylor Creek		800
Shaw Creek		800
Six Mile Creek		800
Smith Creek		800
Spring Creek		800
Spring Steel Creek		800
Steinaucher Creek		800
Swamp Creek		800
Parrish, Prairie River		300
Pembine, Pemberry Creek		1,800
Pemene Bou Wou		1,200
Pemence Creek		1,000
Phelps, Hay Meadow Creek		900
Muskrat		900
Twin Creek		100
Plymouth, Onion River, West Branch		300
Pound, Bowers Creek		100
Rhinelander, Bearskin Creek		1,300
Eight Mile Creek		100
Four Mile Creek		100
Goodegast Creek		100
Indian Creek		100
Jenny Weber Creek		100
Lake Creek		100
Rice Lake, Angles Creek		800
Beaurie Creek		1,600
Cobb Creek		1,600
Cranberry Creek		1,600
Deitz Creek		800
Devils Creek		2,400
French Creek		800
Hay Creek		1,600
Hemlock Creek		1,600
Kenyon Creek		1,600
Kettle Creek		800
Lawler Creek		1,600
Little Bear Creek		1,600
Little Tuscobia Creek		800
Long Lake Creek		1,600
Lost Creek		800
Meadow Creek		800
Moon Creek		800
Mud Creek		800
Overby Creek		1,600
Pekegamo Creek		1,600
Pine Creek		1,600
Rice Creek		800
Rock Creek		1,600
Savage Creek		1,600
Silver Creek		1,600
Spoon Creek		800
Spring Creek		1,600
Spur Nine Creek		1,600
Sucker Creek		800

Disposition.	Fry and eggs.	Fingerlings, yearlings, and adults.
Wisconsin—Continued.		
Rice Lake, Sugar Creek		800
Thirty-three Creek		1,600
Tuscobia Creek		800
Richland Center, Ash Creek, East Branch		3,000
Ash Creek, West Branch		1,500
Bear Creek, Phelan Branch		3,000
Center Creek		1,500
Ewers Creek		1,500
Fancy Creek		3,000
Fox Creek		1,500
Grinsel Creek		1,500
Hawkins Creek		1,500
Hoosier Creek		1,500
Little Bear Creek		3,000
Little Willow Creek		1,500
Longs Branch		1,500
Mothers Creek		1,500
Pine River, East Branch		3,000
Pine River, West Branch		3,000
Rocky Branch		1,300
School Section Hollow Creek		1,500
Soules Creek		1,500
Tormey Creek		1,500
Will Creek, Branch of		1,500
Willow Creek, Jagwish Hollow Branch		1,500
Sauk City, Blums Creek		3,000
Dunlap Creek		3,000
Otter Creek		3,000
Sheboygan, Milwaukee River, North Branch		498
Onion River		498
Oosten Creek		166
Spring Farm Creek		166
Town Scott Creek		498
Trasey Spring Creek		166
Sheboygan Falls, Milwaukee River, North Branch		2,000
Mullett Creek		200
Rhine Creek		600
Solon Springs, Brule River		800
Spring Bank Creek		800
Sparta, Ash Creek		1,500
Beaver Creek		500
Big Creek		1,000
Big Big Creek		900
Bruders Creek		600
Bush Prairie Creek		600
Camp Creek		300
Cannon Valley Creek		600
Clear Creek		500
Coles Valley Creek		600
Fish Creek		600
Flora Doll Creek		300
Hughes Creek		600
Jewell Creek		600
Leverich Creek		300
Little Beaver Creek		600
Little Big Creek		1,100
Little Flora Creek		600
Little La Crosse River		900
Little Silver Creek		500
Lyon Valley Creek		600
Moseley Brook		300
Pauls Creek		300
Pleasant Valley Creek		600

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BROOK TROUT—Continued.

Disposition.	Fry and eggs.	Fingerlings, yearlings, and adults.
Wisconsin—Continued.		
Sparta, Prescott Creek		500
Prince Creek		600
Purdy Valley Creek		600
Reeder Creek		300
Rings Creek		300
Rogers Creek		600
Sand Creek		600
Shalk Creek		300
Snow Creek		300
Spencer Creek		600
Squaw Creek		1,500
Stillwell Creek		600
Strous Creek		300
Swamp Creek		500
Tarr Creek		3,000
West Beaver Creek		600
Winterfield Creek		300
Winters Brook		600
Taylor, Curran Cooley Creek		1,500
Erickson Creek		1,500
French Creek		1,500
Helle Creek		1,500
Holmes Creek		1,500
Litson Creek		1,500
Lowe Creek		1,500
Nichols Creek		1,500
Pile Cooley Creek		3,000
Pine Creek		3,000
Sharp Creek		3,000
Skutley Creek		1,500
Spaulding Creek		1,500
Strouds Creek		3,000
Vossa Cooley Creek		1,500
Tomah, Allen Creek		500
Bear Creek		1,400
Blair Creek		900
Brandy Creek		1,000
Clear Creek		500
Clifton Creek		600
Coles Creek		1,400
Council Creek		1,900
Dandy Creek		900
Deer Creek		800
Dixon Creek		1,400
Drowatzky Creek		300
Elm Creek		500
Finger Creek		900
Fish Creek		900
Flag Creek		1,000
Indian Creek		900
Jennings Creek		1,900
La Flore Creek		1,400
Mill Creek		1,400
Mudd Creek		1,400
Nelson Creek		900
Pigeon Creek		900
Prairie Farm Creek		900
Sand Creek		1,400
Silver Creek		1,900
Sparta Creek		1,500
Squaw Creek		500
Swamp Creek		900
Tarr Creek		1,400
Turtle Creek		900
Wolff Creek		900
Wrights Creek		900
Tomahawk, Beaver Creek		200
Berry Creek		1,300
Big Pine Creek		1,950
Bush Creek		100
Gut Creek		650
Hay Creek		1,500
Kuehling Creek		650
Wisconsin—Continued.		
Tomahawk, Little Pine Creek		1,950
Little Somo River		100
Pine Creek, South Branch		1,300
Rocky Creek		1,300
Squaw Creek		1,300
Trempealeau, Beaver Creek		4,500
Beaver Creek, North Branch		4,500
Beaver Creek, South Branch		4,500
Bohris Valley Creek		1,050
Crystal Spring Pond		1,600
Crystal Valley Creek		4,500
Dutch Creek		4,500
Fox Creek		1,050
French Creek		4,500
Holcomb Valley Creek		1,050
Kerrigan Valley Creek		4,500
Norway Cooley Creek		4,500
Pine Creek		1,050
Tamarack Creek		1,050
Turtle Lake, Beaver Creek		2,400
Turtle Creek		2,400
Warrens, Beltz Creek		600
Brandy Creek		600
Castle Rock Creek		600
Clear Creek		2,000
Daupe Creek		600
Fish Creek		1,600
Harp Creek		600
La Crosse River, North Branch		3,000
Lowrey Creek		1,000
Mill Creek		600
Millston Creek		2,000
Patterson Creek		2,000
Poff Creek		600
Rudd Creek		1,600
Second Creek		600
Whiskey Creek		2,600
Wyman Creek		1,900
Waukesha, Bidwells Creek		1,500
Pebble Brook		3,000
Spring Run		1,500
Stone Creek		4,500
Wolf Creek		3,000
Wrights Creek		3,000
Waupaca, Emmons Creek		664
Pearl Creek		498
Radley Creek		996
Wausau, Black Creek		1,300
Bull Junior Creek		1,300
Bull Sampson Creek		1,950
Four Mile Creek		1,300
Kane Creek		1,300
Little Embarrass River		650
Little Rib River		1,300
Little Sandy Creek		1,300
Pine River, North Branch		1,300
Sand Creek		1,300
Silver Creek		1,300
Weirgor, Maple Creek		1,600
Spring Brook		2,400
Wheeler, Blank Creek		350
Little Otter Creek		700
Otter Creek		700

Details of distribution of fish and eggs, fiscal year 1916—Continued.

BROOK TROUT—Continued.

Disposition.	Fry and eggs.	Fingerlings, yearlings, and adults.
Wisconsin—Continued.		
Whitehall, Big Slough Creek		1,500
Bruce Creek		1,500
Carpenter Creek		1,500
Chimney Rock Creek		3,000
Dagget Creek		1,500
Elk Creek		3,000
Fitch Coulee Creek		1,500
Fly Creek		1,500
Fuller Creek		1,500
Golden Creek		1,500
Irvin Creek		1,500
Johnson Creek		1,500
Lake Coulee Creek		1,500
Nelton Creek		1,500
North Branch Creek		1,500
Olsons Creek		1,500
Pike Creek		1,500
Plumb Creek		1,500
Russel Creek		1,500
Shugurud Creek		1,500
Skimmerhorn Creek		1,500
Sleepy Creek		1,500
Solfest Creek		1,500
Van Sickle Creek		1,500
Wilton, Adrian Creek		1,000
Beach Creek		500
Dorset Creek		500
Dougherty Creek		1,000
Farmers Creek		500
Finneain Creek		1,000
Gallaghers Creek		500
Hibbard Creek		1,500
Hubbard Creek		1,000
Huehl Creek		1,500
Nathan Creek		1,000
Posey Creek		1,500
Riordan Creek		1,500
Schultz Creek		1,000
Sinks Creek		1,000
Slaton Creek		1,500
Smith Creek		1,000
Stratman Creek		2,000
Summerfield Creek		1,500
Uischner Creek		1,000
Waige Creek		1,500
Webb Creek		1,000
Winegar, Ash Creek		100
Beaver Brook		700
Carlins Creek		100
Fur Creek		100
Iron Creek		100
Kimble Creek		100
Otter Creek		100
Rileys Brook		700
Streaters Creek		700
Winneboujou, Bay Lake		1,600
Big Lake		1,600
Brule River		3,200
Cutler Creek		1,600
Hart Lake		1,600
Hungry Run		1,600
Lake Florence		800
Little Brule River		1,600
Long Lake		2,400
Lucius Lake		1,600
Nebagamon River		1,600
Wheaton Creek		800

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
Wisconsin—Continued.		
Winter, Dead Mans Creek		2,400
Wyoming:		
Aladdin, Hay Creek, North Fork		200
Basin, Brokenback Lake		1,600
Beulah, Long Branch		100
Cody, Eleanor Creek		7,000
Shoshone River, North Fork		10,000
Shoshone River, South Fork		10,000
Dayton, Sucker Creek, Upper		800
Tongue River, South Fork		800
Dubois, Warm Spring Creek		20,000
Evanston, Bear River		1,500
Greybull, Beaver Creek		5,250
Cedar Creek		4,250
Willett Creek		5,000
Laramie, Hundred Springs Lake		200
Klein Reservoir		1,500
Lusk, Rawhide Creek		800
Newcastle, Stockade Beaver Creek		400
Ranchester, Lake Creek		10,000
Tongue River, North Fork		10,000
Willow Creek		6,000
Saratoga, Battle Creek		3,000
Brush Creek and branches		20,000
Calf Creek		5,000
Campbell Reservoir		4,000
Cedar Creek and branches		20,000
Cottonwood Creek		4,000
Cow Creek		10,000
Encampment Creek		4,000
Jack Creek and branches		22,000
Lake Creek and branches		10,256
Lily Pond		4,000
Low Creek		4,000
Magnolia Pond		4,000
Pass Creek, Upper and Lower		13,000
Rose Creek		4,000
Savery Creek		2,000
Slater Creek		3,000
Spring Creek and branches		42,000
Stamp Mill Pond		3,000
Sheridan, Bull Creek		5,000
Fool Creek		6,000
Kemp Creek		8,000
Lick Creek		8,000
State fish commission	* 50,000	
Thermopolis, Owl Creek		2,800
Warrenton, Lone Tree Creek		1,500
Total[b]	{ 5,057,650 * 635,000	} 7,576,817

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.
[b] Lost in transit, 28,550 fry, 35,200 fingerlings.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

SMELT.

Disposition.	Eggs.	Fry.
Maine:		
Branch Pond, Branch Pond		10,000,000
Green Lake, Green Lake		2,000,000
Massachusetts: West Barnstable, Neck Pond		500,000
Michigan:		
Big Bay, applicant	2,000,000	
Sault Ste. Marie, State fish commission	10,000,000	
Williamsburg, Scofield Brook	2,000,000	
New York:		
Port Henry, Lake Champlain	5,000,000	
Raquette Lake, Lake Kora	2,000,000	
New York—Continued.		
Willsborough, Warm Pond		500,000
Vermont:		
Brattleboro, South Pond		500,000
Lyndonville, State fish commission	10,000,000	
Newport, Salem Pond		500,000
Petersburg, Big Pond		500,000
Roxbury, State fish commission	5,000,000	
Wilmington, Haystack Lake		500,000
Total	36,000,000	15,000,000

GRAYLING.

Disposition.	Eggs.	Fry.
Idaho: Preston, Bear River		50,000
Michigan: Grayling, Au Sable River	100,000	25,000
Montana:		
Anaconda, State fish commission	2,300,000	
Butte, applicant	700,000	
Deborgia, Hear Lake		25,500
Ennis, Madison Lake		625,000
Madison River		1,000,000
Odell Creek		100,000
Montana—Continued.		
Whitehall, Jefferson River		42,500
Wyoming:		
Laramie, State fish commission	250,000	
Sheridan, State fish commission	150,000	
Total	3,500,000	1,868,000

CRAPPIE.

Disposition.	Fingerlings, yearlings, and adults.
Alabama:	
Abbeville, Norman Lake	100
Andalusia, Doty's pond	80
Knox's pond	80
Rankin's pond	40
Thompson's pond	80
Anniston, Cane Creek	200
Choccolocco Creek	150
Bessemer, Porter's pond	80
West Lake	320
Camden, Bonner's lake	50
Capps, Alexander's pond	50
Comer, Pruett Pond	40
De Armanville, Hillabee Creek	100
Morris Mill Pond	50
Dothan, Baizemore Mill Pond	150
Malone Mill Pond	150
Ward Pond	100
Eufaula, Comer's pond	40
Ogletree's pond	40
Gadsden, Big Canoe Creek	150
Sibert Mill Pond	100
Goodwater, Jayner Lake	40
Whitley's pond	40
Huntsville, Brahan Spring Lake	150
Jackson, Chastain Lake	50
Jemison, Cobb's pond	100
Linden, Hinson's pond	50
Livingston, Big Fin Pond	50
Lowndesboro, Dickson's pond	100
Alabama—Continued.	
Madison, Cold Spring Lake	100
Oneonta, Mill Creek	150
Opp, Weaver's pond	40
Petrys, Duke's pond	50
Prattville, Golson's pond	40
Goodson Mill Pond	80
Rice's pond	80
Walls Pond	80
Unionville, Eley's pond	40
Valley Head, Crane's pond	50
Arkansas:	
Graysonia, Antoine River	200
Hope, Spring Lake	135
Nashville, Coleman's pond (A)	45
Coleman's pond (B)	50
St. Francis River Bridge, St. Francis River	225
Colorado: Arlington, Moseley's pond	300
Florida:	
Lake City, Duval Lake	250
Madison, Lake Rachel	375
Tallahassee, Silver Trout Lake	125
Georgia:	
Athens, Spencer's pond	125
Barwick, Massey's pond	125
Bowdin, Indian Creek	250
Buena Vista, Hollis Lake	375
Taylor's pond	250
Conyers, Ivey's pond	125

Details of distribution of fish and eggs, fiscal year 1916—Continued.

CRAPPIE—Continued.

Disposition.	Fingerlings, yearlings, and adults.
Georgia—Continued.	
Crawfordville, Nunn Pond	125
Douglas, Peterson's pond	250
Fairburn, Wynn Pond	250
Hahira, Miley's pond	250
Kennesaw, Austin's pond	125
Nunez, Forest Glen Pond	125
Oakum, Rockdale Lake	250
Ocilla, Larry Lake	250
Pearson, Guest's mill pond	500
Pidcock, Byrd Pond	125
Cutler Pond	125
Quitman, Blue Pond	250
Goose Pond	250
Stevens Pottery, Bloodworth's pond	125
Stillmore, Warren's pond	125
Sumner, Fowler's pond	250
Swainsboro, Deer Lake	250
Valdosta, Cherry Lake	375
Fly Pond	250
Soldier Lake	375
Willacoochee, Paulk's pond	250
Vickers's pond	250
Illinois:	
Apple River, Apple River	2,000
Belleville, Dewey Club Lake	400
Fern Glen Lake	200
Glen Addie Lake	100
Heineman Lake	400
Oakdale Lake	200
Belvidere, Kishwaukee River	8,250
Benton, Coal Company Pond	200
Shirley Pond	300
Bloomington, Heafers Pond	200
Carbondale, England Lake	200
Maple Hill Lake	300
Thompson Lake	300
Coulterville, Adami Park Lake	100
Illinois Central Lake	200
Council Hill, Apple River	1,000
Du Quoin, Majestic Lake	300
Edwardsville, Le Claire Lake	250
Galesburg, Lake Rice	300
Gibson City, Strata Lake	200
Golconda, Spring Lake Pond	150
Hillsboro, Woodland Lake	100
Hudgens, Crystal Springs Lake	1,000
Kell, Jerseydale Pond	125
Lena, Mammoser Lake	800
McLeansboro, Sayer's pond	100
Meredosia, Illinois River	[a] 108,030
Meredosia Bay	[a] 6,400
Mount Vernon, Piper's pond	100
Napierville, Du Page River	500
New Douglas, Shady Grove Lake	125
Nora, Apple River	2,000
O'Fallon, Cottonwood Lake	200
Pleasant Plains, Brown's pond	100
Polo, Pine Creek	5,900
Rockford, Rock River	7,200
Scales Mound, Apple River	1,200
Stronghurst, Fort Lake	200
Teutopolis, College Pond	250
Thompsonville, Blue Grass Pond	100
Warren, Apple River	800
Warsaw, Lake Melvina	200
Waterloo, Fountain Pond	100
Western Springs, Vaughan's lake	100
Indiana:	
Anderson, Spring Lake	125
Brazil, Big Deer Lick Pond	150
Crawfordsville, Home Lodge Pond	125
Hillsboro, Lake Levi	125
Indianapolis, Eagle Creek	375
White River	375
Indiana—Continued.	
Lake Cicott, Lake Cicott	375
Linnsburg, Smiley's pond	125
Plymouth, Pretty Lake	375
Sunman, Stahley's pond	150
Troutman's pond	150
Terre Haute, Sandberg's pond	150
Vincennes, Friez's lake	150
Lake Mont Clare	150
Iowa:	
Bellvue, Mississippi River	[a] 1,729,100
Boonville, Reiman's pond	250
Davenport, Vanderveer Park Lake	200
Eldora, Iowa River	4,500
Elk Horn, McKinley Pond	250
Exira, Box Elder Lake	250
Highland View Pond	250
Fairfield, Fryman's pond	500
Lime Springs, Upper Iowa River	9,200
North McGregor, Mississippi River	[a] 260,500
Onawa, Blue Lake	3,000
Steamboat Rock, Iowa River	4,500
Story City, Lake Comar	250
Kansas:	
Cherryvale, Hite's pond	100
O'Leary's pond	100
Fredonia, Rainbow Lake	100
Mound City, Adams's pond	100
Seneca, Anthony Farm Pond	500
Welda, Welda Lake	500
Kentucky:	
Bardstown, Spring Pond	100
Benton, Dycus's pond	50
Carlisle, Sampson's pond	125
Chilesburg, Barn Pond	125
Sycamore Pond	125
Connors Station, Cates Lake	300
Corbin, Laurel River	300
Crab Orchard, Crab Orchard Lake	300
Silver Lake	100
Danville, Caldwell Lake	100
Hampton Pond	200
Lee's pond	100
Eminence, Beechwood Pond	125
Nuttall's pond	150
O'Bryant Pond	125
Ewington, Atkinson's pond	125
Farmers, Pond Number One	125
Georgetown, Hall's pond	375
Glasgow, Dean's pond	125
Lee's pond	125
Greendale, Crenshaw's pond	125
Hemp Ridge, Joeffre Creek	300
Henderson, Barret's pond	50
Cherry Hill Pond	100
Hickman, Blue Pond	100
Hamby Pond	100
Hopkinsville, Oak Grove Pond	100
Irvine, Twin Pond	200
Julien, Howell's pond	100
La Center, Hinkle's pond	50
Terrell Pond	50
La Grange, Irwin's pond	150
Lexington, Reservoir No. 4	450
Madisonville, Harmer Pond	100
Parker Pond	50
Maysville, Owens's pond	150
Morton, Gatlin's pond	100
Nicholasville, Hooverhurst Pond	100
Richardson's pond	100
Paducah, Terry's pond	50
Paint Lick, Griffith Pond	200
Paris, Valley Forge Pond	150
Ryland, Ware's pond	150
Shelbyville, Clear Creek	300

[a] Rescued from overflowed lands and restored to original waters.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

CRAPPIE—Continued.

Disposition.	Fingerlings, yearlings, and adults.
Kentucky—Continued.	
Stamping Ground, North Elkhorn River	375
Stanford, Ballard's pond	200
Vine Grove, Cow Lot Pond	125
Hickory Pond	125
Mill Creek	375
Otter Creek	375
Waddy, Waddy Pond	100
Walton, Gaines's pond	150
Whitesburg, Fields's pond	100
Louisiana:	
Bastrop, Anderson's lake	80
Church Point, Daigle's pond	35
Eros, Jackson Parish Lake	150
Gilbert, Gilbert's pond	40
Gloster, Brinkley's pond	315
Hammond, Snell Creek	100
Iota, Henry's pond	70
Minden, McDonald Pond	100
Orphans Lake	150
Natchitoches, Chaplain Lake	135
Scarborough's lake	140
Pearl River, Will's pond	35
Port Hudson, Treakle's pond	30
Ruston, Carroll Pond	70
Shamrock, Cassady's pond	100
Maryland: Bladensburg, Goodloe's pond	35
Massachusetts: Tolland, Big Casino Pond	200
Michigan:	
Clyde, Horne Lake	400
Doster, Pine Lake	400
Farwell, Johnny Lake	125
Pond Lake	100
Jackson, Big Portage Lake	400
Vandercook & Brown Lake	800
Lake, Crooked Lake	250
Marenisco, Lake Gogebic	150
Napoleon, Stony Lake	400
Pentwater, North Ox Bow Lake	100
Rose Center, Geer Lake	400
North Buckhorn Lake	400
Town Line Lake	400
Twin Lake, Mid Lake	100
Minnesota:	
Homer, Mississippi River	a 692,140
Lanesboro, Root River	200
Randolph, Bilsby Lake	600
Mississippi:	
Aberdeen, Duck Pond	70
Menko Pond	35
Paine's pond	35
Quofoloma Lake	70
Robert's pond	70
Rose Hill Lake	70
Round Lake	70
Ackerman, Buck's pond	70
Hemphill's pond	100
Sheedy's pond	70
Amory, Bett's pond	80
Lake Julie	80
Mayfield's lake	80
Bay Springs, Bay Pond	35
Bay Lily Pond	35
Johnston's pond	35
Braxton, Willow Pond	35
Brookhaven, Smith's pond	35
Calhoun City, Macon's pond	40
Smith's pond	80
Canton, Caldwell Lake	70
Luckett Pond	70
Lutz Lake	70
Oil Mill Pond	70
Centerville, Hodges Lake	60
Mississippi—Continued.	
Chunky, McGee's pond	35
Clinton, Thompson Pond	40
Corinth, Estes's pond	35
Kemper Lake	80
Shearon Lake	120
Spring Lake	80
Surratt Lake	80
Crystal Springs, Blenkston's pond	35
Bridges Lake	70
Chatauqua Lake	105
Ervin's pond	35
Scott Lake	35
Willow Pond	35
Edwards, Askew's pond	35
Harris Pond	105
Fayette, Cadillac Pond	30
Kraus's pond	60
Liddell's pond	60
Smith's pond	60
Florence, Steer Pond	50
Forest, Johns Pond	40
Georgetown, Lake Bovard	70
Grenada, Pearson's pond	70
Hazlehurst, Ellis Lake	70
Lake Hazle	105
Lucky Lake	35
Sandy Point Pond	35
Highlandale, Jones's pond	30
Holcomb, Bridger's pond	60
Holly Springs, Hurdle Lake	40
Houston, Fair Lake	120
Irene, Butler's pond	35
Guy's pond	70
Hillside Lake	70
Jackson, Bailey Lake	105
Club Lake	70
Mill Run Lake	70
Tooles Cut Off Lake	105
Kilmichael, Shelton's pond	30
Knoxville, Cobb's pond	60
Norman's pond	60
Kosciusko, Bailey Lake	160
Cain's pond	40
Rimmer's pond	40
Lamar, Cedar Lake	70
McDonald's pond	35
Laurel, Culberth Lake	105
Drennan's pond	35
Meader's pond	80
Southland Pond	70
Travis Pond	140
Louisville, Creosote Pond	160
Fishing Club Lake	105
McGee Pond	35
Mitchell's pond	100
McCool, Gum Pond	50
Macon, Hill Pond	40
Thompson's pond	80
Mantee, Valley Pond	150
Meridian, Hamilton Lake	70
Waterworks Ponds	105
Mize, Bryant's pond	50
Morton, Bushing's pond	35
Moselle, Rumph's pond	70
Natchez, Castleman Lake	60
Ogden Lake	60
Stewart's pond	30
Sunnyside Pond	30
Swayze's pond	30
Wilderness Pond	30
Wilson's pond	30
Okolono, Okolono Pond	160
Olive Branch, McCargo's pond	105

a Rescued from overflowed lands and restored to original waters.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

CRAPPIE—Continued.

Disposition.	Fingerlings, yearlings, and adults.
Mississippi—Continued.	
Oxford, Beard's pond	35
Pachuta, Morgan Lake	70
Pheba, Cliett's pond	30
Cochran Pond	30
Melton's pond	30
Ritch's pond	30
Willow Bend Pond	30
Pocahontas, Cotton Valley Pond	35
Pontotoc, Orchard Lake	70
Patterson's pond	70
Port Gibson, Magnolia Pond	30
Prentiss, Lily Pond	80
Raymond, Estic Pond	35
Saltillo, Parr's pond	80
Sardis, Legge's pond	40
Scooba, East Pond	40
Johnson's pond	40
South Pond	40
Shuqualak, Barn Pond	80
Constantine Pond	80
Henderson's pond (A)	40
Henderson's pond (B)	40
Jones's pond	120
Lake Pond	80
McArthur's pond	40
Mill Pond	80
Steele's pond	80
Wigwam Pond	40
Smith, Marshal Lake	80
Stratton, Popular Pond	35
Summit, Railroad Lake	105
Tishomingo, Camp Spring Lake	35
Toomsuba, Hurtt's pond (A)	35
Hurtt's pond (B)	70
Tunica, Kinney Lake	70
Tylertown, Rimes's pond	35
Willis's pond	35
Union, Day Pond	70
Reagan's pond	35
Vicksburg, Scott Lake	60
Wahalak, Persons Pond	40
Washington, Campbell's pond	50
Waynesboro, Cochran's pond	40
Colo's pond	80
West-King Pond	80
West Point, Coleson's pond	70
Deanes Brothers Lake	105
Hamlin's pond (A)	70
Hamlin's pond (B)	70
Wiggins, Beaver Dam Pond	150
Woodville, Beckham's pond	30
Kaigler's pond	30
Lake Bonniemead	30
Tucker's pond	30
Missouri:	
Alma, Deichoff Pond	150
Blackburn, Chicago & Alton Pond	200
Bunceton, Petite Saline Creek	400
Cabool, Graves's pond	100
Doniphan, Miller's pond	100
Excelsior Springs, Henry's west pond	100
Grandview, Blue Ridge Pond	200
Spring Lake Pond	200
Joplin, Walnut Ridge Pond	150
La Belle, Lake Park	400
Lamar, Gregory Lake	400
Mallett Lake	300
Lebanon, North End Pond	100
Mill Spring, College Lake	100
Neosho, Cedar Lake	200
Turkey Creek	100
Whites Lake	51
Newburg, Mihlfeld Lake	100
Norwood, Farm Pond	100
Odessa, Lake Vinita	300
Missouri—Continued.	
Palmyra, Bay de Charles	200
Parkville, Scarritt's pond	100
Richland, Gasconade River	400
Rocheport, Petrie's pond	100
Saginaw, Bolen Lake	200
St. Clair, Reymer's pond	150
Ste. Genevieve, Wilder Pond	200
St. Louis, Goehrung's lake	150
St. Louis, Poupenny Lake	500
Savannah, McFadden Lake	200
South Greenfield, Limestone Creek	300
Turnback Creek	300
Washburn, Crim's pond	100
Windsor, Wilkerson Park Lake	400
Wyaconda, Wyaconda Lake	250
Nebraska:	
Hardy, Rainey Pond	100
Hartington, Bow Creek	250
Spencer, Jerman's pond	250
Virginia, Virginia Lake	150
Wayside, Baird's pond	250
Bobemien Creek	250
Kitchens Pond	125
New Jersey:	
Millville, Union Lake	400
Newton, Swartswood Lake	400
New York:	
Buffalo, Green Lake	375
Cuba, Cuba Lake	625
Gloversville, Lily Lake	375
Round Lake, Round Lake	375
North Carolina:	
Biscoe, Coggins's pond	125
Burlington, Haw River	250
Murray Mill Pond	250
Piedmont East Lake	250
Henderson, Parker's pond	250
Maysville, New River	375
Mount Airy, Fairchild's pond	125
Laurel Bluff Pond	250
McBride's pond	250
Rockingham, Marks Creek	250
Roseboro, Great Swamp Pond	250
Wilson, Grantham Pond	250
North Dakota:	
Devils Lake, Devils Lake	600
St. John, Byrnes Lake	200
Carpenter Lake	200
Dion Lake	200
Fish Lake	200
Gordon Lake	200
Jarvis Lake	200
Krooks Lake	200
Long Lake	200
Mill Lake	200
Oak Lake	200
Purdy Lake	200
Schnavily Lake	200
Taylor Lake	200
Walker Lake	200
Ohio:	
Batavia, Little Miami River, East Fork	300
Belleville, Gatton's lake	125
Columbus, Big Walnut Creek	375
Geauga Lake, Geauga Lake	625
Georgetown, White Oak Creek	300
Lawshe, Brush Creek	300
Lima, Watkins Pond	150
Loveland, Little Miami River	300
Morrow, Little Miami River, Todds Fork	300
Mount Healthy, Muth's pond	150
Ripley, Eagle Creek	300
Russells Point, Indian Lake	300
Lewistown Reservoir	300

Details of distribution of fish and eggs, fiscal year 1916—Continued.

CRAPPIE—Continued.

Disposition.	Fingerlings, yearlings, and adults.
Oklahoma:	
Ada, Davis Lake	100
Stewart Lake	100
Agra, Herrman's pond	100
Apache, Beauty Lake	100
Arcadia, Sylva Hill Pond	100
Ardmore, Chickasaw Lake	200
Hedges Lake	100
Lake Meda	100
Loyd's pond	200
Buffington, Illinois River	500
Illinois River, Barren Fork	500
Caddo, Hull's pond	100
Cherokee, La Brue Lake	300
Sucker Flat Lake	200
Christie, Barren Fork Bayou	100
Elgin, Shirk's pond	100
Foraker, Robert's pond	100
Guthrie, Beland Lake	300
Santa Fe Lake	400
Henryetta, Stone's pond	100
Hugo, City Lake	200
Outing Club Lake	300
Kuli Chito Club Lake	200
McAlester, Heard's pond	100
Marlow, Johnson's pond	100
Mill Creek, Chilly Creek	100
Mooreland, Heinz Lake	100
Murray Lake	100
Noble, Kirbie Pond	100
Lake Dunaway	100
Oklahoma Lake	100
Prairie Lake	100
Orlando, Ella Pond	100
Prairie Pond	100
Paoli, Ke No Pond	100
Lane's pond	100
Pauls Valley, Morgan Lake	100
Thompson Lake	200
Perry, Barne's pond	100
Sharon, Baptist Lake	100
Healey Lake	100
Lowe Lake	100
Trotter Lake	100
Shawnee, Kirst Lake	200
Mud Lake	300
Stillwater, Sunnyside Resort Pond	100
Supply, Irwin Lake	100
Tangier, Big Spring Lake	100
Horseshoe Lake	100
Laubach's pond	100
Turkey Creek	100
Wolf Lake	100
Valliant, Mossy Lake	100
Vici, Spurlock Lake	200
Woodward, Blue Lake	100
Bowlby Lake	100
Circle Lake	100
Clear Lake	100
Geismar Lake	100
Grant Lake	100
Hastings Lake	100
Kline Lake	100
Kollar Lake	100
Kutchinski's pond	100
Morrow Lake	100
Peugh Lake	100
Roundup Creek	100
Santa Fe Lake	100
Smith Lake	100
Spring Lake (A)	100
Spring Lake (B)	100
Spring Lake (C)	100
Swartz Lake	100
Turnbull Lake	100
Wegner Lake	100
Oklahoma—Continued.	
Woodward, Woodside Lake	100
Wrights Lake	100
Zahnen Lake	100
Pennsylvania:	
Chester, Ridley River, Irvings Dam	200
Denver, Cocalico Creek	400
Frankstown, Juniata River, Frankstown Branch	300
Huntingdon, Hydro Pond	200
Jonestown, Big Swatara Creek	400
Lebanon, Colebrook Lake	200
Lake Conewago	200
Lights Lake	200
Miller Pond	400
Storer Lake	200
Water House Lake	200
McClure, Middle Creek, Branch of	150
South Carolina:	
Abbeville, Little River	500
Florence, Black Creek	900
Gaffney, Turner's pond	100
Honea Path, Clamp's pond	100
Leesville, Shealy's pond	100
Montmorency, Moore's pond	100
Mount Croghan, Klondike Pond	100
Piedmont, Brushy Creek	200
Garrison Lake	200
Grove Creek	300
Saluda River	400
Wellford, Berry Pond	300
South Dakota:	
Belle Fourche, Orman Lake	500
Burke, Schulze's pond	250
Tripp, Lake Andes	500
Winner, Lake Westonka	750
Tennessee:	
Athens, Richeson Pond	100
Brownsville, Davis Pond	50
Chattanooga, Spring Creek	100
Dyersburg, Fowler's pond	50
Fordtown, Halls Clermont Pond	100
Gallatin, Baber's pond	50
Hermitage, Hurt's pond	50
Jackson, Simmons Pond	50
Lebanon, Cedar Creek	50
Coe's pond	50
Manchester, Duck River	200
Little Duck River	150
Phillips's pond	50
Mason, Greenlee Pond	100
Hamblet's pond	100
Memphis, Lago Felice	90
Sink's pond	100
Nunnelly, Piney Creek	100
Shelbyville, Flat Creek	100
Tate, Helton Pond	200
Texas:	
Alma, Zerwer's pond	100
Alvarado, Hallman Lake	100
Rogers Pond	75
Amarillo, Palo Duro Creek	125
Arp, Willow Lake	100
Athens, Koon Kreek Klub Lake	100
Atlanta, Johnson's pond	100
Richey's pond	100
Austin, Caldwell's pond	75
Sterrett Lake	150
Axtell, Morrow's pond	50
Bastrop, Country Club Lake	200
Trigg's lake	125
Belleville, Pin Oak Lake	75
Bluff Dale, Richardson Creek	100
Bradshaw, Earnest Lake	75
Brady, Brady Creek	100
Brownwood, Baugh's pond	125

Details of distribution of fish and eggs, fiscal year 1916—Continued.

CRAPPIE—Continued.

Disposition.	Fingerlings, yearlings, and adults.
Texas—Continued.	
Brownwood, Halliman Pond	125
Sunnyslope Pond	100
Caldwell, Caldwell Pond	125
Pollack's pond	100
Wilson Lake	125
Canadian, Witt's pond	200
Childress, Richards's pond	100
Chillicothe, Clark Lake	125
Cleburne, Country Club Lake	571
Corsicana, Bunert Park Pond	50
Burke Lake	100
David Place Pond	50
Texas Company Pond	100
Craft, Fish Lake	75
Crockett, Collins's lake	100
Davy Crockett Lake	100
Lacy's lake	100
Le Gory's pond	100
Smith Pond	100
Crosbyton, White River	350
Dallas, Burgher's pond	150
Samuel's pond	150
Dawson, Akers's pond	50
Easley's pond	50
Klondike Pond	100
Del Rio, Charco Pond	100
Lake Dobbins	100
Edna, Lavaca River	200
Flatonia, Arnim's pond	75
Fort Worth, Dunmovin pond	200
Lake Edwin	150
Lake Worth	425
Gause, Deen's pond	100
Georgetown, Berry Creek	375
San Gabriel River	225
San Gabriel River, Middle Fork	150
Gilmer, Jones's lake	100
Grand Prairie, Willow Lake	75
Grandview, Country Club Lake	545
Walker's lake	50
Grapeland, Bobbitt Lake	100
Holcomb Lake	100
Greenbrier, Greenbrier Lake	100
Merrill's lake	100
Greenville, Haney's pond	100
Jones Club Pond	75
King's pond	75
Hampton, Fleming's pond	100
Henderson, Dunklin's pond	100
Hillsboro, Electric Lake	150
Ellington Lake	150
Hillsboro Lake	150
Houston, Werner's pond	100
Hubbard, Club Lake	50
Davison's pond	100
Jones's pond (A)	100
Jones's pond	75
McDaniel's pond	100
Matson & McDaniel Ponds	200
West Pond	100
Hutchins, Dowdy Lake	125
Jacksonville, Boles Lake	200
Churchill Lake	100
Crysup Lake	200
Dublin Lake	100
Morris Club Lake	200
Justiceburg, Connell's pond	100
Kerens, Price's pond	50
La Porte, Cartier's pond	75
Laredo, Bruni Pond	125
Leander, Brushy Creek	200
Lindale, Club Lake	150
Thompson Lake	150
Llano, Flag Creek	125
Johnson Creek	200
Texas—Continued.	
Llano, Llano River	200
Oatman Creek	200
Pecan Creek	200
San Fernando Creek	200
Lobo, Lobo Pond	75
Lockhart, Lake Sanchez	75
Lometa, Santa Fe Lake	200
Longview, Lake Devernia	200
Longview Club Lake	200
Tate Lake	100
Thrasher & Sessum Lake	200
Maginta, Cheyenne Lake	125
Marble Falls, Marble Falls Lake	200
Marion, Schul's pond	75
Melissa, Echo Home Pond	75
Memphis, Browder's pond	65
Mercury, Corn Creek	100
Mexia, Cook's pond	75
Mexia Lake	125
Petty's pond	75
Mineola, Massengale's pond	75
Sand Springs Pond	100
Moody, Stampede Creek	125
Mount Vernon, Arrington's pond	75
Dawson & Smith Pond	75
Holbert's pond	75
Narcissus, Clary's pond	75
Navasota, Oakleigh Pond	100
Yarborough Lake	150
New Braunfels, Comal River	300
O'Donnell, Randal's pond	75
Paducah, Fry's pond	100
Richards's pond	100
Palestine, Cannon's pond	100
Phillips Lake	200
Ross Lake	200
Saline Lake	200
Spring Lake	200
Spring Park Lake	100
Taylor's pond	100
Palo, Reagan's pond	325
Placid, Turnell's pond	100
Plano, Huffman's pond	100
Queen City, Shelton Pond	100
Rice, Fitzgerald's pond	100
Riesel, Little Sandy Pond	75
Local Stock Pond	75
Rockwall, Nadine Pond	75
Rusk, Meadow Lake	50
San Angelo, Allen's pond	100
Grimes's pond	125
Johnson's pond	100
Sherwood's pond	75
Tweedy Lake	125
San Antonio, Willow Lake	475
San Marcos, Bachman Lake	300
Blue Hole Pond	300
Seeliger's pond	125
San Saba, Cherokee Creek	100
Seguin, Cottonwood Creek	100
Gerdes's pond	75
Geronimo Creek	200
Stephenville, Bosque River	200
Frey's pond	100
Moore's pond	100
Terrell, Highpoint Pond	125
Oakwood Pond	100
Walton Pond	75
Thorndale, Beard's pond	100
Smith's pond	100
Tyler, Cove Lake	100
Spring Lake	150
Uvalde, Eight Mile Pond	100
Turkey Creek	100
Valentine, Evan's pond	75

Details of distribution of fish and eggs, fiscal year 1916—Continued.

CRAPPIE—Continued.

Disposition.	Fingerlings, yearlings, and adults.	Disposition.	Fingerlings, yearlings, and adults.
Texas—Continued.		West Virginia—Continued.	
Vernon, Bates Lake	200	Shelton, Elk River	300
Bomer Pond	50	Wisconsin:	
Cobbs Lake	100	Birchwood, Balsam Lake	300
Mays Lake	60	Bass Lake	150
Reed's pond	100	Berry Lake	150
Rowland's pond	100	Birch Lake	150
Waco, Escondido Lake	75	Nice Lake	150
Gayland Farm Pond	75	Number One Lake	150
Waxahachie, Ellis Club Lake	150	Number Two Lake	300
Winfield, Smith's pond	75	Red Cedar Lake	150
Wortham, Longbotham's pond	100	Saw Mill Lake	300
Virginia:		Smith Lake	150
Butterworth, Butterworth Pond	150	Spider Lake	150
Carson, Hogwood Mill Pond	300	Blair, Trempealeau Pond	300
Charlottesville, Charlottesville Pond	450	Brokaw, Wisconsin River	400
Dispatch, Higgins Pond	300	Centuria, Rice Lake	200
Faber, Urban's pond	150	Sand Lake	300
Lee Hall, Lee Lake	300	Chippewa Falls, Glen Loch Lake	200
Lester Manor, Lanesville Pond	150	La Crosse, Dark Slough Creek	500
Mattoax, Highpoint Pond	150	Mississippi River	[a] 134,000
Norge, Scimmore Pond	150	Rice Lake	500
Pemberton, Johnson & Duncan Pond	300	Manitowish, Manitowish Lake	1,000
Petersburg, Brander Pond	150	Merrill, Long Lake	400
Winfree Pond	300	Seven Island Lake	400
Richmond, Cottrell's pond	300	North Freedom, Mirror Lake	1,200
Falling Creek Pond	450	Pine River Station, Pine River	400
Hickory Hill Pond	300	Richfield, Friess Lake	300
Suffolk, Copeland Lake	300	Lake Amy Belle	300
Cramer's pond	300	Richland, Parfrey Mill Pond	200
Summit, Frazer's pond	300	Sheboygan Falls, Sheboygan River	1,000
Westham, Boulware's pond	300	Turtle Lake, Hillman Lake	150
Bowe's pond	150	Little Round Lake	150
Gregory's pond	150	Silver Lake	185
Westham Creek	150	Staples Lake	300
Westham Lake	150	Vesper, Maple River Pond	400
Wytheville, Reed Creek, South Fork	6,600	Wausau, Lake Wausau	800
West Virginia:		Wyoming:	
Cameron, Fish Creek	400	Cheyenne, Sloans Lake	100
Fairmont, Booth Creek	400	Glenrock, McDonald Pond	250
Prickett Creek	400		
White Day Creek	400	Total[b]	3,122,332

[a] Rescued from overflowed lands and restored to original waters.
[b] Lost in transit, 970 fingerlings.

ROCK BASS.

Disposition.	Fingerlings.	Disposition.	Fingerlings.
Arkansas:		Indiana:	
Alma, Bushmiaer Pond	2,400	Atlanta, Garhart's pond	300
Batesville, Mobley Pond (A)	1,000	Danville, Trotter's pond	100
Mobley Pond (B)	1,000	Depauw, Blue River	250
Clarksville, Brisco's pond	3,200	Dillsboro, Sanatarium Pond	100
Johnson, Avalon Pond	4,000	Donaldson, Koontz Lake	600
Pocahontas, Black River	184	Elkhart, Christiana Creek	300
Colorado: Mancos, Weston's pond	200	Elkhart River	800
Florida: Wauchula, Breshy Creek	600	English, Dumplin Creek	200
Georgia:		Little Blue River	400
Dalton, Mill Creek	500	Little Patoka Creek	200
Yeager's pond	200	Evansville, Watershed Pond	150
McDonough, Walnut Creek	500	Lexington, Englishton Park Pond	100
Summit, Johnson Pond	300	Lynn, Johnson's pond	100
Suwanee, Spence's pond	400	Marengo, Whiskey Run Creek	400
Illinois:		Muncie, No Name Creek	300
Anna, Sitter's lake	200	Newburg, Sargent's lake	150
Belleville, Lake Christine	500	Otisco, Fourteen Mile Creek	300
Effingham, Greuel's pond	200	Radley, Duck Pond	200
Napierville, Du Page River	800	Saline City, Valleyview Pond	100
West Stone Quarry Pond	800	Scottsburg, Iola Lake	200

Details of distribution of fish and eggs, fiscal year 1916—Continued.

ROCK BASS—Continued.

Disposition.	Finger-lings.
Indiana—Continued.	
Sellersburg, Brock's pond	100
Spades, Lake Flow Mah	100
Sunman, Clear Pond	100
Wabash, Mississinnewa River	500
Iowa:	
Davenport, Lower Pond	150
Yorktown, Miller's pond	125
Kentucky:	
Bardstown, McClure's pond	100
Buechel, Hikes Pond	150
Cadiz, Birds Creek	300
Caney Creek	300
Donaldson Creek	300
Dyers Creek	200
Little River, Lower	400
Little River, Muddy Fork	300
Little River, Sinking Fork	200
Little River, Upper	400
Campbellsville, Campbell's pond	200
Campbellsburg, Sunshine Lake	300
Corbin, Chesnut's pond	400
Covington, Dickman's pond	100
Crab Orchard, Cedar Creek	300
Dix River	1,000
Crescent Springs, Reinhart's pond	150
Elizabethtown, Boyd's pond	500
Irwin's pond	100
Eminence, Silver Lake	200
Thomas Pond	100
Glasgow, Beaver Creek	600
Boyds Creek	300
Miller's pond	100
Hazard, Kentucky River, North Fork	500
Henderson, Sugar Tree Grove Pond	200
Woods Pond	400
Ilsley, Ashmore's pond	100
Fox's pond	100
Lebanon, McElroy's pond	200
London, McKee Pond	200
Louisville, Lansdowne Lake	400
Millersburg, Hinkston Creek	500
Mortons Gap, Lovan's pond	200
Mount Sterling, Prewitt's pond	100
Myra, Bumgardner's pond	200
Nolin, Wolf Spring Pond	100
Nortonville, Oates's pond	100
Paris, Hinxton Creek	400
Quicksand, Back's pond	100
Rowletts, Lester's pond	100
Woodland Pond	200
St. Charles, Coal Company Lake	300
Springfield, Clement's pond	100
Cooper's pond	500
Grundy Home Lake	500
Roanoke Lake	500
Stanford, Dix River, Hanging Fork	400
Trenton, West Fork Creek	1,000
Tyrone, Cedar Brook Pond	200
White Villa, North Lake	200
Williamsburg, Cumberland River	400
Williamstown, Kendall Pond	200
Yeager, Shelby Creek	400
Louisiana: Dubach, Sconyer's pond	4,000
Maryland:	
Asbestos, Burklee Pond	100
Charlestown, Seneca Pond	100
Cheltenham, Brookfield Lake	200
Woodbine, Warfield's pond	100
Michigan:	
Twin Lake, West Lake	325
White Cloud, Little Robinson Lake	325
Minnesota: Homer, Mississippi River	75
Missouri:	
Butler, Spring Pond	150
Crane, Lancaster Lake	300
Miller, Willow Spring Pond	65
Monett, Lake Mendon	100
Morrisville, Paris Pond	2,000
Pleasant Hill, Lake Leonard	2,000
Missouri—Continued.	
Rolla, Little Dry Fork Creek	2,000
Meramec River, Big Dry Fork	2,000
Saginaw, Walker Lakes	300
New Jersey:	
Asbury Park, Wesley Lake	200
Magnolia, Kinsey's pond	200
Red Bank, Nanuet Pond	200
New York:	
Congers, New Lake	127
Derby, Lily Pond	128
Newburgh, Orange Lake	45
Pine Plains, Stissing Lake	400
North Carolina:	
Asheville, White Flint Pond	100
Drexel, Asbury's pond	150
Ela, Ocona Lufty River	400
Ellerbe, Mountain Creek	450
Etowah, Smith's pond	200
Gold Hill, Poole's pond	150
Greensboro, Print Works Lower Pond	200
Haw River, Lake Elizabeth	200
High Point, Yadkin River	400
Hillsboro, Belleview Pond	400
Hominy, Davis's pond	100
Kings Mountain, Wells's pond	150
Lexington, Nokomis Lake	400
Louisburg, Gordon's pond	150
Morrisville, Kelly's pond	100
Oxford, Haymount Pond	150
Pee Dee, Blewitt Falls Pond	300
Pinehurst, McDonald's pond	100
Raleigh, Beaverdam Creek	400
Roaring River, Briar Creek	400
Candill's pond	100
Ronda, Brooks's pond	100
Warren Plains, Weaver's pond	400
Woodleaf, Third Creek Pond	200
North Dakota: Leith, Kolbank Pond	200
Ohio:	
Archbold, Buehrer's pond	100
Belleville, Wade's pond	200
Cincinnati, Chapman Lake	100
Lake View, Indian Lake	500
Mansfield, Clearfork Creek, Buckhorn Branch	200
Clearfork Creek, Johnsville Branch	300
Oklahoma:	
Aydelotte, Willow Lake	7,500
Durant, Gunter's lake	1,600
Guthrie, Joh's pond	4,500
McComb, Motley's pond (A)	3,000
Motley's pond (B)	3,000
Motley's pond (C)	4,500
Mill Creek, Five Mile Creek	5,000
Hepsey Creek	2,000
Three Mile Creek	4,000
Pauls Valley, Dordyn's pond	3,000
Perry, Reservoir Lake	3,000
Shawnee, Kranning's pond	3,000
Tishomingo, Blue River	4,000
Mill Creek	4,000
Tribbey, Henderson's pond	3,000
Vinita, Thompson's pond	2,000
Pennsylvania:	
Ellwood City, Crystal Pond	400
Hanover, Bechtel's pond	200
Jenkintown, Madieara's pond	200
Johnstown, Peters's pond	200
Quemahoning Lake	70
Sugar Run Dam	140
Lake Carey, Lake Carey	100
McClure, Middle Creek, West Branch	100
Mocanaqua, Priest Farm Pond	100
Oil City, McCall's pond	200
Reading, Hill Creek	250
Scranton, Lake William	100
Thurlow, Trainer Creek	300
Waterford, Lake Pleasant	600
Wernersville, Glen Tilt Pond	250

Details of distribution of fish and eggs, fiscal year 1916—Continued.

ROCK BASS—Continued.

Disposition.	Fingerlings.
South Carolina:	
Abbeville, Calvert's pond	100
Central, Rowland's pond	150
Easley, Jones's pond	200
Looper's pond	200
Robinson's pond	150
Honea Path, Clinkscales's pond	200
Poston, Johnson's pond	300
Rock Hill, Davis Springs Pond	200
Wellford, Middle Tiger Lake	100
South Dakota: Smithwick, Happy Hollow Pond	200
Tennessee:	
Baxter, Oliver's pond	150
Brunswick, Kelly's pond	4,800
Sink's pond	2,400
Chattanooga, Lookout Ponds	400
Gates, Wilkes's pond	2,400
Henry, Maple Lake	4,800
Lexington, McHaney's pond	4,800
Medon, McDaniel Lake	4,800
Oakdale, Emory River	200
Powder Springs, Flat Creek	200
Riceville, Boyd's pond	100
Cagle's pond	100
Sparta, Officer's pond	200
Tate Springs, German Creek	100
Tellico Plains, Tellico Lake	400
Wartrace, Duck River, Garrison Fork	200
Texas:	
Arlington, Rudd Lake	100
Asherton, Brown's pond	60
Leonard's pond	60
Taylor's pond	60
Austin, Howell's pond	150
Big Wells, Wait's pond	50
Bonham, Bishop Lake	200
City Lake	200
Bremond, Shaw's pond	100
Brownwood, Roberts Lake	150
Taylor Lake	200
Bryan, Oak Grove Pond	50
Calvert, Jones's pond	75
Chester, Hampton Pond	75
Cisco, Lake Burnie	175
Reich Lake	100
College Station, Kyle's pond	100
Como, Gamblin Lake	100
Cooledge, Osborn's pond	50
Crockett, Smith Wilson Lake	150
Cushing, Stevens Pond	50
Dalhart, Wynne's pond	150
Dallas, Kidd Spring Pond	200
De Leon, Chambers Lake	100
Del Rio, San Felipe Creek	200
Deport, Latham Pond	100
Willow Pond	100
Dublin, Dublin Daisy Pond	50
Eagle Lake, Smith's pond	75
Edgewood, Wolfe's pond	100
Edna, Lavaca River	100
Navidad River	100
Sandies Creek	100
Ellinger, Knolle's pond	50
Falfurrias, Agua Buena Pond	50
Power Company Pond	50
Forney, Sowell's pond	100
Fort Worth, Lake Worth	200
Live Oak Creek	200
Gainesville, Spring Creek	150
Goodnight, Spring Creek Lake	150
Grand Saline, Clear Lake	100
Hallettsville, Gerdes's pond	75
Henderson, Menefee's pond	75
Henrietta, Edwards's pond	100
Honey Grove, Gambill's pond	100
Howe, The L Lake	50
Joaquin, Blackmon's pond	75
Jourdanton, Hagelstein's pond	50
Texas—Continued.	
Karnes City, Morris's pond	50
Kaufman, Nash's pond	65
Pasture Pond	50
Kemp, Clear Lake	120
Long Lake	195
Trinity Lake	75
Laredo, Moritz Lake	100
Lone Oak, Simmons's pond	50
Long Branch, Lake Claytonia	75
Lott, Greener's pond	75
McKinney, Davis's pond	50
Madisonville, Dean's pond	200
Marion, Sylvan Pond	50
Mart, Reuwer's pond	100
Melissa, Nicholson's pond	50
Middle Water, Todd's pond	100
Midland, King's pond	50
Midlothian, Gulf Lake	150
Williams's pond	50
Millsap, Millsap Lake	50
Minard, Ellis Reservoir	50
Moscow, Holland's pond	50
Navarro, White Pond	50
Navasota, Floyd's pond	100
Nevada, Crenshaw's pond	50
New Boston, Hart's pond	100
New Boston Club Pond	200
Pirkey's pond	200
Newville, Wall's pond	100
Pampa, Coffee's pond	100
Perry, Dyck's pond	50
Pine Hill, Orr's pond	75
Pittsburg, Bermuda Lake	100
Cottle Lake	100
Plainview, Buena Vista Lake	200
Duensing's pond	100
Rosebud, Waters's pond	60
Richardson, Sunnybrook Pond	50
Riviera, Roberts's pond	75
Rotan, Bacot's pond	50
Gyp Lake	50
Rugby, Day's pond	100
Grant's lake	100
Griffin's pond	100
Sadler, Sycamore Park Pond	50
San Antonio, Harrigan's pond	80
Saur's pond	80
Schulenberg, Clear Water Lake	50
Sealey, Burger Pond	150
Sherman, Burton's pond (A)	200
Burton's pond (B)	200
Slayden, Kaye Pond	100
Teague, Daniel's pond	50
Terrell, Meadow Lake	100
Terry, Derrough-Singleton Pond	75
Valley Mills, Alfalfa Dale Pond	50
Vernon, Spring Creek	150
Spring Lake	150
Spring Pond	150
Victoria, Antonioli's pond	50
Wellborn, Barron's pond	50
Willis, Smith's pond	150
Wills Point, Freeland Lake	100
Lake Campbell	100
Lake Gallatin	100
Lake Harris	100
Lake Henry	100
Utah: Murray, Spring Pond	200
Virginia:	
Abilene, Millandale Pond	150
Arrington, National Pond	100
Baskerville, Piney Pond	50
Burnleys, Alta Vista Pond	150
Chatham, Hunt's pond	150
Covington, Jackson River	500
Danville, Walters's pond	250
Dry Fork, Taylor's pond	100

Details of distribution of fish and eggs, fiscal year 1916—Continued.

ROCK BASS—Continued.

Disposition.	Fingerlings.	Disposition.	Fingerlings.
Virginia—Continued.		Virginia—Continued.	
Emporia, Meherrin River	160	Stanley, Hawksbill Pond	200
Goode, Lawson's pond	200	Swoope, Middle River	500
Gordonsville, Wellersbacher's pond	150	Union Level, Johnson's pond	50
Gretna, White Thorn Pond	125	Winchester, Lake Frederick	200
Hatton, Stevens's pond	200	Total[a]	165,149
Norfolk, Smith Lake	150		
South Hill, Westview Pond	50		

WARMOUTH BASS.

Florida: Pinetta, Elbow Lake	150	Texas—Continued.	
Georgia: Roberta, Lowe's pond	100	Henderson, Lakewood Pond	75
Texas:		McDavid Lake	75
Henderson, Arnold Lake	75	Total	700
Burk Channel Pond	75		
Gary's pond	75		
Lake Charleybrook	75		

[a] Lost in transit, 250.

SMALLMOUTH BLACK BASS.

Disposition.	Fry.	Fingerlings.	Disposition.	Fry.	Fingerlings.
Alabama:			Indiana—Continued.		
Bangor, Sugar Creek	5,000		Brazil, McGregor's pond		75
Birmingham, Village Creek Lake	12,500		Columbus, Clifty Creek		150
Creola, Hatter's lake	7,500		White River, East Fork	7,500	
Fort Payne, Wills Creek	7,500		Depauw, Blue River		225
Huntsville, Spring Pond		140	Dunkirk, Fishback's pond		50
Leesburg, Terrapin Creek	10,000		Dupont, Guthrie's lake		100
Montgomery, Crescent Lake	5,000		Fort Wayne, Maumee River		100
Mosteller, Spring Creek	5,000		St. Joseph River		150
Tuscumbia, Town Creek	12,500		St. Marys River		100
Connecticut:			Howe, Pigeon River	2,000	
Amston, Warner's pond	3,000		Pigeon Lake		300
Bristol, Cedar Lake		60	Huntington, Little River		150
Waterbury, Chestnut Hill Pond		60	Salamonie River		200
City Mills Pond		60	Wabash River		150
Lake Quassapaug		85	Indianapolis, Buck Creek	7,500	150
Delaware:			Eagle Creek	10,000	200
Wilmington, Circle Pond		100	Fall Creek		150
Spring Pond		265	White River	5,000	150
Georgia:			Lagrange, Cline Lake	2,000	
Adairsville, Oothcalooga Creek	5,000		Mongo Mill Pond	4,000	
Atlanta, Brookhaven Lake	7,500		Shipshowana Lake	4,000	
Cartersville, Euharlee Creek	10,000		Marion, Mississinnewa River		200
Wildwood, Lake Lookout	7,500		Michigan City, Clear Lake	2,000	
Illinois:			Saganoy Lake	2,000	
Antioch, Huntler Lake	7,500		Tee Lake		150
Barstow, Rock River	10,000		Monticello, Tippecanoe River	10,000	
Danville, Little Vermilion River	10,000		Morristown, Blue River		200
Vermilion River, Middle Fork	7,500		Motts, Big Indian Creek	4,000	
Vermilion River, Salt Fork	7,500		New Albany, Mount St. Francis Pond		50
Grayslake, Third Lake	10,000		Noblesville, Cicero Creek		150
Lake Zurich, Lake Zurich	7,500		Hinkles Creek		150
Red Bud, Dinan's pond	7,500		Stony Creek		150
Wilmington, Kankakee River	7,500		White River		200
Indiana:			North Vernon, Mascattauck Creek		150
Bloomfield, Plummer Creek		150	Otisco, Fourteen Mile Creek		150
Richland Creek		150	Peru, Eel River		225
Bluffton, Studebaker's pond		100	Richmond, Thistlewait Ponds	6,000	
			Spencer, Eel River	4,000	

Details of distribution of fish and eggs, fiscal year 1916—Continued.

SMALLMOUTH BLACK BASS—Continued.

Disposition.	Fry.	Fingerlings.
Kentucky:		
Bowling Green, Drakes Creek		350
Brush Creek, Round Stone Creek	7,500	
Corbin, Lynn Camp Creek	7,500	
Crab Orchard, Cedar Creek		300
Danville, Caldwell Lake	5,000	
Elizabethtown, Nolin River	12,500	
Elkton, Dill Pond	2,500	
Elk Fork Creek	7,500	
Frankfort, Cedar Creek and tributaries	7,500	
State Hatchery Pond	7,500	
Glasgow, Beaver Creek	10,000	
Herndon, Little River	10,000	
Hodgenville, Lily Pond		1,000
Jackson, Kentucky River, North Fork	10,000	
Maceo, Kingfisher Lake	5,000	
Nortonville, No. 1 Lake	7,500	
Paris, Xalapa Lakes	3,000	
Shelbyville, Brashears Creek	10,000	
Somerset, Fishing Creek		600
Pittman Creek		600
Stamping Ground, North Elkhorn Creek	10,000	
Stearns, Kinne's pond	5,000	
Rock Creek		600
Louisiana: Lake Charles, Calcasieu River	4,000	
Maine: Fryeburg, Lake Keyar		198
Maryland:		
Detour, Double Pipe Creek		106
Monocacy River		[illegible]
Dorsey, Deep Run Branch		53
Massachusetts:		
Lowell, Burgess Pond	800	
Nabnassett Pond	800	
Newfield Pond	800	
Sagamore, Wakeby Lake		200
Shelburne Falls, Ashfield Pond		50
Bardwell Pond		50
Franklin Pond		50
Gardner Falls Lake		50
Griswold Pond		50
Lamson-Goodnow Pond		50
Mannings Eddy Pond		50
Reservoir No. 2		50
Reservoir No. 3		50
Reservoir No. 4		50
Shattuck Pond		50
Willis Place Pond		50
Michigan:		
Alpena, Franks Lake	1,000	
Grand Lake	2,000	
Hubbard Lake	2,000	
Amasa, Fire Lake		300
Lake Lady		400
Au Train, Au Train Lake		400
Belding, Pine Island Lake	4,000	
Belleville, "Q" Pond	2,000	
Bergland, Lake Gogebic		500
Calumet, Medora Lake		300
Caro, Cass River	8,000	
Cassopolis, Stone Lake	1,000	200
Cedar City, Andresen's pond	2,000	
Champion, Lake Michigamme		500
Charlevoix, Adams Lake		150
Matchett Lake	2,000	
Nowland Lake	2,000	150
Susan Lake		200
Twenty Six Lake	2,000	200
West Twin Lake	2,000	
Cliff, North American River		200
Michigan—Continued.		
Clyde, Duck Lake	2,000	
Irving Lake		75
Long Lake		200
Milford Lake		100
Spring Lake		200
Westerley Lake	1,000	
Crystal Falls, Fortune Lake		400
Lake Marie		400
Upper Holmes Lake		300
Davisburg, Pennell Lake	2,000	
Delaware, Beaver Lake		200
Bete Gris Bayou		200
Deer Lake		200
Lac La Belle		200
Lake Upson		200
Mud Lake		200
Dunham, Lake Celeste		300
Edmore, Little Penny Lake	2,000	
Edwardsburg, Davis Lake	1,000	
Elba, Riley Lake	2,000	
Escanaba, Ontonagon Lake		400
Farwell, Deadmans Lake	1,000	
Devils Lake	1,000	
Dollar Lake	1,000	
Lower Lake	1,000	
Snod Lake	1,000	
Thirteen Lake	1,000	
Francisco, Clear Lake	1,000	
Gaylord, Crescent Lake	2,000	
Greenville, Bass Lake	2,000	
Fish Lake	2,000	
Loon Lake	4,000	
Sanderson Lake	2,000	
Turk Lake	4,000	
Turkey Lake	4,000	
Hastings, Barber Lake		400
Bumps Lake		400
Carters Lake		400
Leach Lake		300
Long Lake		400
Highland, Dunham Lake	2,000	
Long Lake	2,000	
Pettibone Lake	2,000	
Round Lake	2,000	
Waterbury Pond		50
Whalen Lake	2,000	
Holly, Allen Lake	1,000	
Bevins Lake	1,000	
Long Lake	2,000	
Mallott Lake	1,000	
School Lot Lake	1,000	
Warren Lake	1,000	
Wendell Lake	1,000	
Houghton, Otter Lake		400
Interlochen, Duck Lake		300
Green Lake		300
Iron Mountain, Bass Lake		300
Ishpeming, Flat Lake		300
Gribben Lake		300
Silver Lake		300
Jackson, Big Portage Lake	2,000	
Brown Lake	1,000	
Portage Lakes		225
Finton Lake	1,000	
Vandercook Lake	2,000	
Jones, Driskel Lake	1,000	
Kenton, Crystal Lake		300
Maggie Walton Lake		150
Ontonagon River, East Branch		200
Kingsley, Arbutus Lake	2,000	
Lake Ann, Bellows Lake	1,000	
Lake View	1,000	
Ransom Lake	1,000	
Lake Gerald, Lake Gerald		300
Lake Gogebic, Merrowether River		100

Details of distribution of fish and eggs, fiscal year 1916—Continued.

SMALLMOUTH BLACK BASS—Continued.

Disposition.	Fry.	Fingerlings.
Michigan—Continued.		
Lakeland, Huron River	4,000	
Strawberry Lake	4,000	
Little Lake, Horseshoe Lake		300
Little Lake		400
Spring Lake		300
Mandan, Copper Creek		200
Hoar Lake		200
Lake Addie		200
Lake Fanny Hooe		200
Lake Patty		200
Manganese Lake		200
Medora River		100
Partridge Lake		200
Marenisco, Hawk Lake		300
Heart Lake		300
Lake Gogebic		625
Marquette, Badger Creek Pond		200
Lake Thirty Two		300
Star Lake		300
Michigamme, Gibson Lake		300
Millersburg, Barnhardt Lake	2,000	
Mullet Lake, Mullet Lake		500
Negaunee, Hanson Lake		300
Horseshoe Lake		300
Newaygo, Emerald Lake		200
Sylvan Lake		200
Niles, Barron Lake	4,000	200
Northville, Cooley Lake	15,000	
Long Lake	12,500	
Silver Lake		200
Straits Lake	12,500	
Union Lake	17,500	
Walled Lake	17,500	
Oden, Crooked Lake	4,000	
Onato, Deer Lake		300
Orchard Lake, Cooley Lake	2,000	
Cranberry Lake	4,000	
Long Lake	2,000	
Oscoda, Cook Site Pond	2,000	
Van Ettan Lake	2,000	
Otia, Benton Lake		400
Lake Otia	2,000	
Owosso, Shiawassee River		225
Peacock, Sable Lake		300
Penroga, Indian Lake		400
Phoenix, Gratiot Lake		400
Thayers Lake		200
Tobacco River		200
Pori, Bab Lake		300
Quimby, Clear Lake		300
Cox Lake		300
East Lake		300
Long Lake		300
Middle Lake (A)		300
Middle Lake (B)		300
Mixer Lake		300
Podunk Lake		300
Republic, Michigamme River		400
Rose Center, Arnold Lake	1,000	
Bates Lake	1,000	
Bennett Lake	1,000	
Buckhorn Lake	3,000	
Cheese Lake	1,000	
Downing Lake	2,000	
Field Lake	1,000	
Garden Lake	1,000	
Gardner Lake	1,000	
Green Lake	2,000	
Humiston Lake	1,000	
Longton Lake	1,000	
Mud Lake	1,000	
Munger Lake	1,000	
Perrigo Lake	1,000	
Small School Lot Lake	1,000	
South Buckhorn Lake	1,000	
Trumpet Lake	1,000	
Michigan—Continued.		
Saline, Spring Lake	1,000	
Sidnaw, Burns Lake		100
Chapin Lake		100
Corbin Lake		100
Crystal Lake		100
Kunze Lake		100
McClelland Lake		50
Murphy Lake		100
Reed Lake		100
South Range, Lake Eva		300
Stager, Stager Lake		300
Sturgis, Adams Lake	2,000	
Twin Lakes, Johnson Lake		300
Lake Gerald		400
Warren, Brick Yard Pond	2,000	
Waterford, Williams Lake		150
Watersmeet, Allen Lake		300
Lost Lake		300
Wetmore, Mirror Lake		500
Reddies Lake		500
White Cloud, Crystal Lake		300
Little Patterson Lake		300
Lost Lake		300
Witbeck, Chief Lake		300
Outlet Lake		300
Witch Lake		300
Wixom, Moores Lake	1,000	
Wooster, Peck Lake		300
Missouri:		
Aurora, Big Flat Creek	680	
Marceline, Santa Fe Club Lake		216
St. Joseph, Crowley Lake		500
Savanna, Club Preserve Lake		480
Verona, Spring River	850	
Mississippi: Corinth, Powells Pond	2,500	
New Jersey:		
Branchville, Culver Lake		212
Bridgeville, Mountain Lake		106
Camden, Willow Grove Lake		159
Hackettstown, Guard Lock Lake		106
Musconetcong Pond		212
State fish commission		159
Hammonton, Hammonton Lake		159
Paterson, Pompton Lake		265
Trenton, Gropp's lake		53
Silver Lake		106
New York:		
Batavia, Horseshoe Lake		159
Bridgehampton, Kellis Lake		145
Central Bridge, Schoharie River		300
Clemons, Pine Lake		195
Clinton Corners, Upton Lake		150
Cobleskill, Schuyler Lake		150
Smith Lake		200
Summit Lake		150
Colliers, Goodyear Lake		200
Congers, New Lake		100
De Ruyter, Tioughnioga Lake		106
Irvington on Hudson, Irvington Lake		150
Johnstown, East Caroga Lake		150
Lake Clear Junction, Osgood Lake		141
Lake Mahopac, Wickson Pond		150
Monroe, Walton Lake		350
Monticello, Kiamesha Lake		100
Newburgh, Orange Lake		150
Niagara Falls, Niagara River		159
Parish, Little Salmon River		106

Details of distribution of fish and eggs, fiscal year 1916—Continued.

SMALLMOUTH BLACK BASS—Continued.

Disposition.	Fry.	Fingerlings.
New York—Continued.		
Peekskill, Johnston's pond		125
Petersburgh, Lake Tilley		100
Pine Bush, Paughcaughnaughsinque Creek		100
Riparius, Brant Lake		130
Ronkonkoma, Lake Ronkonkoma		200
St. Johnsville, East Canada Lake		150
Green Lake		150
Lily Lake		50
West Canada Lake		50
Schroon Lake, Schroon Lake		65
Syracuse, Cross Lake		50
Jamesville Reservoir		50
Lake Owahgena		50
Skaneateles Lake		50
Ulster Park, Mirror Lake		100
Water Mill, Lake Nowedonah		195
Wayland, Loon Lake		200
White Plains, Rye Lake		450
North Carolina: Asheville, Club Lake		250
Lake Fernihurst		350
Ohio:		
Batavia, Little Miami River, East Fork		1,150
Stone Lick Creek		150
Columbus, Alum Creek		200
Black Lick Creek		200
Duncan Run		333
Licking River		234
Olentangy River		233
Raccoon Creek		200
Rocky Fork Creek		200
Defiance, Maumee River		150
Georgetown, White Oak Creek		150
Lawsha, Ohio Brush Creek		150
Lima, McCullough Lake	2,000	
Loveland, Little Miami River		150
Morrow, Little Miami River		300
Little Miami River, Todds Fork		300
Newark, Licking River	6,000	
Raccoon Creek	2,000	
Rocky Fork Creek	2,000	
Ripley, Eagle Creek		150
Troy, Great Miami River	4,000	
Lost Creek	2,000	
Urbana, Brush Lake		150
Nettle Creek		100
Washington Court House, Compton Creek	2,000	
Paint Creek	2,000	
Paint Creek, North Fork	2,000	
Winchester, White Oak Creek		2,000
Woodsfield, Sunfish Creek	2,000	
Oklahoma: Wainwright, City Pond	780	
Pennsylvania:		
Dalmatia, Susquehanna River		159
Fairview, Wigton Ponds		159
Gettysburg, Big Marsh Creek		106
Greenville, Little Shenango River		53
Harrisburg, Conodoguinet Creek		159
Pennsylvania—Continued.		
Horrell, Juniata River, Frankstown Branch		159
Huntingdon, Juniata River		159
Juniata River, Rayrtown Branch		159
Indian Creek, Indian Creek		106
Johnstown, Quemahoning Lake		106
Sugar Run Pond		106
Lititz, Cocalico Creek, Lower		106
McClure, Jacks Creek		106
Manheim, Chicoquis Creek		106
Phillipsburg, Delaware River		159
Royersford, French Creek		106
Kimberton Pond		53
Schuylkill River		53
Selins Grove, Penns Creek		106
Sewickley, Big Travis Creek		106
Williamsport, Pine Creek		159
York, Conewago Creek		106
Tennessee: Tullahoma, East Mulberry Creek		300
Vermont:		
Danville, Keeser Pond		195
Mud Pond		195
Fairlee, Lake Morey		150
Ferrisburg, Little Otter Creek		95
Hardwick, Valley Lake		50
Morrisville, Lake Lamoille		195
North Ferrisburg, Cedar Lake		195
Poultney, Lake St. Catherine		195
Rocky Point, Groton Pond		200
Rutland, Meadow Lake		75
Otter Creek		75
Springfield, Black River		100
Swanton, Lake Champlain		40
Winooski, Winooski River		195
Virginia:		
Edinburg, Shenandoah River, North Fork	6,000	
Lee, Powhatan Club Pond	7,500	
Marion, Holston River, Middle Fork	3,500	
Richmond, Allen Club Lake	3,000	
Forest Hill Lake	3,000	
Roanoke, Roanoke River	7,500	450
Salem, Roanoke River		450
Stephens City, Opequon Creek	6,000	
Taylorville, Little River	3,000	
Woodstock, Shenandoah, River, North Fork	6,000	
Wytheville, Cove Creek		300
West Virginia:		
Bluestone Jct., Bluestone River	10,000	
Elkins, Tygarts Valley River	12,000	
Elm Grove, Wheeling Creek	15,000	
Huntington, Guyandotte River	10,000	
Keyser, Patterson Creek	10,000	
Marlinton, Kapps Creek	8,000	
Wellsburg, Buffalo Creek	10,000	
Romney, South Branch River	5,000	
Total *a*	762,710	65,169

a Lost in transit, 159 fingerlings and 35,000 fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

LARGEMOUTH BLACK BASS.

Disposition.	Fry,[a] fingerlings, yearlings, and adults.
Alabama:	
Abbeville, Abbey Creek	100
Arnold Pond	100
Choctawhatchee River	3,250
Espey's pond	150
Ward Lake	100
Alexander City, Hillabee Creek	300
Tankersley's pond	100
Alpine, Caldwell Pond	150
Alton, Dean's lake	2,000
Andalusia, Riley's pond	150
Anniston, Choccolocco Creek	4,000
Mangham's pond	2,000
Oxford Lake	300
Rock Creek	100
Whiteside's pond	4,000
Willett's pond	60
Ashby, Myrtle Lake	200
Athens, Mackey's pond	1,500
Bangor, Beechwood Lake	500
Birmingham, Edgewood Lake	1,000
Turkey Creek	1,000
Boaz, Moss Pond	1,000
Brantley, Hill's pond	150
Tuck's pond	750
Brent, McMillan's pond	750
Brewton, Barbour's pond	500
Big Jumper Creek	500
Cedar Creek Pond	500
Ellis Pond	1,000
Murder Creek	500
Brierfield, Mahans Creek	4,000
Brundidge, Dubose's pond	500
Calcis, Kelly Creek	1,500
Caldwell, Forman's mill pond	60
Camden, Albritton's pond	30
Capps, Fall Pond	250
Carney, Carney Pond	110
Cedar Bluff, Johnson's pond	1,000
Chase, Flint River	500
Cherokee, Keeton's pond	30
Chesterfield, Lookout Mountain Lake	30
Clanton, Foshee's pond	500
Clayton, Clarks Old Mill Pond	150
Clayton's pond	100
Kennedy's pond	250
Martin's pond	100
Old Warren Pond	300
Cobra, Lake Bologna	50
Courtland, Big Nance Creek	1,000
Cuba, McGowen's pond	600
Dancy, Baker's pond	50
Cedar Lake	1,000
Virginia Lake	1,000
DeArmanville, Choccolocco Creek	300
Demopolis, Prout's lake	500
Warrior River	200
Dora, Big Warrior River	900
Elba, Allred's lake	200
Backwater Lake	300
Elmore, Goree's pond	50
Ethelsville, Hancock's pond	1,000
Eufaula, Country Club Pond	1,250
Evergreen, Cane Brake Creek	500
Fayetteville, Averitt Branch	50
Florala, Lake Jackson	2,800
Foley, Lake Petit	1,000
Walker's lake	1,000
Ft. Payne, Little River	4,000
Town Creek	4,000
Gadsden, Bellevue Pond	1,600
Cox Lake	2,000
Nocolula Creek	3,000
Alabama—Continued.	
Gantt, Gantt Mill Pond	1,000
Rawl Mill Creek	150
Wayne Able Pond	200
Greenville, Four Mile Mill Pond	200
Guntersville, Smith's mill pond	2,000
Haleyville, Clear Creek	600
Headland, Brown's mill pond	50
Helena, Buck Creek	3,500
Inverness, Hill Pond	100
Irvington, Clear Lake	1,000
Jacksonville, Brown's pond	200
Jamestown, Mill Creek	80
Leighton, Town Creek	1,000
Lincoln, Choccolocco Creek	300
Hollingsworth's pond	100
Lisman, Miller's pond	1,000
Wahaloc Creek	2,000
Livingston, Ziegler's pond	300
Luverne, Kings Lake	750
McDonald Lake	250
Matthews Lake	250
Welch's pond	250
Madison, Bronaugh's pond	500
Fletcher's pond	500
Jamar Pond	2,000
Willow Lake	2,000
Montgomery, Gravel Pit Lake	1,250
Holt's lake	750
Irvine Lake	750
Naftel, Naftel Pond	750
Newton, Jones's pond	100
Oneonta, Little Warrior River	2,000
Opp, Weaver's pond	80
Ozark, Weeks's pond	500
Paint Rock, Paint Rock River	1,080
Pelham, White's pond	1,000
Pike Road, Crow Nest Lake	400
Quinton, Skelton Creek	1,300
Reads Mill, Reads Mill Pond	200
Rendalia, Riser's pond	100
Repton, Porter's pond	1,000
Russellville, Sloss Pond	300
Rutherford, Cowiker Creek	1,500
Samson, Crow's pond	50
Selma, Ivey Pond	100
Kahn's pond	200
Melwood Lake	200
Speigner, State Farm Pond	1,000
Sterrett, Kelly Creek	300
Stewart, Hedleston Lake	600
Sulligent, Brush Creek Pond	1,000
Talladega, Pope Creek	50
Tallassee, Tallapoosa River	200
Three Notch, Bluff Creek	200
Johnston's pond	100
Lake View	*300
Thornton's pond (A)	100
Thornton's pond (B)	100
Thornton's pond (C)	100
Troy, Henderson's lake	1,000
Tuscaloosa, Johnston's pond	300
Union Springs, Edward's pond (A)	500
Edward's pond (B)	500
Rosenstihl's pond	150
Sims's pond	500
Uniontown, Becker Pond	1,000
Perry Place Pond	500
Stollenwerck Pond	2,000
Valley Head, Benges Creek	30
Verbena, Chestnut Creek	750
Wells, Price's pond	50
Whatley, Grant Lake	250

[a] Fry indicated by an asterisk, thus (*); all others are fingerlings, yearlings, and adults.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

LARGEMOUTH BLACK BASS—Continued.

Disposition.	Fry,[a] fingerlings, yearlings, and adults.	Disposition.	Fry,[a] fingerlings, yearlings, and adults.
Arizona:		Florida:	
Ash Fork, Lewis's pond	200	Alturas, Star Lake	750
Meath Pond	200	Bartow, Polk Lake	300
Piachao Pond	200	Chapman, Pearl Lake	750
Clarkdale, Pecks Lake	300	Clermont, Lake Oakley	750
Naco, Naco Pond	100	Compass Lake, Compass Lake	400
Prescott, Lake Watson	900	Crescent City, Lake Stella	130
San Simon, Buck's pond	100	Davenport, Lake Edward	500
Williams, Howard Lake	300	De Funiak Springs, Buffalo Lake	750
Arkansas:		Chipley Lake	750
Cable Creek, Big Piney Creek	*4,000	Lake Stanley	750
Camden, Bradley Lake	155	De Land, Blue Lake	1,000
Johnson Lake	150	Wood's pond	250
Webb Lake	225	East Lake, Lake Weir	1,850
Woodard Lake	80	Eustis, Eustis Lake	1,000
Elba, Little Red River	*4,000	Lake Joana	750
	2,000	Lake Saunders	1,000
Elkins, White River	800	Lake Yale	1,000
Greenland, White River, East Fork	600	Flora, Heart Lake	1,500
Hope, Coffey Lake	*2,000	Fort Meade, Four Mile Lake	300
Kings River, Kings River	400	Fort Myers, Aloha Creek	100
Osage River	300	Geneva, Buck Lake	3,700
Little Rock, Dickinson Lake	2,000	Lake Leota	300
Neimeir Lakes	2,000	Grand Ridge, Lake Alford	100
Spring Lake	2,000	Lakeland, Lake Bonnett	750
Mammoth Spring, Spring River	*25,000	Lake Bonney	750
	105	Lake Hollingsworth	750
Ozark, Mulberry Creek	120	Lake Hunter	750
Patmos, Burns Mill Pond	*3,000	Lake Morton	750
Willow Spring Pond	*6,000	Lake Parker	750
Pocahontas, Black River	204	Magnolia Glen Pond	2,100
Lewis's lake	75	Laurel Hill, Gordon's pond	250
Mansco Creek	50	Leesburg, Lake Griffin	1,250
Mill Creek	25	Mohawk, Mohawk Lake	1,000
Russellville, Illinois Bayou, East Fork	*3,000	Monticello, Lake Catherine	200
South Greenfield, Cox's pond	300	Loch Mary Ellen	200
Springdale, Dan Lewis Lake	400	Rocky Ford Branch	400
East Brush Creek	400	Wolf Pond	200
Illinois River	800	Ocala, Vetter's pond	100
Osage River	600	Orlando, Kuhl Lake	300
Richland Creek	600	Lake Hardeman	70
Spring Creek	400	Lake Jenne Jewell	750
War Eagle Creek	600	Sebring, Horse Lake	1,750
White River	400	Sorrento, Lake Kittie	750
Swan Lake, Swan Lake	400	Tarpon Springs, Lake Butler	800
Texarkana, Country Club Lake	*3,000	Wauchula, Brushy Creek	750
Colorado:		Carter Lake	1,250
Akron, Gill's lake	600	Hog Branch	500
Avondale, Grant's pond	300	Horse Creek	1,000
Falcon, Edwards's pond	150	Little Charley Creek	1,500
Glenwood Springs, Lyle Lake	300	Peace Creek	300
Grand Junction, Redlands Pond	600	Pin Crow Lake	2,500
Hooper, King's lake	300	Red Water Lake	2,500
Lamar, Adobe Lake	750	Sand Branch	200
Chain of Lakes	750	Thompson Creek	950
Two Buttes Lake	750	Troublesome Creek	750
Loveland, Benson Lakes	300	Turkey Creek	200
Fairport Lake	450	Whittington's pond	200
Rist-Benson Lake	450	Winter Haven, Boat Course Lake	400
Manzanola, Mallett's lake	300	Eagle Lake	1,000
Miramonte, Carter's lake	300	Georgia:	
Peyton, Herman Pond	300	Atlanta, Glen Iris Creek	4,000
Rouse Junction, Valdez Lake	450	Augusta, Anderson Mill Pond	750
Connecticut:		Hagler Pond	2,000
East Windsor, Windsorville Pond	100	Hancock Pond	2,000
Niantic, Cedar Lake	200	Keys Mill Pond	2,000
Pataganset Lake	200	Lombard Pond	3,000
West Cornwall, Cornwall Pond	200	Spirit Creek	3,000
Delaware:		Wright's pond	2,000
Cheswold, Sherwood Mill Pond	125	Austell, Noses Creek	1,000
Felton, Felton Club Ponds	375	Sweetwater Creek	6,000
Laurel, State Game Farm Pond	375	Avera, Chalker's pond	500
Wilmington, Circle Pond	125	Bainbridge, Alford's pond	500

[a] Fry indicated by an asterisk, thus (*); all others are fingerlings, yearlings, and adults.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

LARGEMOUTH BLACK BASS—Continued.

Disposition.	Fry,[a] fingerlings, yearlings, and adults.
Georgia—Continued.	
Bainbridge, Sikes Mill Pond	750
Barretts, Ocean Wave Pond	750
Bellville, Overstreet's pond	500
Riggs's pond	500
Berner, Ocmulgee River	5,000
Bowdon, Beck Mill Creek	3,000
Little Tallapoosa River	4,000
Bowman, Beaverdam Creek	3,000
Braswell, Lake Jacall	1,000
Bronwood, Kinchafoonee Creek	750
Calhoun, Dew's pond	200
Carrollton, Buck Creek	3,000
Centralhatchee Creek	2,000
Tallapoosa River	4,000
Cleveland, Tesnatee Creek	3,000
Town Creek	4,000
Coffee, Smith's mill pond	500
Columbus, Ram Pond	3,000
Comer, Edwards Mill Pond	4,000
Noell's pond	4,000
Covington, Covington Mill Pond	4,000
Culverton, McWhorter's pond	2,000
Cuthbert, Butler's mill pond	500
Daisy, Tippins's pond	500
Dalton, Whitfield Club Lake	4,000
Willow Dale Lake	1,000
Davisboro, Tarver's mill pond	2,000
Deercourt, Walters Pond	2,000
Douglas, McClelland Pond	500
Douglassville, Austell's pond	500
Elberton, Beaverdam Pond	7,000
Ellijay, Cartecay River	1,250
Ellijay River	200
Fairburn, Favers Pond	2,000
Fairfax, Satilla River	400
Farmington, Marshall's pond	250
Fayetteville, Lake Bennett	3,000
Gainesville, Brennan Lake	300
Chattahoochee River	2,000
Little River	2,000
Gay, Wyche's pond	100
Gillsville, Candlers Creek	1,000
Grove River Lake	100
Suddath's pond	100
Gough, Buckhead Lake	300
Greensboro, Bowden's pond	2,000
McCommons's pond	3,000
Hawkinsville, Big Creek	4,000
Hephzibah, Grindstone Pond	200
Murphey's pond	750
Holly Springs, Little River	2,500
Jefferson, Shield's pond	100
Jonesboro, Jester's old mill pond	2,000
Lakemont, Lake Stevenson	1,250
Rabun Lake	8,000
Lavonia, Tugaloo River	200
Lithonia, Whitley's pond	2,000
Lyons, Page's pond	150
McDonald, Satilla River	300
McIntyre, Jackson's pond	100
Macon, Nelson Mill Pond	750
Willow Lake	1,000
Winship Pond	500
Milledgeville, Cox's pond	1,000
Millhaven, Brier Creek	1,000
Monroe, Appalachee River	350
Montezuma, Harrison's pond	500
Morven, Morrison's pond	500
Nelson, Arthur's pond (A)	100
Arthur's pond (B)	100
Nichols, Grandon Lake	250
North Helen, Hiawassee River	300
Georgia—Continued.	
Oglethorpe, Flint River	400
Whitewater Creek	750
Omega, Gay's pond	250
Palmetto, Springdale Lake	2,500
Quitman, Silver Lake	500
Withlacoochee River	750
Reidsville, McCall's pond	500
Rochelle, Holt's pond	750
Senoia, Keg Creek	3,000
Sharpe Spur, Darby Garbut Pond	250
Smyrna, Anthony's pond	1,000
Social Circle, Almond's pond	1,000
Crawley's pond	2,000
Duval Lake	2,000
McDowell's pond	1,000
Williams's pond	1,000
Stevens Pottery, Echols Pond	2,000
Summerville, Clemmons Pond	100
Gamble Creek	100
Sylvania, Freeman Pond	750
Temple, Tallapoosa River	1,500
Thomasville, Blue Pond	500
Tioga, Call Creek	100
Tyrone, Adams's pond	1,000
Union Point, English's pond	1,500
Valdosta, Indian Pond	500
Whitewater Club Lake	1,000
Washington, Fishing Creek	5,500
Little River	5,000
Watkinsville, Durham's pond	100
Oconee River	7,000
Waynesboro, Beaverdam Creek	500
Beaverdam Pond	500
Buckhead Creek	1,000
White Plains, Sanders Pond	2,000
Williamsburg, Natcheaway Creek	1,250
Wray, Harper's pond	500
Luke's pond	500
Illinois:	
Belvidere, Kishwaukee River	50
Carrollton, Walnut Hull Lake	300
Coulterville, Creamery Pond	40
Park Pond	40
Danville, Vermillion River	240
Vermillion River, North Fork	200
Franklin, Burlington Lake	200
Hamilton, Montebello Bay	250
Hillsboro, Hope's pond	40
Service Lake	80
Seymour North Lake	80
Seymour South Lake	120
Hudgens Station, Crystal Springs Lake	240
Jacksonville, Morgan Lake	250
Lena, Mammooser Lake	200
McLeansboro, Burnett's pond	80
Mascoutah, Lincoln Lake	80
Meredosia, Illinois River	[b] 28,940
Meredosia Bay	[b] 40
Napierville, Du Page River	450
North Stone Quarry Pond	525
Nashville, Carlsbad Lake	120
Polo, Pine Creek	150
Prentice, Hodgson Park Pond	100
Rockford, Rock River	720
Warren, Apple River	800
West Point, Spence's pond	250
Indiana:	
Anderson, Anado Pond	100
Batesville, Hillcrest Golf Club Lake	100
Bethany Park, Jewel Lake	300
Birdseye, Blume's pond	100
Bloomington, Bean Blossom Creek	400

[a] Fry indicated by an asterisk, thus (*); all others are fingerlings, yearlings, and adults.
[b] Rescued from overflowed lands and restored to original waters.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

LARGEMOUTH BLACK BASS—Continued.

Disposition.	Fry,[a] fingerlings, yearlings, and adults.
Indiana—Continued.	
Bloomfield, Dones Creek	200
Inman Creek	200
Booneville, Sunlight Pond	200
Woodland Lake	100
Cedar Lake, Cedar Lake	375
Chili, Eel River	375
Columbus, Big Sand Creek	300
Corydon, Fleace's pond	100
Kirkham's pond	100
Crawfordsville, Rock River	300
Crown Point, Fancher Lake	500
Culver, Lake Maxinkuckee	300
Dale, Bockstahler's pond	100
De Long, Tippecanoe River	375
Donaldson, Koontz Lake	375
Dubois, Patoka River	300
Eckerty, Railroad Pond	100
English, Blue River	300
Little Blue River, Bogard Fork	200
Little Blue River, Otter Fork	200
Patoka River	300
Evansville, Wiltshire's lake	100
Flat Rock, Flat Rock River	300
Frankfort, Shoemaker Lake	125
Germany, Tippecanoe River	250
Greencastle, Big Walnut Creek	300
Griffin, Fish Pond	100
Huntingburg, Woods Valley Pond	100
Hymera, Consolidated Mine Pond	100
Warren Coal Company Pond	200
Indianapolis, Eagle Creek	150
Fall Creek	250
White River	225
Kendallville, Bixler Lake	300
Little Long Lake	300
Kingsbury, Manja Mill Pond	200
Knightstown, Furgeson Lake	100
Lake Cicott, Lake Cicott	300
Leiters Ford, Tippecanoe River	375
Lynn, Greenville Creek	100
Marysville, Fourteen Mile Creek	200
Milltown, Big Blue River	300
Morgantown, Bowman's pond	100
Muncie, Mississinnewa River	300
White River	400
Otisco, Fourteen Mile Creek	200
Richmond, Hawkins Lake	200
Morton Lake	100
Richmond Lake	300
Whitewater River	200
Whitewater River, East Fork	100
Whitewater River, Middle Fork	100
Ridgeville, Lake Pequanahaw	250
Roann, Lukens Lake	375
Russellville, Rock Lake	100
Scottsburg, Waunita Pond	100
Shelbyville, Drakes Lake	100
Summitville, McLain's pond	100
Roseboom's pond	100
Sunman, Big Four Pond	100
Terre Haute, Evergreen Lawn Pond	100
Pierson's pond	100
Tippecanoe, Tippecanoe River	375
Twelve Mile, Hilda Lake	100
Veedersburg, Coal Creek	300
Vincennes, Frisz's lake	200
Lakewood Park Lake	300
Waynetown, Coal Creek	300
Iowa:	
Allerton, Railroad Pond	200
Anamosa, Buffalo River	300
Bellevue, Mississippi River	[b] 30,000
Chariton, Williamson Lake	265
Iowa—Continued.	
Clear Lake, Clear Lake	400
Corydon, Poston's pond	100
Cresco, Turkey River	400
Davenport, Vanderveer Park Lake	300
Decorah, Upper Iowa River	300
Earlville, Plum Creek	150
Eldora, Iowa River	250
Emmetsburg, Medium Lake	400
Lime Springs, Forreston Mill Pond	400
Upper Iowa River	1,000
Mason City, Lime Creek	300
North McGregor, Mississippi River	[b] 5,300
Oelwein, Lake Oelwein	400
Osceola, Rarick's pond	115
Seymour, City Reservoir	200
Steamboat Rock, Iowa River	250
Kansas:	
Cherryvale, City Lake	300
Clifton, Randle's pond	100
Fredonia, Rainbow Lake	150
Girard, Burnett's lake	200
McFarland Lake	200
Huron, Anthony Farm Pond	300
Junction City, Country Club Lake	500
Kincaid, Grindstone Lake	200
La Cygnes, Middle Creek	250
Lebo, Cassell's pond	100
Lyndon, Salt Creek	300
Moran, Moran Lake	500
Mound City, Little Sugar Creek	300
Olathe, Cedar Creek Lake	300
North Lake	200
South Lake	150
Paola, Bull Creek	300
Marais des Cygnes River	200
Wea Creek	300
Peabody, Spring Creek	200
Pittsburg, Rodells Pond	400
Richmond, Richmond Pond	500
St. Francis, Case's pond	150
Spring Creek	300
Selden, Prairie Dog Creek	600
Stanley, Rural Retreat Lake	400
Kentucky:	
Allensville, Gill's pond	250
Prince's pond	250
Barbourville, Fighting Creek	40
Mountain Lake	600
Bardstown, Beam's lake	400
Bloomfield, Chaplin River	60
Boston, Lick Creek	40
Wilson Creek	40
Bowling Green, Sloss's pond	*2,000
Brandenburg, George Long Pond	70
Hunter's pond	70
Campbellsville, Big Pittman Creek	60
Campbellsville Lake	60
Utilities Lake	800
Carlisle, Carlisle Pond	70
Cave City, North Valley Lake	*2,000
Cornettsville, Kentucky River, North Fork	860
Crab Orchard, Hutching Pond	80
Springs Hotel Lake	400
Crestwood, Cox's pond	100
Crofton, Railroad Lake	500
Cumberland Falls, Cumberland River	1,200
Danville, Caldwell's lake (A)	60
Caldwell's lake (B)	200
Duckers, Smith's pond	140
East View, Nolin Creek	140
Elizabethtown, Bunnell's pond	300
Fife Ponds	125

[a] Fry indicated by an asterisk, thus (*); all others are fingerlings, yearlings, and adults.
[b] Rescued from overflowed lands and restored to original waters.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

LARGEMOUTH BLACK BASS—Continued.

Disposition.	Fry,[a] fingerlings, yearlings, and adults.
Kentucky—Continued.	
Elizabethtown, Rough Creek	800
West Rhodes Creek	400
Elkhorn City, Big Sandy River, Levisa Fork	225
Big Sandy River, Russells Fork	500
Escondida, Green Creek	70
Franklin, Banton's pond	*2,000
Comer's pond	200
Gap in Knob, Cedar Creek	40
Georgetown, Elkhorn River	300
Hall's pond (A)	70
Hall's pond (B)	35
North Elkhorn River	40
Payne Pond	100
Glasgow, Skeggs Creek	*4,000
Strader's pond	125
Glasgow Junction, Sunnyside Pond	125
Glandale, Nolin Creek	375
Greenbrier, Lake Greenbrier	100
Greenup, Little Sandy River	80
Guthrie, Hibiscus Lake	500
Mimms's pond	500
Harrodsburg, Chaplin River	60
Hazard, Kentucky River, North Fork	60
Hiseville, Hodges's pond	125
Summers's pond	125
Hodgenville, Creal's pond	300
Heady's pond	300
Martin Pond	70
Nolin River, South Fork	600
Slaughter's pond	70
Sutton Pond	300
Weldon's pond	300
Hopkinsville, Lake Tandy	1,000
Winfree's pond	500
Horse Cave, Higgason's pond	*2,000
Hulen's pond	*2,000
Hutchen's pond	*2,000
Love's pond	*4,000
Mustain's pond	*2,000
Oldham's pond	*2,000
Poynter's pond	*2,000
Veluzat's pond	*4,000
Young's pond	*4,000
Idamay, Sturgeon River	1,025
Jackson, Kentucky River, North Fork	800
Jenkins, Elkhorn Lake	150
Johnson, Fleming Creek	300
Knob Lick, Blue Spring Creek	250
La Grange, Irwin's pond	70
Latonia, Jockey Club Lake	80
Lebanon, Caney Creek	600
Cloyds Creek	600
Graham's pond	40
Hardin Creek	600
Indian Creek	600
North Rolling Fork Creek	600
Pine Hill Pond	300
Pope Creek	600
Rolling Fork Creek	900
South Rolling Fork Creek	600
Lexington, Quarry Pond	150
Louisville, Wagner's lake	200
Lyndon, Marcia Power House Lake	100
Maceo, Kingfisher Lake	*20,000
Madisonville, Wilderness Pond	500
Marshall, Licking Creek, North Fork	300
Middlesborough, Fern Lake	80
Little Yellow Creek	80
Millersburg, Carpenter's pond	100
Hinkston Creek	400
Moberly, Lake Valentine	200
Morton, Lake Rabbitt	1,000
Kentucky—Continued.	
Morehead, Triplett Creek	40
Mount Sterling, Bogie's pond	150
Bruton Branch	70
Johnson's pond	150
Little State Creek	40
Prewitt Pond	150
Walker's pond	70
New Haven, Rolling Fork River	60
Newstead, Jenkin's pond	250
Olive Hill, Kinniconick Creek	105
Olmstead, Whipporwill Creek	*4,000
Red Oaks, Twin Pond	250
Richmond, Kensington Lake	200
Lake Reba	1,000
Otter Creek	40
Rowletts, Lester's pond	70
Salt Lick, Licking River	140
Salvisa, Salt River	60
Samuels, Sherman Lake	20
Shelbyville, Brown's pond	100
Bullskin Creek	400
Guthrie's pond	100
South Park, South Park Lake	1,000
Springfield, Cartwright Creek	40
Cottonwood Lake	400
Highview Lake	200
Staunton, Red River, North Fork	140
Stephensburg, Stephensburg Lake	70
Stithton, Mill Creek	200
Tip Top, Valley Lake	100
Tonieville, Shipp's pond	200
Trenton, West Fork Creek	1,000
Walton, Rankin's pond	70
West Point, Shady Grove Pond	200
Whick, Kentucky River, North Fork	600
Whitesburg, Kentucky River, North Fork	100
Williamsburg, Cumberland River	800
Winchester, Crump's pond	70
Woodburn, Station Pond	*2,000
Louisiana:	
Carencro, Lake Chillon	*1,000
Clinton, Brick Yard Lake	200
Coushatta, Dupree's pond	3,000
Hand's pond	1,500
Duberly, Shadow's pond	*2,000
Keatchie, Derrick Lake	*1,000
Fisher's lake	*1,000
Hall's pond	*1,000
Schuler's pond	*1,000
Lake Charles, Wilson's pond	*3,000
Lake Providence, Lake Providence	*8,000
Nettie, Magnolia Lake	200
New Orleans, Audubon Park Lake	400
Shreveport, Comegy's pond	*1,000
Pruett Lake	*3,000
Tremont, Perrine's pond	27
Urania, Lake Urania	*9,000 1,500
Whitman, Jackson's pond	200
Zwolle, Mill Pond	*2,000
Maryland:	
Alberton, Patapsco Creek	75
Alesia, Little Gunpowder River	300
Annapolis Junction, Little Patuxent River	750
Antietam, Antietam Creek	300
Baltimore, Gwynns Falls Lake	200
Bladensburg, Bellevue Pond	150
Forest Lake	200
Boring, Piney Run	150
Capitol Heights, Star Lake	200
Catoctin, Potomac River	300

[a] Fry indicated by an asterisk, thus (*); all others are fingerlings, yearlings, and adults.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

LARGEMOUTH BLACK BASS—Continued.

Disposition.	Fry,[a] fingerlings, yearlings, and adults.	Disposition.	Fry,[a] fingerlings, yearlings, and adults.
Maryland—Continued.		Michigan—Continued.	
Chestertown, Brice's mill pond	125	Ellsworth, Eaton Lake	200
Cockeysville, Black Rock Run	100	Noble Lake	200
Conowingo, Deer Creek	300	Whites Lake	200
Cropley, Potomac River	600	Gladwin, Chesser Lake	100
Cumberland, Evitts Creek	950	Round Lake	100
Flintstone Creek	200	Hardy, Crooked Lake	300
Potomac River	1,850	McPhee Lake	300
Town Creek	650	Sand Lake	300
Wills Creek	350	Hastings, Leach Lake	200
Easton, Peach Blossom Creek	125	Lower Lake	200
Ellerslie, Wills Creek	50	Middle Lake	100
Ellicott City, Little Patuxent River	200	Highland, Lake Dunham	170
Emmitsburg, Toms Creek	400	Houghton, Lake Gerald	200
Forestville, Belle Chance Lake	75	Lake Roland	200
Frederick, Linganore Creek	550	Twin Lakes	200
Monocacy River	1,650	Iron River, Camp Lake	200
Frostburg, Casselman River	1,200	Chicagon Lake	200
Glencoe, Gunpowder River	250	Stanley Lake	200
Hagerstown, Antietam Creek	600	Jackson, Brown Lake	170
Conococheague Creek	900	Gillett Lake	170
Licking Creek	100	Vandercook Lake	170
Hughesville, Goode's pond	100	Wolf Lake	170
LeGore, Monocacy River	300	Kalamazoo, Gull Lake	300
Middletown, Catoctin Creek	300	Lake Ann, Bellows Lake	300
Mount Calvert, Patuxent River	875	Lake Ann	400
North East, Big Northeast Creek	125	Lake Roosa	300
Rockville, Lakeview Farm Pond	100	Lake View	300
Smithsburg, Lake Villa Farm Lake	300	Lakeview, Bass Lake	100
Snow Hill, Pocomoke River	625	Lapeer, Lake Bronson	100
Taneytown, Bear Creek	600	Lake Nepessing	100
Woodbine, Cat Tail Creek	150	McKeen Lake	100
Woodmont, Potomac River	750	Mohawk, Duncans Bay	350
Massachusetts:		Niles, Colvin Lake	100
Annawan Lake, Annawan Lake	200	Singer Lake	100
Gloucester, Cape Pond	100	Smith Lake	150
Greenfield, Connecticut River	200	Omena, Omena Bay	400
Deerfield River, Upper	200	Orchard Lake, Spring Lake	300
Lee, Upper Goose Lake	400	Provemont, Lake Leelanau	800
New Bedford, Cedar Dell Pond	200	Ramonia, Diamond Lake	400
Little Quittacas Pond	200	Richland, Gull Lake	100
North Dartmouth Mill Pond	200	Long Lake	100
Pittsfield, Onota Lake	200	Miller Lake	100
Pontoosuc Lake	200	Rose Center, Bush Lake	170
Shelburne Falls, Beaver Lake	100	Esler Lake	170
Springfield, Lake Congamond	300	Saginaw, Saginaw River	300
West Barnstable, Long Pond	100	Sidnaw, Gregory Lake	200
Lot Pond	100	Norway Lake	200
Mystic Lake	200	South Branch, Adams Pond	300
Michigan:		Iosgemaw Pond	200
Allenville, Brevort Lake	200	Turtle, Bear Lake	200
Alma, Pine River	150	Hemlock Lake	100
Alpena, Long Lake	600	Independence Lake	200
Baldwin, Lake Cashion	340	Island Lake	200
Belding, Big Wabasis Lake	150	Maple Lake	100
Beulah, Crystal Lake	800	Miller Lake	200
Buchanan, Clear Lake	150	Mosquito Lake	100
Pike Lake	150	North Lake	100
Charlevoix, Matchett Lake	400	Rat Lake	200
Clare, Arnold Lake	170	Silver Lake	200
Bailey Lake	340	Spruce Lake	200
Beebe Lake	170	Sutherland Lake	200
Dollar Lake	170	Twin Lake, Twin Lake	300
East Lake	170	Union City, Turtle Lake	170
Gerow Lake	170	Vincent Lake	340
Glass Lake	170	Yorkville, Gull Lake	100
Gut Lake	170	Minnesota:	
Loon Lake	170	Alexandria, Lake Henry	300
Round Lake	150	Lake Ida	300
South Lake	170	Lake Miltona	300
Stevens Lake	170	Harmony, Iowa River	200
Clyde, Fish Lake	170	Homer, Mississippi River	*70,000 [b]485
Dunham, Heart Lake	200		
Edwardsburg, Davis Lake	150	Lanesboro, Root River	200

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Details of distribution of fish and eggs, fiscal year 1916—Continued.

LARGEMOUTH BLACK BASS—Continued.

Disposition.	Fry,[a] fingerlings, yearlings, and adults.
Minnesota—Continued.	
Lanesboro, Root River, North Branch	200
Preston, Iowa River	100
Root River	100
Mississippi:	
Aberdeen, Jandon's pond	*4,000
Murff's pond	*4,000
Amory, Hatley Lake	*4,000
Malone Lake	*6,000
Booneville, Cape Horn Lake	*2,000
Mason's pond	*2,000
Braxton, Willow Pond	18
Burdette, Dan Williams Lake	*5,000
Byram, Woodall Pond	500
Canton, Galoway Lake	1,000
Horseshoe Lake	1,000
Lutz's pond	1,000
Round Lake	500
Cleveland, Sunflower River	1,250
Clinton, Lewis's pond	200
Columbia, Simmons's pond	300
Corinth, Bynum Lake	225
Hinton Lake	100
Miller's pond	225
Waukomis Lake	*8,000
White Lake	*4,000
Fernwood, Little Tangipahoa River	1,000
Packwood Lake	1,000
Flora, Bradley's pond	200
Oakhurst Pond	200
Gloster, Bass Lake	30
Bates Pond	200
Beresford's pond	60
Fern Lake	60
Hoskins's pond	30
Potenga's pond	30
Robinson's pond (A)	200
Robinson's pond (B)	30
Tarver Pond	200
Gulfport, Bayou Bernard	*6,000
Guntown, Norton's pond	*4,000
Hazelhurst, Lake Hazle	500
Heidelberg, Thornton's pond	200
Jackson, Carson's pond	500
Ratliff Inland Pond	500
Kosciusko, Boyd-Laudrum Pond	*2,000
Buck Spring Pond	*2,000
Carpenter's pond	*2,000
Cooper's pond	*2,000
Cullen's pond	*2,000
Currie's pond	*2,000
Doss's pond	*2,000
Evans's pond	*2,000
Presley's pond	*2,000
Longview, Heflin's pond	*2,000
Louisville, McCully's pond	60
Lumberton, Williamson's pond	200
McAdams, Gilbert's pond	200
Macon, Stemia Pond	*1,000
Madison, Jones Lake	*4,000
Magnolia, Crystal Lake	500
Maridian, South Pond	*2,000
Mossville, Hogan's pond	1,000
Mount Olive, Amenson's pond	200
Crafts Creek	1,500
Natchez, Ormonde Pond	400
Noxapater, Young's pond	1,000
Ocean Springs, Simmon's pond	500
Okolona, Abernathy's pond	*1,000
Adams's pond	110
Pachuta, Phaeti Lake	1,500
Pheba, Terry's pond	*6,000
Philadelphia, Lundy Lake	500
Mississippi—Continued.	
Pickens, Johnson Pond	45
Plantation, McCool's pond	*2,000
Pontotoc, Bishop's pond	150
Pope's pond	500
Porterville, Rogers's pond	*1,000
Prairie, Lawler Pond	200
Quincy, Jones Lake	1,000
Raworth, Raworth Pond	1,200
Rienzi, Monroe's pond	*4,000
Perry's pond	*4,000
Sandersville, Seller's pond	600
Sarah, Poe's pond	400
Walnut Lake	700
Shuqualak, Fleming's pond	300
Silver Leaf Lake	600
Silver Water Pond	300
Starkville, Chesser's pond	200
Richey's pond	*2,000
Stringer, Stringer's pond	300
Strongs, Clays Creek	*4,000
Dream Lake	*4,000
Fuller Pond	*4,000
Hanging Kettle Creek	*4,000
Taylorsville, Ford's pond	1,000
Theadville, McRae's pond	150
Thornton, Bee Lake	*2,000
Tupelo, Harman's pond	150
Ritter's pond	*4,000
Threlkeld's pond	500
Turnbull, Heart Lake	200
Perkins's pond	200
Vicksburg, Long Lake	400
Wahalak, Bealler Lake	200
Persons's pond (A)	200
Persons's pond (B)	200
Persons's pond (C)	200
Vaughn Lake	200
Waynesboro, Barnett's pond	150
Sigler's pond	600
Wethersby, Prine's Lake	200
Wesson, Emery Lake	350
Winchester, Winchester Lake	56
Yazoo City, Williams's pond	*8,000 265
Missouri:	
Amsterdam, Amsterdam Lake	600
Aurora, Little Flat Creek	300
Branson, Lake Taneycomo	900
Cabool, Brushy River	300
Hog Creek	200
Piney River	400
Cuba, Burbeuse River	300
Deepwater, Dickey Lake	200
De Soto, Exposition Lake	300
Doniphan, Current River	400
Elk Springs, Elk River	450
Excelsior, Kimber Lake	200
Firma, Barrett Lake	200
Fredericktown, St. Francis River	400
Gilliam, Slick Bottom Lake	150
Higginsville, Chicago & Alton Pond	400
Holmes Park, Excelsior Lake	400
Independence, Compton's lake	140
Ironton, Lake Killarney	300
Kearney, Ludwig's lake	350
Lebanon, Mayfield's pond	150
Lisle, Lisle Lake	1,300
Louisiana, Salt River	625
McBride, Saline Creek	200
Macon, Blees Lake	210
Mansfield, Lake Crystal	400
Martin City, Merryvale Lake	600
Mexico, Burlington Lake	625

[a] Fry indicated by an asterisk, thus (*); all others are fingerlings, yearlings, and adults.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

LARGEMOUTH BLACK BASS—Continued.

Disposition.	Fry,[a] fingerlings, yearlings, and adults.
Missouri—Continued.	
Mine Lamotte, Mine Creek Lake	105
Newburg, Little Piney Creek	140
Ozark, Finley River	450
Palmyra, Bay de Charles	375
Pierce City, City Lake	300
Rolla, Little Piney Creek, Lower	105
Saginaw, Montgomery Lake	450
Sloan's lake	450
St. Charles, Ballast Pit Lake	300
St. Clair, Burboise River	500
Ste. Genevieve, Boslers Pond	200
Bovene's pond	100
Clark Lake	200
Roettler Lake	100
St. Louis, Rock Lake	70
St. Marys, Pouyer's pond	100
Savannah, Blakeslee Lake	300
South Greenfield, Cox's pond	100
Van Vleet, Gum Tree Pond	60
Montana: Huntley, Huntley Creek	100
Nebraska:	
Paxton, Cedar Creek	100
Virginia, Virginia Lake	250
New Hampshire:	
Amherst, Baboosic Lake	200
Berlin, Head Pond	200
Littleton, Forest Lake	200
Meredith, Lake Winnepesaukee	300
Nashua, Corbett Pond	200
North Weare, Weare Reservoir	200
Pelham, Gumpus Pond	200
Island Pond	300
New Jersey:	
Beaver Lake, Beaver Lake	500
Blairstown, Fairview Lake	200
Butler, Apshawa Pond	200
Camden, Malaga Lake	250
Portstown Lake	250
Portstown River	250
Gibbstown, Third Creek	125
Haddon Heights, Haddon Heights Lake	125
Millville, Union Lake	250
Mountain Lake, Mountain Lakes	200
Wildwood Lake	200
Newton, Swartswood Lake	250
Piccatinney, Piccatinney Lake	375
Red Bank, Lake Marion	125
South Ogdensburg, Hawthorne Lake	200
New Mexico:	
Abbott, Abbott Reservoir	200
Carlsbad, Black River	500
Cimarron, Antelope Valley Lakes	600
Espanolla, Hatch Pond	200
Kenna, Bonam Pond	200
Las Vegas, Hooker's pond	100
Omava, La Jara Lake	150
Lake David	100
Raton, McAuliffe Lake	100
Roswell, North Bottomless Lakes	200
Shoemaker, Cherry Valley Lake	150
Socorro, Rito Springs Pond	300
Springer, Jaritas Lake	150
New York:	
Addison, Canisteo River	300
Goodhue Lake	300
Bainbridge, Mud Pond	125
Binghamton, Chenango River	200
Silver Lake	300
Susquehanna River	300
Clayton, St. Lawrence River	375
Delanson, Upper Lake	300
New York—Continued.	
Fishkill, Bennywater Pond	100
Brinckeroff Pond	100
Lake Garda	100
Kings Park, Loony Lake	250
Lake Mahopac, Kirk Lake	200
Lyons, Ganargua Creek	300
Machias, Lime Lake	400
Martindale, Forest Lake	300
Millbrook, Sandanomá Lake	100
Oneonta, Susquehanna River, Collins Dam	300
Orangeburg, Maze's pond	125
Parish, Grays Pond	250
Port Henry, Lake Champlain	625
Riverside, Rogers Pond	250
Schroon Lake	625
Thurman Pond	250
Ronkonkoma, Lake Ronkonkoma	625
Schenectady, Featherstone Lake	500
Shinnecock Hills, Far Pond	500
Wayland, Loon Lake	500
North Carolina:	
Angier, Rambaut's pond	*600
Apex, Johnson's pond	40
Pate's pond	20
Silver Lake	20
Upchurch's pond	*600
Asheville, Big Ivy Creek	40
White Flint Pond	40
Auburn, Farrill's pond	*400
Benson, Parrish's pond	*600
Black Mountain, Ottobrook Creek	1,500
Brown Summit, Cunningham Mill Pond	*400
Burlington, Griffin's pond	400
Holman's mill pond	400
Calypso, Goshen Swamp Pond	60
Charlotte, Catawba River	120
Coats, Nordon's pond	*400
Concord, Mill Pond	*400 200
Connelly Springs, Cannon Branch	200
Corapeake, Mathias's pond	*1,600
Cranberry, Toe River	150
Culberson, Mill Creek	1,000
Dillard, Big Creek	120
Dillsboro, Tuckaseigee River	6,195
Edenton, Queen Anns Creek	225
Elizabethtown, Spring Branch	*400
Elkin, Roaring River	40
Faison, King's pond	*400
Fayetteville, Cedar Lake	*700
Cumberland Lake	40
McNair Ponds	40
Flat Rock, Lowndes's pond	20
Garland, Peterson Pond	*500
Gastonia, Catawba Creek	*600
Gold Hill, Campbell's pond	75
Second Creek	75
Goldston, Dunns Pond	*400
Sharps Pond	*400
Greenlee, Greenlee Lake	40
Greensboro, Hayworth's pond	*400
Hilton's pond (A)	*400
Hilton's pond (B)	*600
Stinking Quarter Pond	2,200
Guilford College, Horse Pen Pond	*400
Hamlet, Hatcher's mill pond	40
Hendersonville, Club Lake	40
Jordan's pond	20
Lake Warzaw	40
Laurel Park Lakes	40

a Fry indicated by an asterisk, thus (*); all others are fingerlings, yearlings, and adults.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

LARGEMOUTH BLACK BASS—Continued.

Disposition.	Fry,[a] fingerlings, yearlings, and adults.
North Carolina—Continued.	
Lily Pond	40
Twin Springs Lake	5,000
Hickory, Baker's pond	200
Catawba River	1,400
Foard's pond	700
High Point, Willis's pond	400
Kingsboro, Nobles Mill Pond	40
Lumberton, McMillan's pond	*300
Marion, Catawba River, North Fork	40
Gilkey's pond	40
Loftis Pond	2,500
Morgan's lake	2,500
North Fork Creek	2,500
Patton Mill Pond	2,500
Maysville, White Oak River	60
Mayworth, Duharts creek	*400 400
Mebane, McIver's pond	400
Milwaukee, Lake Kirby	1,000
Monroe, Aquadale Lake	200
Austin's pond	200
Baucom's pond	75
Buckhorn Falls Pond	*800 200
Helms Lake	400
Mullis's pond	200
Newsom's pond	200
Stump Lake	*400
Morrisville, Sorrell's pond	400
Morven, Melton Pond	20
Mount Airy, Snow's pond	40
Murphy, Grape Creek	2,500
Hiawassee River	325
North Wilkesboro, Hunting Creek	*800
Moravian Creek	40
Old Fort, Curtis Creek	2,500
Oriental, Smithe Creek	*400
Parkersburg, Johnson Mill Pond	150
Patrick, Camp Creek	75
Pee Dee, Blewett Falls Pond	*1,200 60
Pollokville, Trent River	60
Raleigh, Buckhorn Falls Pond	*400 400
Roaring River, Roaring River	40
Upper Briar Creek	20
Rocky Mount, Bynum's pond	*1,000
Roseboro, Suggs Mill Pond	150
Roxboro, Bowes's pond	*200
Bradsher's pond	*200
Runion, Shelter Laurel Creek	1,500
Spruce Pine, Beaver Creek	75
Grassy Creek	75
North Toe River	225
Star, Scout Pond	75
Statesville, Steele's pond	100
Sylva, Tuckaseigee River	4,580
Whiteville, Black Mill Pond	*800
Winston-Salem, Lake Katherine	*800 60
North Dakota:	
Devils Lake, Devils Lake	500
Stump Lake	300
Grace City, Jake Juanita	300
Hettinger, Buckhorn Lake	500
Lisbon, Horseshoe Lake	300
Sheyenne River	300
St. John, Byrnes Lake	200
Carpenter Lake	200
Dion Lake	200
Fish Lake	400
Gordon Lake	200
North Dakota—Continued.	
St. John, Gravel Lake	200
Jarvis Lake	200
Krooks Lake	200
Long Lake	200
Mill Lake	200
Oak Lake	200
Oslund Lake	200
Purdy Lake	200
Schnavilly Lake	200
Taylor Lake	200
Walker Lake	200
Wimbledon, Spiritwood Lake	300
Ohio:	
Akron, Long Lake	500
Turkeyfoot Lake	500
Batavia, Little Miami River, East Fork	300
Bellville, Clear Fork Creek	200
Gatton's lake	100
Honey Creek	100
Mohican River, Clear Fork	500
Cadiz, Chautauqua Lake	500
Canton, Timken Lake	300
Columbus, Mount Air Lake	300
Defiance, Maumee River	200
Delhi, Runck's pond	100
Dundas, Benner Run	100
Edon, Nettle Lake	200
Fort Jennings, Rekart Quarry Pond	200
Galion, Sandusky River	300
Whetstone Creek	300
Geauga Lake, Geauga Lake	500
Georgetown, White Oak Creek	200
Lawshe, Brush Creek	200
Lima, McCullough Lake	100
Loveland, Little Miami River	300
Malvern, Big Sandy Creek	300
Mansfield, Mohican River, Black Fork	300
Mohican River, Clear Fork	300
Whetstone Creek	200
Millersburg, Kilbuck River	300
Mineral Ridge, Meander Creek	100
Minerva, Big Sandy Creek	300
Morrow, Little Miami River, Todds Fork	200
Mount Orab, Moberly-Roselott Pond	100
Newark, Buckeye Lake	400
New Philadelphia, One Leg Creek	300
Sugar Creek	300
Oneida, Big Sandy Creek	300
Paulding, Auglaize River	200
Portsmouth, Brush Creek	100
Little Scioto River	100
Ravenna, Lilly Park Pond	100
Ripley, Eagle Creek	200
Russell Point, Indian Lake	200
Shelby, Mohican River, Black Fork	200
Tiffin, Sandusky River	300
Troy, Great Miami River	200
Uhricksville, Big Stillwater Creek	300
Tuscarawas River	300
Van Wert, Van Wert Lake	100
Zanesville, Muskingum River	500
Oklahoma:	
Afton, Frisco Pond	1,000
Alderson, Buck Lake	75
Ardmore, Ardmore Club Lakes	180
Chickasaw Lake	300
Gill's pond	60
Kinkade's lake	60
New Lake	60
North Lake	60
Plainview Lake	60

[a] Fry indicated by an asterisk, thus (*); all others are fingerlings, yearlings, and adults.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

LARGEMOUTH BLACK BASS—Continued.

Disposition.	Fry,[a] fingerlings, yearlings, and adults.
Oklahoma—Continued.	
Boynton, Cobb Lake	20
Buffington, Illinois River	385
Illinois River, Barron Fork	110
Coalgate, Canyon Lake	90
City Reservoir	40
Harley Pond	20
Maxwell Pond	90
M. K. & T. Pond	60
Custer, Bruce's pond	140
Graves's pond	70
Neher's pond	70
Schneider's pond	210
Foyil, Skelton's pond	300
Grandfield, Little Blue Lake	115
Natural Lake	115
Guthrie, Bickford Lake	*6,000
Santa Fe Lake	*8,000
Hartshorne, Lake Savage	30
Hickory, Pond No. 16	36
Hobart, Northwest Lake	170
Indiahoma, Baldwin's pond	70
Ketchum, Thompson's lake	1,000
Konawa, Bermuda Lake	*4,000
Lindsay, Power's pond	*2,000
McCurtain, San Bois Lake	100
Manitou, Manitou Pond	70
Maramec, Maramec Lake	400
Mill Creek, Brushy Creek	90
Buckhorn Creek	60
Flood Creek	36
Hickory Creek	36
Mill Creek	90
Mounds, Barton's lake	20
Mulhall, Hunt's pond	*2,000
Muskogee, Country Club Lake	300
Noble, Chickasaw Lake	*4,000
Oklahoma Lake	*4,000
Nowata, Tillottson's pond	1,000
Oklahoma City, Granite Lake	*10,000
Lieneman's pond	*4,000
Wright's pond	*4,000
Okmulgee, Walker's pond	*2,000
Orlando, Valley Pond	*2,000
Paoli, Willow Pond	*2,000
Pauls Valley, Horseshoe Pond	*2,000
Republican Pond	*2,000
Shady Pond	*4,000
Vaughn's pond	100
Perry, City Lake	*4,000
Country Club Lake	*3,000
Cow Creek	200
Dormar's pond	100
Hartman's lake	200
Long Slough Lake	100
McFarlin's pond	200
McKinstry Pond	*2,000
Mullinex Pond	*2,000
Nelson's pond	100
New City Lake	200
Perry Pond	*5,000 100
Sokol Pond	*4,000
Treeman Lake	*4,000
Pittsburg, Lake Austin	60
Pittsburg Pond	40
Pryor, Hedrick's pond	* 2,500 2,000
Robbin, Illinois River, Barron Fork	260
Shawnee, Baldwin Lake	*4,000
Lowdan's lake	*2,000
Spiro, Waterworks Lake	90
Stigler, Waterworks Lake	90
Stillwater, Thatcher's pond	200
Yost Lake	300
Tishomingo, Big Sandy Creek	60
Blue River	90
Pennington River	90
Rock Creek	90
Waterworks Lake	60
Tulsa, Clearwater Lake	2,000
Vinita, Mustang Creek	3,000
Wanette, Scott's pond	*4,000
Wardville, Gantt's lake	60
Weleetka, Buckley Pond	60
Woodward, Beatte's pond	100
Cline Lake	100
Dillon's pond	100
Green Lake	100
Hoge Lake	100
McPherson Lake	100
Nixon's lake	200
Oal Lake	100
Osage Springs Lake	100
Roundup Creek	100
Sand Creek	100
Wyatt-Ferguson Lake	100
Pennsylvania:	
Annville, Quittapahilla Creek	125
Swatara Creek	250
Baden, Douds's pond	125
Bentleyville, Pigeon Creek, North Fork	400
Berwyn, Tarleton Pond	125
Brackney, Quaker Lake	600
Bryn Mawr, Pembroke Pond	125
Bushkill, Forest Lake	200
Cambridge Spring, Edinboro Lake	300
Chadds Ford, Patterson's pond	125
Chambersburg, Conococheague Creek	200
Cherry Tree, Kneedler's pond	100
McKeage Pond	100
Chester, Sycamore Creek	125
Coogan Station, Lycoming Creek	200
Columbia, Chickies Creek	250
Conneaut Lake, Conneaut Lake	800
Denver, Brubaker Dam	125
Bucher Dam	125
Cocalico Creek	125
Garrett Dam	125
King Dam	125
Leeds Creek	125
Lesher Dam	125
Meckley Dam	125
Royer Dam	125
Shimp Dam	125
Shober Pond	125
Swamp Creek	125
Uibel Dam	125
Wegner Dam	125
Witmer Creek	125
Dinsmore, Herman Pond	200
Echo Lake, Echo Lake	200
Ephrata, Cocalico Creek	125
Fahnestock Creek	125
Little Muddy Creek	125
Middle Creek	125
Moyer Pond	125
Upper Conestoga Creek	125
Waw Bash Creek	125
Falls, Susquehanna River	300
Gettysburg, Big Marsh Creek	250
Haines, Susquehanna River	625

[a] Fry indicated by an asterisk, thus (*); all others are fingerlings, yearlings, and adults.

Details of distrbution of fish and eggs, fiscal year 1916—Continued.

LARGEMOUTH BLACK BASS—Continued.

Disposition.	Fry,[a] fingerlings, yearlings, and adults.
Pennsylvania—Continued.	
Harrisburg, Susquehanna River	600
Huntingdon, Juniata River	750
Juniata River, Raystown Branch	125
Stony Creek	250
Indiana, Yellow Creek	200
Johnstown, Upper Stony Creek River	300
Jonestown, Little Swatara Creek	250
Lackawaxen, Faust's pond	100
Lancaster, Brooks Lake	125
Cocalico Creek	250
Geiger's lake	125
Hammer Creek, Lower	125
Hunsecker Pond	125
Middle Creek	125
Mill Creek	125
Paper Mill Pond	125
Park Pond	125
Public Pond	125
Lansdale, Spring Lakes	125
Lewisburg, Beaver Run	100
Buffalo Creek	200
Little Buffalo Creek	100
Spruce Run	100
Susquehanna River, West Branch	200
Turtle Creek	100
Meadville, Cussewago Creek	150
French Creek	150
Woodcock Creek	150
Mill Hall, Big Fishing Creek	200
Fill Pond	200
Milton, Loyalsock Creek	200
Monaca, Raccoon Creek	250
Monocacy, Lewis's pond	125
Muncy Valley, Eaglesmere Lake	500
New Galilee, Little Beaver Creek	150
New Milford, East Lake	200
Oil City, President Run	600
Sugar Lake	1,000
Peach Bottom, Susquehanna River	125
Pequea, Pequea Creek	250
Susquehanna River	250
Petersburg, Warrior Ridge Lake	250
Philadelphia, Crum Creek	250
Quarryville, Hopkins Lake	125
Octoraro Creek	125
Reading, Maiden Creek	125
Northkill Creek	250
Red Hill, Perkiomen Creek	375
Rohrerstown, Little Conestoga Creek	250
Royersford, Mill Pond	250
Schuylkill River	250
Stony Run	250
Sabula, Sabula Lake	200
Scranton, Gravel Lake	200
South Danville, Susquehanna River	200
Standing Stone, Susquehanna River	200
Stroudsburg, McMichael Creek	200
Sunbury, Susquehanna River	200
Thompson, Wrighter Lake	200
Titusville, Oil Creek	600
Trout Run, Lycoming Creek	200
Tucquan, Susquehanna River	250
Waterville, Big Pine Creek	200
Little Pine Creek	200
Williamsburg, Juniata River	200
Williamsport, Loyalsock Creek	200
Wind Ridge, Wheeling Creek, South Fork	400
Porto Rico: San Juan, Carite Reservoir	600
Rhode Island:	
Pascoag, Pascoag Lake	100
Providence, Waterman Reservoir	300
West Kingston, Yaugoo Pond	200

Disposition.	Fry,[a] fingerlings, yearlings, and adults.
South Carolina:	
Abbeville, Calhoun Creek	130
Miller Mill Pond	130
Aiken, Bridge Creek Pond	1,000
Hendrix's pond	100
McElmurray's pond	1,500
Stevens Creek	1,500
Tarrant's pond	1,540
Wright's pond	1,000
Alcot, Stuckey's pond	150
Anderson, Townsend Lake	1,000
Batesburg, Hartley's pond	500
Bethune, Cato's pond	1,000
Murchison Branch	500
Blair, Broad River	2,950
Blythewood, Rimer's pond	150
Sandfield Pond	150
Wooten's pond	500
Campobello, Atkins's pond	20
Caves, Johns Cross Roads Pond	1,000
Chester, Grassy Run	125
Chesterfield, Gaddy's pond	75
Columbia, Crane Creek Pond	1,000
Messers Lake	2,500
Percival Mill Pond	1,000
Poplar Pond	1,000
Dawkins, Broad River	1,150
Broad River Pond	150
Park Shoals Pond	150
Due West, Long Branch	20
Easley, Nally's pond	500
Edmund, Beaver Pond	500
Dreher's pond	100
Folley's pond	50
Rikard's pond	1,000
Scouter Creek	1,000
Scouter Creek Pond	1,500
Shumpert's pond	1,000
Enoree, Enoree River	40
Enoree River Pond	20
Estill, Hamilton Ridge Mill Pond	20
Fairfax, Ritter Pond	40
Florence, Black Creek	4,000
Gilbert, Hamburg Pond	40
Gray Court, Warnor River	130
Greenville, Greens Lake	1,500
Laurens, Badgett Creek	20
Barksdale Pond	500
Beaverdam Creek	40
Big Rabun Creek	60
Bush River, North Fork	500
Cotton Mills Lake	40
Dial Creek	40
Dirty Creek	40
Duncan Creek	1,000
Fleming Branch	40
Holmes Creek	1,000
Indian Creek	20
Lick Creek	40
Little River, Branch of	40
Madden Creek	1,500
Mill Creek	20
Moore Creek	1,000
Petsland Creek	1,000
Reedy River	1,000
South Reedy Fork Creek	40
Taylor Creek	500
Wall Pond	500
Walnut Creek	1,000
Leesville, Adam's pond	500
Smith's pond (A)	500
Smith's pond (B)	40
Lexington, Laurel Falls Lake	40
Mathias's pond (A)	1,000
Mathias's pond (B)	1,000

[a] Fry indicated by an asterisk, thus (*); all others are fingerlings, yearlings, and adults.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

LARGEMOUTH BLACK BASS—Continued.

Disposition.	Fry,[a] fingerlings, yearlings, and adults.
South Carolina—Continued.	
Lowrys, Robbin's pond	500
Meredith, Beaverdam Pond	3,000
Monetta, Cato's pond	500
Jordan's pond (A)	500
Jordan's pond (B)	500
Monroe, Hursey Pond	2,000
Moore, Whites Creek	225
Mount Croghan, McGregor's pond	150
Mill Branch	500
Springwater Pond	1,000
Neeces, Livingston's pond	1,500
North, Craft's pond	1,000
Orangeburg, Corcor Swamp Pond	500
Farnum Pond	1,500
Fishery Branch	2,500
Four Mile Branch Pond	1,000
North Edisto River	10,000
Sims's pond	1,000
Smoaks Pond	1,000
Pageland, Hursey Pond	150
Pelion, Fort Pond	100
Gantt's pond (A)	100
Gantt's pond (B)	100
Gantt's pond (C)	1,000
Lucas's pond	250
Rawls's pond	100
Rayflin, Chalk Hill Pond	1,000
Gantt's pond	500
Ridge Spring, Bog Branch	1,000
Cullom's pond (A)	1,000
Cullom's pond (B)	1,000
Jordan's pond	1,000
Lotts Creek	500
McTier Creek	500
Mill Creek	50
Rocky Springs Creek	500
Strother's pond	40
Rock Hill, Arcade Pond	40
Rockton, Castles's pond	75
St. Matthews, Little Beaver Creek	1,000
Salley, Gunter's pond	1,500
Sharp, Tompkins Pond	500
Society Hill, Rocky Dundee Ponds	2,000
Springfield, Dean Swamp Pond	1,000
Strother, Broad River	150
Swansea, Bull Swamp Pond	1,500
Jackson's pond	40
Jeffcoat's pond	40
Third Pond	1,000
Trenton, Beaverdam Pond	1,000
Bouknight's pond	1,000
Boynhams Pond	1,000
Horns Creek Pond	1,000
Longs Pond	1,000
Salter's pond	40
Smith Pond	1,500
Wagner, Giddy Swamp Pond	1,500
Westminster, Knox Creek	130
White Pond, Owens Pond	500
Sicurrin's pond	100
Windsor, Bonnett's pond	1,500
Woodford, Jeffcoat's pond	500
Yorkville, Wallace's pond	500
Waterworks Pond	500
South Dakota:	
Belvidere, Addison's pond	200
Capa, Capa Lake	300
McCook, McCook Lake	300
Morristown, White Deer Creek	600
Pukwana, Red Lake	300
Tripp, North Star Pond	100
Tennessee:	
Arlington, O. K. Pond	100
Ashland City, Sycamore Creek	1,000
Tennessee—Continued.	
Chapel Hill, Duck River	*4,000
Clarksville, Fletcher Fork Creek	500
College, Sequatchie River	80
Dechard, Ducare Pond	500
Estill Springs, Elk River	900
Fayetteville, Elk River	*1,500 9,350
Norris Creek	*1,000
Huntingdon, Dill's pond	200
Jackson, Lake Louise	100
Long's pond	100
Johnson City, Watauga River	450
Kingston Springs, Harpeth River	1,000
Knoxville, Limestone Lake	400
Lewisburg, City Lake	*4,000
Lone Mountain, Limstone Creek	80
McKenzie, Weeping Willow Pond	1,600
McMinnville, Barren Fork Creek	500
Caney Fork Creek	1,500
Charleys Creek	500
Collins River	1,500
Hickory Creek	1,000
Mountain Creek	1,000
Maryville, Lake Sidney Lanier	200
Moscow, Oak Lake	35
Murphreesboro, Stone River	800
Nashville, Lake Clara	1,000
Stone River	1,000
Newport, Pigeon River, East Fork	60
Riverside, Buffalo River	1,000
Little River	365
Rogersville, Caney Creek	275
Crockett Creek	255
Shelbyville, Duck River	1,500
East Mulberry Creek	900
Springfield, Sycamore Creek	1,000
Stanton, Tucker's pond	100
Tate, Bean Creek	150
Briary Fork Creek	150
Garretts Blue Lake	75
Proffett Creek	80
Tazewell, Barron Creek	20
Townsend, Little River	725
Trenton, Forked Deer River, North Fork	*2,000
Tullahoma, Motlow's mill pond	900
Wartrace, Duck River, Garrison Fork	900
Wartrace Creek	900
Whitwell, Looneys Creek	20
Texas:	
Abilene, Deadman Creek	1,420
Albany, Lake Diller	100
Waterworks Lake	150
Allen, McMahan Lake	50
Alpine, Crystal Valley Pond	50
Amarillo, Palo Duro Creek	3,600
Palo Duro Lake	2,400
Annona, Beaverdam Lake	1,900
High Lake	560
Arlington, Owls Nest Pond	200
Athens, Dunbar's pond	50
Knight's pond	900
Koon Kreek Lake	750
Searls Point Lake	50
Bagwell, Ward's lake	1,000
Bastrop, Club Lake	1,450
Bennetts, Lake Dorothy	1,600
Bertram, Bingham Pond	220
Big Springs, Guitar's pond	230
Big Wells, Zimmerman's pond	400
Blooming Grove, Cole's pond	1,000
Walker's pond	1,000
Blossom, King's pond	250
Bowie, Wagoner's pond	900

a Fry indicated by an asterisk, thus (*); all others are fingerlings, yearlings, and adults.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

LARGEMOUTH BLACK BASS—Continued.

Disposition.	Fry,[a] fingerlings, yearlings, and adults.
Texas—Continued.	
Brady, Bluff Creek	250
Brady Creek	1,525
Cow Creek Lake	125
Live Oak Creek	175
Brandenburg, Brandenburg Lake	4,000
Brenham, Club Lake	2,360
Parker's lake	561
Bremond, Flag Lake	600
Brownsville, Calumet Pond	1,000
Country Club Lake	1,260
Resaca de la Palma	1,000
Brownwood, Anderson's pond (A)	1,000
Anderson's pond (B)	256
Clark's pond	256
Day's pond	256
Forsythe's pond	1,000
Home Lake (A)	1,000
Home Lake (B)	43
Lake Alba	2,000
Ovalo Lake	256
Shipman's pond	128
Simmon's lake	1,000
Brundage, Moore's pond	250
Burnett, Hamilton Creek	1,301
Caldwell, Mateek's pond	180
Calvert, Parkinson's pond	400
Cameron, Barton's pond	200
Bergum's lake	100
Dairy Lake	1,000
Lake Cameron	200
Roth's pond	200
Willow Lake	1,000
Cary, Gaither's pond	2,700
Celeste, Williams Pond	900
Center, Clear Lake	50
Hearn Pond	100
Hurst's pond	1,000
Kelly Lake	800
Kennedy's pond	1,000
Lawson's pond	1,000
Napier's pond	1,000
Sand Spring Branch	100
Christine, Norwood Lake	400
Clarksville, Bledsoe's pond	1,000
Cleburne, Club Lake	11,930
Clifton, Meridian Creek	170
Columbus, Glendale Pond	55
Wooten's pond	100
Concord, Brown's lake	2,000
Cooledge, McCoy's pond	500
Corsicana, Magnolia Ponds	200
Coughran, Green Lodge Lake	250
Crandall, Bluewater Lake	800
Crockett, Glenn's pond	75
Grounds Lake	700
Hollywood Lake	1,350
Rice Lake	700
Crystal City, Taft's pond	56
Winter Garden Lake	2,535
Cuero, Club Lake	100
Cuero Creek	1,000
Deer Creek	2,200
Guadalupe River	400
Irish Creek	800
Lake No. 1	200
McCoys Creek	1,000
Thomas Creek	1,000
Daingerfield, Martin's pond	2,400
Dallas, Kidd Spring Pond	200
De Kalb, Jones Lake	1,000
Del Rio, Cienegas Creek	300
Devils River	4,655
Denton, Wilkirson's pond	1,250
Texas—Continued.	
Detroit, Club Lake	1,000
East Lake	1,500
Oil Mill Pond	1,000
Red Pond	1,000
Union Grove Pond	1,000
Wards Pond	1,000
Dibell, Everglade Pond	100
Dilley, Lake Cory	50
Dundee, Griffin Lake	2,000
Eastland, Lake Tilman	50
Lyerla's pond	60
Edgewood, Gin Lake	800
Scott's pond	1,000
Edna, Goose Lake	100
Kerr Lake	615
Elgin, Clopton's pond	400
El Paso, Railroad Pond	100
Enloe, McCarty's pond	115
Ennis, Anderson Ranch Pond	800
Latimer Lake	800
Estelline, Matador Lake	1,800
Fant City, Demonstration Farm Pond	56
Farmersville, Strong Pond	900
Fentress, San Marcos River	300
Ferris, Lloyd's pond	400
Nolen's pond	400
Flatonia, Hajek's lake	50
Fletcher, Village Creek	5,000
Floyd, Club Pond	2,000
Fort Worth, Lake Hearst	2,200
Magnolia Lake	435
Frisco, Clarks Lake	400
Lake Bonnie	550
Garrison, Erwin's lake	150
Gatesville, Cow House Creek	896
Georgetown, Ganns Mill Lake	2,000
San Gabriel River and branches	1,900
Giddings, Fischer's pond	800
Holman's pond	400
Raube's pond	800
Schneider's pond	400
Whitter Pond	400
Gilmer, Davis Lake	2,950
Green Lake	50
Robertson Lake	600
Simpson Lake	50
Smith Lake	4,750
Tanglewood Lake	2,000
Goree, Goree Pond	2,000
Graford, Loving Creek	170
Grandview, Club Lake	2,090
Grapeland, Gee's pond	700
Myrtle Lake	150
Persimmon Lake	1,540
Whitiker's pond	1,500
Greenbrier, Brewster Creek	100
Greenbrier Lake	50
Grigsby, West's pond	750
Harrold, McClendon's pond	900
Haskell, Three W Ranch Pond	1,000
Henderson, Dickinson Lake	750
Dulin Pond	760
Howland, Jones Lake	115
Hughes Springs, Milner's pond	1,400
Jacksboro, Beck Pond	800
Carroll Creek	1,950
East Keechi Creek	1,600
Hensley Lake	800
Knox's lake	135
Mountain Lake	800
Rummage Lake	800
Jayton, Long's pond	1,000
Jourdanton, Hagelstein Pond 69	400

[a] Fry indicated by an asterisk, thus (*); all others are fingerlings, yearlings, and adults.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

LARGEMOUTH BLACK BASS—Continued.

Disposition.	Fry,[a] fingerlings, yearlings, and adults.
Texas—Continued.	
Justin, Denton Creek	825
Kaufman, Brown's pond	500
Carlateright Lake	800
Cartwright's pond	60
Coleman Gin Pond	700
Meadow Pond	60
Spikes's pond	500
Terry's pond	800
Kemp, Hurley's pond (A)	800
Hurley's pond (B)	800
Kerrville, Beck Pond	460
Guadalupe River	2,150
Harris Pond	636
Schreiner's pond	636
Sherman Mill Pond	2,000
Wachter Pond	636
Kingsville, Santa Gertrudis Creek	2,000
Kirbyville, Cow Creek	3,000
Krum, Ram Ranch Lake	270
La Coste, Medina River	150
Lancaster, Country Club Lake	2,000
La Rue, Oak Heights Lake	1,600
La Vernia, Cibolo River	100
Leesville, Lenahan Lake	* 3,000
Lincoln, Proske's pond	325
Linden, Hedges Mill Pond	500
Livingston, Lawrence's pond	50
Lockhart, Lockhart Branch	115
Lone Oak, Hughes Pond	900
Schenck's pond	900
Longview, Echols Lake	150
Hipsidom Lake	225
Luling, San Marcos River	150
Mabank, Cotton Mill Lake	800
Old Gin Lake	1,000
Osbornes Resort Pond	800
Tynes's pond	800
McDade, Owen Lake	400
McKinney, Cleveland's pond	115
Club Lake	2,000
Manor, Hulin Springs Pond	105
Marble Falls, Marble Falls Lake	1,000
Marfa, Gem Pond	100
Marshall, Craver's Lake	2,000
Peden's pond	900
Maud, Helms's pond	200
Maypearl, Golladay's pond	700
Menard, Augustine Creek	869
Callans Big Lake	869
Celery Creek	1,738
Clear Creek	869
Dry Creek	869
Elm Creek	1,738
Rocky Creek	1,738
San Saba River	625
San Saba River, Hubbells Dam	1,738
Sheens Branch	869
South Elm Creek	1,738
Streigler Lake	100
Mercury, Corn Creek	125
Miami, Jeffus's pond	1,000
Mineral Wells, Corn Pond	170
Eagle Creek	1,600
Ioni Creek	1,285
Mount Pleasant, Meadowbrook Pond	2,700
Mount Vernon, Hill's pond	115
Murchison, Moore Lake	600
Nacogdoches, Sheppard Lake	170
South End Lake	515
Naples, Naples Lake	50
Neuville, Fults's pond	50
New Braunfels, Comal River	6,970
Olmos, Elm Creek	2,340
Paducah, Cook's pond	900
Texas—Continued.	
Palacios, McDonald's pond	75
Paris, Bauman's pond	500
Gordon Club Lake	340
Igo's pond	500
Johnsons Lake	1,500
Lake Virginia	1,000
Timber Lake	500
Petrolia, Lake Cullinan	3,600
Petty, Collier's pond	500
Maness's pond	250
Willow Pond	250
Pilot Point, Emberson's lake	900
Pittsburg, Davis Club Lake	300
Plainview, Lake Plainview	3,000
Point, Horton's pond	900
Jones's pond	115
Randolph, Randolph Pond	425
Ranger, Bruce Pond	60
Hodges Pond	60
Weaver Pond	60
Reisel, Goodman's pond	400
Richland, Swink's pond	50
Roaring Springs, Reeves's pond	900
Rockdale, Rock Lake	130
Roscoe, Grantham Pond	100
Round Rock, Lake Creek	4,750
San Antonio, Mahucke Park Ponds	3,750
San Antonio River	11,050
San Augustine, Jones's pond	100
Sandy Point, Palo Alto Lake	3,000
Sanger, Duck Creek	550
San Marcos, Blanco River	400
Dedeke Pond	200
San Marcos River	404
San Marcos River, Davis Hole	400
Woods Bend Creek	400
Sarita, Los Palomas Lake	700
Sayers, Big Sandy Creek	4,000
Little Sandy Creek	3,000
Sealy, San Bernardino Lake	4,596
Shamrock, Coburn Pond	900
Masterson Pond	900
Smithville, Harbicht Lake	1,800
Jones's lake	150
Snyder, Scoggin's pond	1,000
Staples, San Marcos River	300
Steep Creek, Chinquapin Creek	1,050
Hines's lake	50
Stephenville, Sycamore Creek	1,625
Streetman, McConnell's pond	40
McDaniel's pond	40
Milligan's pond	30
Sugar Land, Cleveland Lake	100
Sulphur Springs, Brown Lake	1,000
Buford Lake	230
Coapland Lake	900
Elberta Lake	3,041
France's lake	900
Lake Buford	1,400
Lake Tatom	1,400
Pierce's pond	1,000
Roberts's pond	900
Rock Crusher Lake	2,800
Smith Lake	2,000
Sweetwater, Lake Trammell	2,000
Swenson, Headquarter Lake	2,000
Taylor, Washington Heights Pond	1,200
Teague, Hines Lake	1,425
Middleton Pond	2,500
Whaley's pond	2,000
Terrell, Bond's pond	1,000
Williams's pond	1,000
Texarkana, Horseshoe Lake	550
Temple's pond	400

[a] Fry indicated by an asterisk, thus (*); all others are fingerlings, yearlings, and adults.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

LARGEMOUTH BLACK BASS—Continued.

Disposition.	Fry,[a] fingerlings, yearlings, and adults.
Texas—Continued.	
Thorndale, Elliott's pond	2,200
Heintze's pond (A)	800
Heintze's pond (B)	700
Lee's pond	800
Newton's pond	700
Watkins's pond	700
Thrall, Stiles's lake	65
Timpson, Bridwell's pond	200
Lake of the Woods	215
Tolbert, Cobb's pond	900
Tyler, Rowlands Lake	300
Uvalde, Chalk Bluff Pond	75
Dry Frio River	115
Eagle Pass Pond	300
Eight Mile Lake	75
Frio River	115
Kincaid Dam Pond	115
La Pryor Pond	75
Leona River	100
Nueces River	175
Pulliam Ranch Pond	115
Ranger Lake	1,050
Tom Nunn Pond	75
Turkey Creek	1,400
Vernon, Long's pond	900
Muller Lake	900
Spring Lake	2,700
Waco, Cooper's lake	90
Everman Lake	600
Farrish's pond	950
Whitesboro, Clark Lake	200
Whitewright, Farrow's pond	1,000
Whitney, Deep Pond	50
Live Oak Lake	50
Wichita Falls, Avis Lake	1,200
Lone Star Lake	1,200
West Lake	1,200
Wichita Club Lake	2,400
Wills Point, Beck Lake	1,450
Blitz Pond	1,000
Bone Lake	1,600
Brundidge Lake	1,200
Ennis Lake	2,050
Fish Lake	1,250
Fish Tail Lake	2,400
Lake Charles	2,900
Lake Gilchrist	1,600
Lake Payne	1,250
McKee Pond	900
Nugent Lake	2,250
Reagan Pond	500
Roddy Lake	1,250
Swank Lake	1,200
Windom, Shelley Pond	250
Winnsboro, Bell Lake	900
Popes Lake	1,000
Winona, Driskell Pond	300
Vermont:	
Barton, Parker Pond	100
Ely, Fairlee Lake	200
Hydeville, Lake Bomoseen	200
Island Pond, Railroad Pond	100
Lyndonville, Chandler Pond	100
Virginia:	
Adams Grove, Williams's pond	100
Ashby, Shenandoah River	1,600
Basic City, South River	1,600
Beaverdam, Thompson's pond	150
Ben Hur, Powells River	210
Berryville, Shenandoah River	200
Blackstone, Belmont Pond	300
Boyce, Shenandoah River	1,600
Bremo Bluff, McKenna Pond	1,000
Bridgewater, North River	150
Virginia—Continued.	
Carrsville, Holland's pond	100
Chesterfield, Cogbill's pond	300
Coan, King's pond	100
Coeburne, Guests River	210
Cohoke, Cohoke Pond	600
Covington, Dunlap Creek	150
Jackson River	70
Duffield, Tompkins's pond	140
Fair Oaks, Hicks's pond	300
Fredericksburg, Pulliam's pond	150
Gainesville, Catharpin Creek	100
Little Bull Run	80
Gordonsville, Brackett's pond	150
Gretna, Whitethorn Creek	150
Guinea, Clear Lake	450
Morris's pond	150
Payne's pond	450
Ta River	450
Harrisonburg, Nicolas's pond	125
Silver Lake	1,500
Hot Springs, Jackson River	70
Jarratt, Pedneau's pond	100
Lawrenceville, Meherrin River	800
Lester Manor, Club Pond	450
Lofton, Lilley's pond	500
Maidens, Carlisle Pond	1,000
Manassas, Occoquan Creek, Upper	80
Martinsville, Smith River	450
Max Meadows, Reed Creek	1,500
Middletown, Cedar Creek	250
Milford, Kenbrook Pond	150
Mount Crawford, North River	200
Nathalie, Martin's pond	100
New Market, Shenandoah River, North Fork	2,000
Oak Ridge, Oak Ridge Lake	150
Pemberton, Johnson-Duncan Pond	150
Whiteville Pond	1,500
Muddy Creek Pond	300
Pembroke, Mountain Lake	350
Penola, Camps Pond	150
Plains, Goose Creek	2,000
Richmond, Jolly Mill Pond	300
Salem, Roanoke River	750
Saunders Wharf, Spindle's mill pond	100
Staunton, Middle River	450
Stephens City, Bartonsville Dam	100
Klines Dam	175
Shenandoah River	150
Strasburg, Shenandoah River, North Fork	200
Suffolk, Darden's mill pond	200
Lake Savage	1,200
Summit, Massaponax Church Pond	150
Taylorsville, Beech Branch Lake	150
Tazewell, Clinch River, Maiden Spring Fork	140
Toms Brook, Shenandoah River, North Fork	2,000
Walker Ford, James River	2,000
Waverly, Harrison Pond	400
Shady Grove Lake	500
West Point, Goddin's pond	300
Marston's mill pond	300
Rays Neck Mill Pond	300
Winchester, Opequon Creek	250
Windsor, Bradshaw's pond	300
Turner's pond	100
Winston-Salem, Mountain Run	40
Woodsland, Pugh's pond	50
Wytheville, Reed Creek, South Fork	1,500
West Virginia:	
Boury, New River	70
Bramwell, Bluestone River	80

[a] Fry indicated by an asterisk, thus (*); all others are fingerlings, yearlings, and adults.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

LARGEMOUTH BLACK BASS—Continued.

Disposition.	Fry,[a] fingerlings, yearlings, and adults.
West Virginia—Continued.	
Clarksburg, West Fork River	300
Elkins, Tygarts Valley River	105
Groves, Big Buffalo Creek	70
Birch River	70
Huntington, Guyandotte River	120
Keyser, Patterson Creek	400
Martinsburg, Opequon Creek	150
Potomac River	150
Middletown, Middle Island Creek	600
Mullens, Guyandotte River	200
Oral, Oral Lake	800
Parsons, Cheat River, Shavers Fork	150
Paw Paw, Great Cacaopn River	250
Phillippi, Buckhannon River	70
Tygarts Valley River, Middle Fork	70
Raleigh, Glade Creek	70
Piney River	70
Romney, Potomac River, South Branch	300
Shepherdstown, Potomac River	160
Springfield, Potomac River, South Branch	95
Wheeling, Wheeling Creek	400
Wisconsin:	
Arcadia, Lake Idlewild	300
Silver Lake	200
Spring Lake	200
Barneveld, Aavang Creek	200
Duffey Creek	200
Jones Valley Creek	200
Mile Pond	200
Oimoen Creek	200
Tvedt Creek	200
Urbin Creek	200
Barron, Manitou Lake	200
Birchwood, Birch Lake	200
North Lake	200
Bloomer, Bass Lake	200
Boyd, Big Hay Creek	200
Pike Lake	200
Butternut, Hoffman Lake	200
Luebke Lake	200
Morse Lake	200
Mud Lake	200
Parker Lake	200
Pine Creek	200
Richter Creek	200
Sickle Lake	200
Cable, Big Rosa Lake	200
Namakagon Lake	200
Williams Lake	200
Cedarburg, Cedar Creek	600
Milwaukee River	600
Centuria, Long Lake	200
Chippewa Falls, Duncan Creek	200
Popple Lake	200
Coloma, Cartis Lake	200
Splitgaber Lake	500
Crandon, Dry Lake	200
Rice Lake	200
Stone Lake	200
Donaldson, Big Bass Lake	600
Lac Vieux Desert	600
Moccasin Lake	800
Mud Lake	600
Spring Lake	600
Drummond, Spring Lake	400
Eagle Point, Rasmus Pond	200
Eau Claire, Twin Island Lakes	500
Eggleston Crossing, Stevens Lake	300
Eland, Birchwood Lake	3,800
Lake Go To It	200
Elkhart Lake, Crystal Lake	800
Elk Mound, Cedar Falls Lake	300
Fifield, Jupa Lake	200
Round Lake	200
Wisconsin—Continued.	
Fond du Lac, Lake de Neveu	200
Mullet Lake	300
Gagon, Round Lake	400
Gleason, Echo Lake	300
Glidden, Torrey Lake	200
Gordon, Bass Lake	200
Clear Lake	200
Metzger Lake	200
Ox Lake	200
Swenson Lake	200
Grand Rapids, Wisconsin River	600
Hancock, Fish Lake	200
Hartford, Frieses Lake	100
Mud Lake	100
Murphy Lake	200
Pike Lake	200
Hayward, Clover Lake	200
Grindstone Lake	100
Ishum Lake	100
Martin Lake	100
Moose Lake	100
Namakagon Lake	100
Namakagon River	100
Patrick Lake	200
Rodeman Lake	200
Shue Lake	100
Slim Lake	100
Spring Lake	100
Thayer Lake	100
Williams Lake	200
Hazelhurst, Lake Katherine	200
Hitterdal, Lake Wilson	600
Holcombe, Kappa Lake	200
Round Lake	200
Janesville, Rock River	400
Kilbourn, Wisconsin River	400
La Crosse, French Lake	200
Joe Lynn Creek	200
Ladysmith, Flambeau River	200
Hemlock River Pond	200
Pekegama Lake	200
Pulasky Lake	200
Twin Lakes	200
Lake Beulah, Lake Beulah	400
Lake Mills, Rock Lake	200
Laona, Birch Lake	200
Riley Lake	300
Lyndhurst, Beaulieu Lake	100
Big Lake	150
Gardner Lake	250
Island Lake	150
Miller Lake	150
Moon Lake	150
Schmidt Lake	150
Slinlin Lake	150
Manitowoc, English Lake	300
Glombsky Lake	300
Goss Lake	100
Hartlaub Lake	400
Hempton Lake	400
Kastbaum Lake	300
Lutzlse Lake	400
Schisel Lake	400
Silver Lake	150
Mason, Phantom Lake	200
Mattoon, Baker Lake	400
Johnson Lake	200
Mitchell Lake	200
Moose Lake	200
Mauston, Lemonweir River	300
Mayville, Rock River	300
Medford, Lake Esadore	200
Mellen, Loon Lake	200
Menomonie, Atlasta Lake	200
Chippewa River	370

[a] Fry indicated by an asterisk, thus (*); all others are fingerlings, yearlings, and adults.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

LARGEMOUTH BLACK BASS—Continued.

Disposition.	Fry,[a] finger-lings, yearlings, and adults.	Disposition.	Fry,[a] finger-lings, yearlings, and adults.
Wisconsin—Continued.		Wisconsin—Continued.	
Menomonie, Downsville Lake	200	Sparta, Perch Lake	200
Dunnville Lake	200	Walworth Pond	200
Hoolid Lake	200	Spider, Smith Lake	400
Pitt Lake	200	Spread Eagle Lakes, Spread Eagle Lakes	550
Red Cedar River	200	Stanley, Diamond Lake	200
Wilson Lake	200	Jump River	250
Yellow Bank Lake	200	Yellow River	250
Youngs Lake	200	Star Lake, Ballard Lake	200
Nashville, Dry Lake	200	Little Muskellonge Lake	200
Horseshoe Lake	200	Sweden, Beaver Lake	200
Norrie, Bass Lake	200	Three Lakes, Barrard Lake	155
Lake Go To It	300	Big Lake	155
Mud Lake	200	Big Fork Lake	155
Pike Lake	200	Big Stone Lake	155
North Freedom, Schramm Mill Pond	200	Bonner Lake	155
Okauchee, Okauchee Lake	1,000	Butternut Lake	150
Owen, Black River	280	Columbus Lake	150
Popple River	200	Cook Lake	155
Pelican Lake, Pelican Lake	300	Dog Lake	155
Phelps, Big Twin Lake	300	Hutchinson Lake	155
Little Twin Lake	200	Island Lake	155
Phillips, Crane-Chase Lake	200	Little Fork Lake	155
Deer Lake	200	Lost Lake	155
Poynette, Poynette Mill Pond	200	Medium Lake	155
Prairie du Chien, Mississippi River	1,500	Mud Lake	155
Random Lake, Random Lake	400	One Stone Lake	155
Spring Lake	400	Planting Ground Lake	150
Reedsburg, Baraboo River	300	Round Lake	150
Hay Creek	100	Thunder Lake	155
Rhinelander, Bass Lake	200	Townline Lake	155
Faust Lake	200	Tomahawk, Deer Lake	200
Lake Creek	200	Lake Clara	200
Mill Lake	200	Mirror Lake	200
Sugar Camp Lake	200	Somo River	200
Wisconsin River	200	Spirit River	200
Rice Lake, Balsam Lake	300	Tomahawk River	200
Barry Lake	100	Wisconsin River	200
Beaver Lake	100	Trevor, Rock Lake	200
Carter Lake	150	Waukesha, Little Muskego Lake	200
Desair Lake	150	Popple Creek	200
Devils Lake	150	Waupaca, Bass Lake	200
Long Lake	225	Goose Neck Lake	200
Quince Lake	100	Loon Lake	200
Rice Lake	100	McClain Lake	200
Silver Lake	100	Wausau, Croched Lake	200
Tuscobia Lake	150	Eau Claire River	400
Richland Center, Bowen Mill Pond	50	Lake Wausau	600
Excelsior Mill Pond	50	Pine River	200
Ithaca Mill Pond	50	Rib River	200
Lone Rock Mill Pond	50	Road Lake	200
Mill Creek	50	Short Portage Lake	600
Mill Pond	50	Wisconsin River	400
Rodolph Mill Pond	50	Wautoma, Bugh Lake	200
Sextonville Mill Pond	50	Waverly, Waverly Lake	300
Sayner, Plum Lake	300	West Bend, Silver Lake	300
Shawano, Keshena Lake	400	Whitehall, Trempealeau River	300
Lamote Lake	400	Whitewater, Green Lake	200
Loon Lake	400	Middle Lake	200
Round Lake	400	Mill Lake	200
Sandy Lake	400	Turtle Lake	200
Sullivan Lake	400	Whitewater Lake	200
Sheboygan, Coetzer Lake	200	Winter, Barber Lake	200
Pigeon River	200	Barker Lake	200
Sheboygan Falls, Sheboygan River	200	Bass Lake	200
Shell Lake, Big Ripley Lake	200	McDonald Lake	200
Chain of Lakes	200	Woodland, Neosho Mill Pond	200
Devils Lake	200	Wyoming:	
Little Long Lake	200	Cheyenne, Lake Minnehaha	200
Shell Lake	600	Sloan's lake	200
Solon Springs, Black Fox Lake	200	Gillette, Burlington Lake	250
Deer Print Lake	200		
Sparta, Angelo Pond	200		
Depot Pond	150	Total [b]	*471,300 1,357,768
La Crosse River	100		
Paper Mill Pond	200		

[a] Fry indicated by an asterisk, thus (*); all others are fingerlings, yearlings, and adults.
[b] Lost in transit, 12,000 fingerlings; 500 fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

SUNFISH.

Disposition.	Fry,[a] fingerlings, yearlings, and adults.
Alabama:	
Andalusia, Henderson's pond	200
Radford's pond	200
Anniston, Cane Creek, tributary of	200
Sam McCluskin Pond	100
Ariton, Ziglar's pond	200
Ashby, Oak Hill Pond	300
Attalla, Brasher's pond	100
Bangor, Blue Hole Lake	300
Bessemer, West Lake	600
Birmingham, Barrett's pond	300
Clark's pond	400
Doster's pond	200
Rock Quarry Lake	200
Wilson Lake	300
Brierfield, Shoals Creek	600
Caldwell, Pleasant Hill Mill Pond	200
Carrollton, Lubbeck Pond	800
Lubbub Creek	800
Clayton, Blue Hole Pond	200
Nix's pond	400
Thomas's pond	400
Cordova, Black Warrior River	1,000
Cullman, Fronhold's pond	100
Tucker's pond	100
Dancy, Clark's pond	450
Virginia Lake	450
Dozier, Moore's pond	200
Pine Root Pond	200
Evergreen, Tanner's pond	100
Falkville, Flint Creek	400
Fayetteville, Davis Branch	300
Gadsden, Nocolula Creek	300
Greensboro, Ramey's pond	150
Stickney's pond	200
Greenville, Hillcrest Pond	250
Headland, Brackin's pond (A)	100
Brackin's pond (B)	150
Brackin's pond (C)	100
Mathis's pond	150
Inverness, Pasture Pond	200
Jasper, Cane Creek	1,000
Letohatchee, Payne's pond	300
Lineville, Lake Mary Scott	500
Lineville Lake	350
Moon's pond (A)	150
Moon's pond (B)	100
Luverne, Beall's lake	200
Benbow's pond	200
Howard's pond	100
Madison, Lily Flag Pond	300
Marion, Jones Pond	100
Montgomery, Line Creek	400
Olive Lake	400
Munford, Ossco Pond	100
Notasulga, Vaughan Mill Pond	825
Oneonta, Wilemon's pond	100
Opelika, Ingram's mill pond	300
Roaring Springs Pond	300
Opp, Shady Pond	100
Peachburg, Weem's pond	200
Pell City, Cornett's pond	200
Petrey, Bodiford's pond	100
Spradley's pond	200
Plantersville, Jones's pond	200
Prattville, Davis's pond	300
Pyriton, Birchfield's pond	150
Blackstock's pond	100
Morrison's pond	100
Ramer, Boothe's pond	200
Riderville, Price-Rider Pond	300
Speigner, Morton Pond	950
Stevenson, Hackworth's pond	200
Talladega, Talladega Creek	400
Alabama—Continued.	
Talladega Springs, Sapsucker Creek	200
Sulphur Branch	300
Tennille, Brestwood's pond	300
Tyson, James Pond	200
Oak Lea Pond	100
Tuscaloosa, Nabers's pond	40
Stewart Lake	200
Arizona:	
Gleeson, Gibson's pond	50
San Simon, Bartlett's pond	50
Homrighausen's pond	50
McLarty's pond	50
Morrow's pond	50
Sunflower Ranch Pond	50
Arkansas:	
Emerson, McDonald's pond	500
Gravette, Austin's pond	2,000
Greenwood, Harper's pond	4,000
Townley's pond	1,000
Hot Springs, Bull Creek	3,000
Fordyce Lake	3,000
Little Rock, Crystal Pond	1,000
Magnolia, Benvenue Pond	1,000
Goode's pond	2,000
Puckett's pond	500
Waller's pond	1,000
Subiaco, Subiaco Lake	2,000
Florida:	
DeFuniak Springs, Gum Pond	600
Murphy's pond	400
East Lake, Lake Weir	600
Graceville, Snell's pond	500
Tampa, Clearwater Pond	150
Pinetta, Alcyone Pond	300
Elbow Lake	600
Redman, Redman Pond	200
Round Lake, Round Lake	400
Georgia:	
Allenhurst, Terrell's pond	400
Americus, Mill Pond	400
Athens, Water Oak Pond	250
Atlanta, McClelland's pond	350
Augusta, Hagler Pond	400
Hammond Creek	1,250
Baconton, Bacon's pond	200
Bainbridge, Callahan Mill Pond	300
Deep Water Pond	300
Four Mile Pond	400
Belair, Green Garden Pond	200
Box Springs, King Mill Pond	300
Bullochville, Waddell's pond	200
Walden's pond (A)	200
Walden's pond (B)	200
Walden's pond (C)	200
Chipley, Maple Grove Pond	100
Cisco, Cockburn's pond	150
Lake View	150
Columbus, Ram Pond	150
Cordele, Ray's pond	1,100
Dalton, Gossage's pond	150
McLellan's pond	150
Danville, Champion's pond	200
Decatur, Mill Pond	300
Greenville, Terrell's pond	250
Hapeville, Appling's pond	200
Holly Springs, Fowler's pond	150
McWhiter's pond	100
Ideal, Cromer's pond	150
Jefferson, Head's pond	100
Jimps, Wilson's pond	400
Louisville, Smith Branch	100
Lulaton, Satilla River	800
Lumpkin, Fort's pond	200

[a] Fry indicated by an asterisk, thus (*); all others are fingerlings, yearlings, and adults.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

SUNFISH—Continued.

Disposition.	Fry,[a] fingerlings, yearlings, and adults.
Georgia—Continued.	
McDonald, Satilla River	1,200
McDonough, Lower Pond	200
McIntyre, Holton's pond	200
Price's pond	200
Macon, Sherwood Creek	150
Martin, Dean's pond	100
Matthews, Pennington's pond	400
Meldean, Mossy Creek	500
Mitchell, Kitchens's pond	600
Monroe, Cochran pond	100
Oakwood, Walnut Creek Pond	200
Preston, Nicholson's pond	400
Shellman, Robinson's pond	200
Smyrna, Akin's pond	150
Stone Mountain, McCurdy's pond	300
Summerville, Montgomery Mill Pond	550
Summit, Johnson's pond	300
Suwaunee, Jay's pond	50
Swainsboro, Kea's pond	400
Summer Place Pond	300
Talbotton, Spear's pond	100
Tallulah Falls, Tallulah Lake	600
Thomasville, Smith-Moreland Pond	200
Tifton, Lula Lake	300
Whitley's pond	400
Toccoa, Soapstone Lake	150
Unadilla, Duncan's pond	200
Valdosta, Gornto's pond	400
Vidette, Robinson's pond	200
Walls Crossing, Snider's pond	150
Washington, Little River	1,200
Ravenwood Pond	150
Watkinsville, Oconee River	300
Weston, Spann Mill Pond	300
Whigham, Ochlocknee River	750
Winchester, Felton Mill Pond	300
Illinois:	
Mayfair, Udally's pond	100
Meredosia, Illinois River	[b] 108,930
Meredosia Bay	[b] 350
Napierville, DuPage River	775
Pittsfield, Matthew's pond	100
Indiana:	
Anderson, Stillwell's pond	200
Wildwood Pond	400
Bloomington, Bean Blossom Creek	600
Bluffton, Gravel Pit Pond	200
Bryant, Ligger's pond	200
Dubois, Sendelweck's pond	200
Frankfort, Shoemaker Lake, East	200
Gilman, Cherry Pond	200
Indianapolis, Fall Creek	600
Lippus Pond	200
Middlebury, Stone Lake	400
Muncie, Drumm's pond	200
Pendleton, McCarty's pond	200
Plymouth, Dixon Lake	400
Richmond, Morton Lake	400
Ridgeville, Lake Pequannaha	200
Scottsburg, Iola Lake	200
Tangier, Moore's pond	200
Tipton, Duncan's pond	200
Twelve Mile, Hilda Lake	200
Van Bruen, Crevistona Pond	200
Warren, Salamonia River	400
Iowa:	
Bellevue, Mississippi River	[b] 180,800
Davenport, Vanderveer Park Lake	400
Eldora, Iowa River	1,400
Lime Springs, Upper Iowa River	4,500
Manchester, Maquoketa River	15,350
North McGregor, Mississippi River	[b] 265,000
Iowa—Continued.	
Numa, Norris's pond	400
Steamboat Rock, Iowa River	1,600
Williamsburg, Pilot Grove Pond	200
Kansas:	
Effingham, Cook's pond	200
Kincaid, Blue Grass Lake	200
Sanders's pond	200
Olathe, Hoff's lake	300
Scipio, Richmond Pond	500
Kentucky:	
Allenville, Donaldson's pond	300
Mallory's pond	300
Riley's pond	200
Berea, Silver Creek, Brushy Fork	400
Silver Creek, Upper	400
Booker, Smith's pond	300
Campbellsville, Speer's pond	150
Carrollton, Grobmyer's pond	150
Corydon, Horse Lot Pond	100
Crestwood, Brewer's pond	150
Danville, Bright's pond	300
Ekron, Bluegrass Pond	200
Maggies Lake	200
Zack Pond	200
Elizabethtown, Breeden's pond	300
Erlanger, Codey's pond	150
Frankfort, Reformatory Pond	200
Glasgow, Beaver Creek	100
Hollow Pond	100
Greenup, Buffalo Creek	80
Tygart River	160
Greenville, Coomb's pond	200
Helechawa, Red River	300
Henderson, Fruitland Pond	100
Hopkinsville, Little River, Sinking Fork	100
L. & E. Junction, Rayborn's pond (A)	200
Rayborn's pond (B)	200
Maceo, Hawes's pond	200
McKinney, Milling Company Pond	150
McNary, Hahn's pond	200
Maysville, Ohio River	1,200
Mount Sterling, Cockrell's pond	100
Jeffrie's pond	200
Prewitt Pond	150
Ratliff's pond	200
Mount Vernon, Maret's pond	100
Nebo, Woehler's pond	100
Nicholasville, Smither's pond	100
Nolin, Black Rock Pond	100
Home Pond	100
Owensboro, Meadow Pond	100
Rocky Hill Station, Hudson Creek	200
Rowletts, Davis's pond	200
Shelbyville, Undulata Lake	150
Silver Creek, Paint Lick Creek	300
Thomson, Eubank's pond	100
Water Valley, Lone Oak Pond	100
Winchester, Red Cross Pond	200
Louisiana:	
Chatham, Smart's pond	*15,000
Dodson, Stovall's pond	*9,000
Elmore, Mount Zion Pond	*9,000
New Iberia, Duboin's pond	20
Wilson, Thompson's pond	300
Maryland:	
College Park, Experiment Station Pond	150
Hagerstown, Antietam Creek	450
Conococheague Creek	450
Ijamsville, Willow Pond	150

[a] Fry indicated by an asterisk, thus (*); all others are fingerlings, yearlings, and adults.
[b] Rescued from overflowed lands and restored to original water.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

SUNFISH—Continued.

Disposition.	Fry,[a] fingerlings, yearlings, and adults.
Michigan:	
Battle Creek, Lake Goguac	125
Holly, Burns Lake	75
Jackson, Vandercook Lake	75
Wolf Lake	125
Montgomery, Long Lake	75
Newaygo, Pickerel Lake	600
Otia, Blue Lake	600
Rose Centre, Spring Lake	25
White Cloud, Lost Lake	1,200
Williams, Wolf Lake	75
Minnesota:	
Homer, Mississippi River	[b] 599,461
Lanesboro, Root River	800
Root River, North Branch	800
Mississippi:	
Aberdeen, Blue Lake	200
Carter Pond	300
Cribbs Pond	200
Cypress Pond	200
Goose Lake	200
Hickon Lake	300
Amory, Armstrong's pond	200
Artesia, Brothers Pond	100
Bay St. Louis, Nicoise Pond	100
Blue Mountain, Sumrall's pond	300
Booneville, Smith Pond	400
Carriere, Breland's pond	100
Centreville, Cox's lake	400
Clinton, Johnston's pond	300
Corinth, Miller's pond	400
Shadburn's pond	150
Derma, Hardin's pond	300
Egypt, Hammond's pond	300
Fayette, McNair's pond	300
Forest, Riser's pond	150
Gloucester, Day's pond	200
Dye Pond	200
McGehee's pond	200
Robinson Pond	200
Hazelhurst, Ranch Pond	200
Hickory, Walker's pond	300
Jackson, Lake von Leotzen	300
Learned, Osborn's pond	300
Liberty, Brueck's pond	200
Louisville, Brickyard Pond	300
Carter Pond	200
Clark Pond	200
Club Pond	450
Storer's pond	200
Lyman, Poley Branch Lake	150
Macon, Scales's lake	400
Meridian, Queen City Pond	400
Mize, Bryant's pond	200
McAlpin's pond	150
Mount Olive, Caraway's pond	200
Penn's pond	150
Neshoba, Hillman's pond	200
Olive Branch, Elder's pond	200
Philadelphia, Cole's pond	200
Hester's pond (A)	300
Hester's pond (B)	300
Sallis, Temple's pond	200
Shuqualak, Bell's lake	200
McNee's pond	200
Maury Pond	200
Minor Pond	200
River Lake	200
Vickers Lake	200
Willow Lake	200
Starkville, Gamble's pond	200
Hogan Lake	200
Templeton's pond	200
Mississippi—Continued.	
Stringer, Knight's pond	200
Summer, Fergusson's pond	300
Sumrall, Miller's pond	200
Tomsuba, Page's pond	150
Tupelo, Amity Pond	200
Sander's pond	150
Shumpert's pond	200
Wheeler Pond	200
Van Vleet, Willow Pond	200
Water Valley, Enderlin's pond	200
West Point, Brady Pond	200
Yazoo City, Williams Pond	800
Missouri:	
Blackburn, Pecan Grove Pond	200
Bucklin, Chariton River, Mussell Fork	1,200
Calhoun, Butler Place Pond	400
Centralia, Bluegrass Pond	100
De Soto, Cape's pond	200
Everton, Meierhoff's pond	150
Excelsior, Henry East Pond	200
Henry Northeast Pond	200
Firma, Barrett Lake	1,000
Hardland, Prairie View Pond	150
Kirksville, Moots's pond	300
Lawson, Elm Grove Pond	200
Mansfield, Lake Crystal	600
Palmer Pond	150
Monet, Cundet's pond	495
Norwood, Farm Pond	150
Palmyra, Bay de Charles	600
Pomona, Lake Pippin	150
Potosi, Quaker Springs Pond	100
Purcell, Bradford's pond	200
Rolla, Frisco Lake	4,000
St. Charles, Passell's pond	200
Savannah, McFadden's pond	450
Sedalia, State Fair Pond	100
Wayland, Johnson's pond	200
Windsor, Johnson's pond	400
Montana:	
Forsyth, Crockett Lake	200
Yellowstone River	525
Glendive, Yellowstone River	250
Miles City, Yellowstone River	250
Nebraska:	
Arnold, Cass's pond	150
Hardy, Rainey Pond	100
New Hampshire: Canaan, Spectacle Pond	200
New Jersey:	
Asbury Pary, Wesley Lake	600
Piccatinney, Piccatinney Lake	600
New Mexico:	
Albuquerque, Beckham's pond	50
Buchanan, Cooley's pond	50
Carlsbad, Black River	50
Seaton's pond	50
Willis's pond	50
Cimarron, W. S. Lake	150
Clayton, Duren Creek	200
Deming, Bauman's pond	50
Des Moines, Spring Hill Pond	50
Dulce, Dulce Lake	50
Estancia, Sherwood's pond	50
Walker's pond	50
Kenna, Cooper's pond	50
Savage's pond	50
Las Vegas, Chupainas Pond	50
Lucia, McGillvray's pond	50
Montoya, Twine Mill Lake	50
Mountainair, Arroya de la Cienega	50

[a] Fry indicated by an asterisk, thus (*); all others are fingerlings, yearlings, and adults.
[b] Rescued from overflowed lands and restored to original waters.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

SUNFISH—Continued.

Disposition.	Fry,[a] fingerlings, yearlings, and adults.
New Mexico—Continued.	
Romero, Vernon's pond	50
Roswell, North Bottomless Lake	100
Taiban, Jeter's pond	50
Klutts's pond	50
Muller's pond	50
Sherman's pond	50
Wise's pond	50
New York:	
Addison, Canisteo River	400
Baldwin, Clown Lake	200
Binghamton, Fiala's pond	200
Boston, Boston Hill Pond	200
Chappaqua, Kent's pond	200
Congers, New Lake	400
Fishkill, Lake Garda	200
Highland, Central Lake	200
White Plains, Rathbone's pond	200
North Carolina:	
Apex, Seagrove's pond	100
Atkinson, Hawes's pond	200
Cofield, Wiley Pond	200
Concord, Irish Buffalo Creek	550
Faison, Goshen Creek	1,200
Four Oaks, Flowers's pond	200
Franklinton, Williams's pond	400
Garland, Carter's pond	150
Gold Hill, Morgan's pond	150
Poole's pond	150
Gulf, Caroline Pond	100
Hamlet, Gibson's pond	200
Henderson, Parker's pond	200
Hickory, Rocket's pond	100
Huntersville, Wilson's pond	100
Kings Mountain, Sevier Mills Pond	100
Kinston, Gray's pond	400
Lumberton, McMillan Pond	450
McCullers, Franks's pond	150
Marshall, Walnut Creek	300
Maysville, White Oak River	600
Mineral Springs, Long's pond	150
Rorie's pond	150
Monroe, Baucom's pond	100
Mooresville, Community Pond	300
Morven, Cox's pond	300
McLauren's pond	200
Watts's pond	200
Murphy, Valley River Pond	200
Pee Dee, Blewett Falls Pond	300
Rockfish, Jumping Gully Pond	300
Rockingham, Falling Creek Pond	400
Hitchcock Creek	400
Liles's pond	400
Statesville, Steele's pond	50
Stovall, Gregory's pond	400
Wilson, Tribo Flowers Pond	200
North Dakota: Devils Lake, Devils Lake	800
Ohio:	
Akron, Brady Lake	280
Fritch Lake	280
Nesmith Lake	280
New Reservoir	280
Rex Lake	560
Twin Lakes	280
Bellville, Gattons Lakes	225
Geauga Lake, Geauga Lake	450
Lima, McCullough Lake (A)	400
McCullough Lake (B)	400
Malvern, Big Sandy Creek	280
Newark, Buckeye Lake	275
Portsmouth, Little Scioto River	100
St. Clairsville, Cloister Pond	400
St. Marys, Lake St. Mary	800
Sardinia, Druhot's pond	100
Oklahoma:	
Ada, Forest Grove Lake	3,000
Ardmore, Chickasaw Lake	100
Harreld's ponds	400
Plainview Pond	2,000
Woods Lake	6,000
Asher, Knight's pond	3,000
Blanchard, Robinson's pond	400
Buffington, Illinois River	16,000
Canute, Young's pond	50
Cherokee, Beadman Lake	100
Foss, Augustine Pond	400
Hallett, Cassady's pond	4,000
Hennessey, Gritz's pond	400
Hollister, Stephen's pond	300
Isabella, Laubach's pond	300
Konawa, Fiddler's pond	3,000
McComb, Spray Pond (A)	3,000
Spray Pond (B)	3,000
Madill, Willow Lake	4,500
Manitou, Elmwood Pond	200
Marlow, Rubendall's pond	900
Mill Creek, Pennington River	4,000
Mooreland, Borchardt's pond	50
Lakeside Pond	50
Willow Lake	50
Noble, Chickasaw Lakes	10,500
North Coalgate, Gills Lake	8,000
Okemah, Riley's pond	4,500
Willow Grove Pond	4,500
Pauls Valley, Mankins Lake	6,000
Perry, Duncan's pond	3,000
Quinlan, Wylie's lake	50
Reeding, Triplett's pond	800
Seminole, Dolen's pond	400
Snyder, Stradley's pond	150
Woodward, Russau's pond	50
Pennsylvania:	
Chambersburg, Conococheague Creek	200
Coleman, Stony Creek River, Upper	1,200
Denver, Good's pond	300
Gap, Salesbury Lake	300
Greensburg, Beason Run Pond	300
Holden, Moore's pond	200
Jenkintown, Madiera's pond	300
Lancaster, Kukle Lake	600
Reedys Lake	300
Lansdale, Spring Lakes	300
Mill Hall, Brungard Pond	200
Monocacy, Lewis's pond	300
Murraysville, Jankowiak's pond	300
New Florence, Hendrix Creek, Lower	600
Phoenixville, French Creek	600
Reading, Alleghaney River	300
Antietam Creek	300
Cacoosing Creek	300
Licking Creek	300
Manatawny Creek	300
Pine Creek	300
Sacony Creek	300
Spring Creek	300
Swamp Creek	300
Teagley Lake	600
Tulpehocken Creek	300
Wyomissing Creek	300
Waterville, Little Pine Creek	200
Wilcox, Brennen Pond	225
Shultz Pond	225
Porto Rico: San Juan, Carite Reservoir	1,500
South Carolina:	
Abbeville, Calhoun Creek	600
City Waterworks Pond	200
Gambrell's pond	200
Long Cane Creek	600

[a] Fry indicated by an asterisk, thus (*); all others are fingerlings, yearlings, and adults.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

SUNFISH—Continued.

Disposition.	Fry,[a] fingerlings, yearlings, and adults.
South Carolina—Continued.	
Abbeville, Perrin's pond	100
Allendale, Wood Place Pond	200
Anderson, McKinney's lake	1,000
Bennettsville, Stillwater Pond	200
Cheraw, Hunt Pond	200
Whites Creek	400
Conway, Bourne's pond	500
Due West, Ashley's pond	150
Effingham, Lawrence's pond	200
Estill, Hamilton Ridge Pond	100
Florence, Black Creek	1,200
Gilmore Mill Pond	400
Haynsworth's pond	150
Fort Motte, Burgess's pond	400
Greenville, City Quarry Pond	150
Hartsville, Boggy Pond	150
McIntosh Mill Pond	200
Heath Springs, Moore's pond	150
Hodges, Nickles's pond	200
Honea Path, Simmons's pond	100
Jefferson, Bird's pond	100
Lamar, White's pond	200
Langley, Langley Pond	200
Laurens, Little River, Balls Fork	200
McBee, Sowell's pond	200
North, Johnson's pond	200
Orangeburg, Sims's pond	200
Smaoks Pond	200
Pelion, Pelion Pond	200
Piedmont, McMahan's pond	200
Rock Hill, Arcade Pond	200
St. Mathews, Corcor Swamp Pond	200
Neale's pond	200
St. Stephens, Tom Bottom Pond	400
Society Hill, Evans Mill Pond	400
Springfield, Electric Power Pond	300
Summerville, Winningham Pond	300
Sumter, Bethel Pond	200
McCutcheon Pond	200
Osteen's pond	200
Taylors, Beaverdam Pond	100
Trenton, Hatcher Pond	200
Rock Pond	100
Sease's pond	200
Wedgefield, Sherwood Pond	100
Winnsboro, Jackson Creek Pond	100
South Dakota: Winner, Lake Westonka	250
Tennessee:	
Arthur, Lambirt's pond	300
Atoka, Hill and Vale Pond	200
Bristol, Large's pond	150
Wolford's pond	100
Capleville, Ellis's pond	200
Cedar Hill, Red River, Sulphur Fork	10,000
Chattanooga, Chattanooga Creek	625
Freeman's pond	400
Middle Creek	400
Cleveland, Springdale Pond	425
Crab Orchard, Wheeler's pond	200
Greeneville, Doty's pond	150
Henning, Currie's pond	200
Hunter, Stony Creek	1,000
Jackson, Simmons's pond	200
Lenoir City, Alexander Lake	600
Madison, Gee's pond	4,000
Maryville, Allen's pond	150
Mason, Boyd's pond	200
Hamblet's pond	400
Old Whitley Pond	200
Montvale, Carpenter's pond	150
Murfreesboro, Downing's pond	200
Prospect, Bester's pond	25
Stanton, Morris's pond	4,000
Wartrace, Duck River, Garrison Fork	800
Texas:	
Abernathy, Oliver's pond	75
Alanreed, Brown's pond	75
Alba, Patten's pond	150
Archer City, Windthorst Pond	125
Arp, Bates's pond	150
Asherton, Finley's lake	100
Atlanta, Cameron's pond	150
Bastrop, Country Club Lake	150
Bedias, Lake Grove	150
Belew, Young's pond	250
Big Sandy, Mayfield's pond	150
Brenham, Club Lake	200
Brownwood, Ratliff's pond	150
Bryson, Lipscomb's pond	75
Burlington, Brod's pond	100
Caldwell, Haddox Pond	200
Hitchcock's pond	200
Oliver's lake	200
Canyon, Palo Duro Creek	300
Carbon, Murphy's pond	50
Carlton, Dixie Pond	100
Cedric, Cowles's pond	100
Center, Oak Lawn Lake	150
Wood Lake	200
Cheneyboro, Cheney's pond	100
Chico, Booth's pond	75
Clifton, Riverside Garden Pond	50
Clyde, Ferguson's pond	75
Coahoma, Winston Pond	75
Columbus, Wooten Pond	150
Cooper, De Vaney's pond	100
Corsicana, Fish Pond	150
Gentsch's pond	75
Magnolia Pond	150
Crosbyton, White River	500
Cross Plains, Cross Cut Reservoir	150
Everett's pond	100
Cuero, Tully's pond	100
Dallas, Gatman's pond	200
Kidd Spring Pond	400
Detroit, Gray Lake	250
Dumont, East Bank Lake	125
Edgewood, Melton Flanagan Lake	125
Ennis, Moore Lake	75
Willow Pond	75
Falfurrias, Margarita Lake	100
Farwell, Goodenough's pond	100
Withers's pond	75
Fort Worth, Lake Como	100
Lake Worth	200
Silver Creek	200
Gainesville, Priddy's lake	50
Gary, Graves-Daniel Pond	150
Williams's pond	150
Gilmer, Lake Oakland	200
Glazier, Locust Grove Pond	75
Gonzales, Lewis's pond	100
Steen's pond	100
Grand Saline, Carrington Lake	125
Greenbrier, Butler Lake	200
Hamilton, Rea's pond	100
Happy, Lake View	75
Hartley, Shady Pond	150
Henderson, Jones's pond	75
Long Lake	50
Snider Pond	75
Willow Pond	75
Yandle's pond	75
Hereford, Roberson's pond	75
Hondo, Moss Pond	60
Honey Grove, Carter's pond	125
Hubbard, Swader's pond	200
Huntington, Wood's pond	75
Itasca, Mitchell's lake	50

[a] Fry indicated by an asterisk, thus (*); all others are fingerlings, yearlings, and adults.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

SUNFISH—Continued.

Disposition.	Fry,[a] fingerlings, yearlings, and adults.	Disposition.	Fry,[a] fingerlings, yearlings, and adults.
Texas—Continued.		Texas—Continued.	
Jacksboro, Blue Pond	100	Sherman, Country Club Lake	250
Jacksonville, Alexander's pond	200	Sipe Springs, Leonard's lake	150
Josephine, Davis's pond	100	Somerville, Lang's pond	150
Jourdanton, Hagelstein's pond	50	Stanton, Henson's pond	75
Kaufman, Cottonwood Pond	325	Sulphur Springs, Taylor's pond	200
Kerens, Massey's pond	100	Wilder's pond	100
Kress, Groff's pond	75	Tahoka, Lockhart's pond	100
Lamesa, McCarty's pond	100	Taylor, Schwenker's pond	100
Sandy Shoal Lake	100	Texarkana, Southside Pond	100
Lindale, Hazel Lake	150	Thornton, Adair's pond	75
Lockney, Curlew Pond	75	Tulia, Shady Nook Pond	150
Longview, Campbell-Morgan Pond	300	Vega, Bluewater Hole Pond	100
Catterton's pond	300	Vernon, Spring Creek	300
Teague's pond	200	Washington, Hibbett's pond	150
Lorenzo, Hoops's pond	100	Wellborn, Barron's pond	150
Lovelady, Pecan Hill Pond	150	Wichita Falls, Archer Lake	300
McKinney, Perkins's pond	100	Wills Point, Black Jack Lake	125
Marathon, Santiago Ponds	250	Dicks Lake	250
Marion, Weyel's pond	150	Ditch Lake	125
Mart, Tidwell's pond	150	East Wills Point Pond	125
Matagorda, Norton's pond	75	Lake Allen	125
Meridian, Meadowside Lake	50	Lake Bruce	125
Miami, Dial Lake	150	Lake Charles	125
Mineola, Glade Creek	300	Lake Gilchrist	125
Kendrick's pond	200	Lake Marshall	125
Lloyd's pond	200	Lake Pratt	125
Mineola Club Lake	200	Lake Province	125
Pollard's pond	150	Lake Sigmond	125
Sikes's pond	150	Lake Wilson	125
Mineral Wells, Wynne Mountain Lake	75	Palmer Lake	125
Mount Calm, Nelson Lake	100	Uta Pabst Lake	125
Mount Vernon, Bryant's pond	75	Van Zandt Lake	250
Muleshoe, Elrod's pond	175	Wortham, Hackney's pond	150
Nacogdoches, Nacogdoches Creek	300	Virginia:	
Naples, Sycamore Pond	150	Battery Park, Rainbow Farm Pond	200
Navasota, Woodlawn Pond	150	Beaver Dam, Osier Swamp Pond	300
New Waverly, Lewis's lake	150	Coan, Benfirmel Pond	400
Palacias, Campbell's pond	75	Columbia, Baker's pond	200
Paris, Lake View	125	Gretna, Whitethorn Creek	150
Pine Hill, Farley's pond	75	Hewlett, Trevillian's pond	200
Pittsburg, Bermuda Lake	150	Keysville, Red Hill Pond	40
Holt's lake	150	Pamplin, Horse Pen Pond	200
Hughes Lake	150	Plains, Huntland Pond	40
Roark's pond	100	Shackleford, Rays Neck Mill Pond	200
Willow Pond	150	Suffolk, Norfleet Pond	500
Plainview, Abney's pond	75	Wise, Hamilton's pond	200
Allen's pond	75	West Virginia:	
Helen-Temple Pond	75	Spencer, Hospital Lake	200
Lake Plainview	300	Waiteville, Hinchie Pond	240
Post, Crane's pond	75	Wisconsin:	
Quinlan, Wooldridge's pond	150	Frederic, Coon Lake	200
Ridgeway, Hill's pond	100	Galesville, Lake Marinuka	600
Riviera, Graham's pond	100	La Crosse, Mississippi River	[b]136,000
Ralls, White-Robertson Lake	100	Rosholt, Trilweiler Lake	800
Roxton, Bywater's pond	100	South Germantown, Quarry Ponds	1,600
San Marcos, Burger Pond	150	West Bend, Lily Lake	2,000
Santo, Live Oak Pond	75		
Schulenburg, Russek's pond	100	Total [b]	*33,000 1,635,881
Scurry, Murdock's pond	150		
Nash's pond	100		

[a] Fry indicated by an asterisk, thus (*); all others are fingerlings, yearlings, and adults.
[b] Lost in transit, 4,620 fingerlings.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

PIKE AND PICKEREL.

Disposition.	Fingerlings, yearlings, and adults.	Disposition.	Fingerlings, yearlings, and adults.
Illinois:		Montana:	
Belvidere, Kishwaukee River	100	Forsythe, Yellowstone River	75
Freeport, Pecatonica River	360	Glendive, Yellowstone River	458
Polo, Pine Creek	100	Miles City, Yellowstone River	32
Iowa:		Wisconsin: La Crosse, Mississippi River	a 5,800
Bellevue, Mississippi River	a 18,400		
Manchester, Maquoketa River	479	Total	43,436
North McGregor, Mississippi River	a 550		
Minnesota: Homer, Mississippi River	a 17,082		

a Rescued from overflowed lands and restored to original waters.

PIKE PERCH.

Disposition.	Eggs, fry, and yearlings. a	Disposition.	Eggs, fry, and yearlings. a
Connecticut:		Michigan—Continued.	
Bristol, Pine Lake	300,000	Oscoda, Allen Lake	500,000
Taconic, Long Pond	300,000	Cook Pond	600,000
Illinois:		Duell Lake	400,000
Du Quoin, Gregory's pond	200,000	Van Ettan Lake	800,000
Hallidayboro, Hallidayboro Lake	700,000	Otia, Benton Lake	300,000
Meredosia, Meredosia Bay	50,000	Topinabee, Mullett Lake	1,000,000
Sandwich, Fox River	700,000	Wooster, Crystal Lake	400,000
Spring Grove, State fish commission	*20,000,000	Yorkville, Gull Lake	800,000
Indiana:		Minnesota:	
Columbia City, State fish commission	*15,000,000	Carlton, Chub Lake	400,000
Columbus, White River, East Fork	*2,000,000	Cromwell, Island Lake	400,000
Corunna, Indian Lake	300,000	Duluth, Horse Shoe Lake	100,000
Culver, Lake Maxinkuckee	700,000	Pike Lake	100,000
Indianapolis, White River	*2,000,000	Schumultz Lake	100,000
Lafayette, Wabash River	800,000	Faribault, Shields Lake	225,000
LaGrange, Pigeon Lake	400,000	Homer, Mississippi River	†2,660
Ligonier, Diamond Lake	400,000	Lanesboro, Root River	200,000
Logansport, Wabash River	600,000	Root River, North Branch	200,000
Mentone, Tippecanoe River	500,000	Mazeppa, Lake Mazeppa	225,000
Shelbyville, Flat Rock River	600,000	Mentor, Maple Lake	400,000
Warsaw, Winona Lake	600,000	Orchard Lake, Lake Avelon	200,000
Iowa:		Robinsdale, Twin Lake	200,000
Mason City, Lime Creek	300,000	Sturgeon Lake, Sturgeon Lake	400,000
Spirit Lake, State fish commission	*25,000,000	Nebraska: Gretna, State fish commission	*1,500,000
Steamboat Rock, Iowa River	800,000	New Hampshire:	
Kentucky: Lexington, State Fish Commission	9,600,000	Concord, Contoocook River	400,000
Maryland: Tolchester, Herring Pond	200,000	Littleton, Forest Lake	400,000
Massachusetts:		New Jersey:	
Palmer, State fish commission	*25,000,000	Boonton, Capstick Lake	300,000
Springfield, Turners Park Pond	300,000	Rockaway, Cedar Lake	300,000
Michigan:		New York:	
Allenville, Brevoort Lake	500,000	AuSable Forks, Butternut Pond	200,000
Alpena, Long Lake	800,000	Furnis Lake	200,000
Baraga, Sturgeon River	100,000	Silver Lake	200,000
Bay City, Saginaw Bay	1,500,000	Taylor Pond	200,000
Byron, McKane Lake	500,000	Bath, Lake Salubria	400,000
Caseville, Saginaw Bay	3,000,000	Canisteo, Demon Pond	400,000
Charlevoix, Susan Lake	500,000	Cape Vincent, St. Lawrence River	13,500,000
Detroit, State fish commission	*26,235,000	Evans Mills, Indian River	500,000
Floodwood, Edgar Lake	150,000	Fishkill, Bennywater Pond	300,000
Grawn, Duck Lake	600,000	Brinkerhoff Pond	300,000
Holly, Long Lake	400,000	Fullers Bay, Lake Ontario	5,000,000
Houghton, Poppy Creek	150,000	Gouverneur, Grass Lake	500,000
Lake Ann, Lake View	500,000	Pleasant Lake	800,000
Ontonagon, Carp Lake	300,000	Grass Bay, St. Lawrence River	10,000,000
		Highland Falls, Long Pond	200,000
		Roe Lake	200,000
		Niagara Falls, Lake Ontario	1,000,000
		Niagara River, Upper	1,000,000

a Eggs are indicated by an asterisk, thus (*); yearlings by a dagger, thus (†); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

PIKE PERCH—Continued.

Disposition.	Eggs, fry, and yearlings.[a]
New York—Continued.	
Ogdensburg, Oswegatchie River	8,400,000
St. Lawrence River	3,600,000
Portlandville, Goodyear Lake	1,000,000
Redwood, Millsite Lake	800,000
Riverside, Loon Lake	300,000
Mountain Spring Lake	150,000
Schroon Lake	400,000
Schroon River	200,000
St. Johnsville, Stewarts Landing Creek	300,000
Schenectady, Mohawk River	800,000
Whaley Lake, Whaley Lake	800,000
Wurtsboro, Masten Lake	200,000
Yankee Lake	500,000
North Dakota:	
Binford, Red Willow Lake	300,000
Devils Lake, Devils Lake	*3,000,000
Pingree, Jim Lake	400,000
St. Johns, State fish commission	*6,000,000
Ohio:	
Isle St. George, Lake Erie	10,000,000
Kellys Island, Lake Erie	10,000,000
Lake View, Indian Lake	600,000
Marblehead, Lake Erie	5,400,000
Middle Bass, Lake Erie	10,000,000
Millersburg, Killbuck River	500,000
Port Clinton, Lake Erie	5,000,000
Put in Bay, Lake Erie	10,000,000
State fish commission	*68,425,000
Woodsfield, Crow Nest Creek	400,000
Zoar, Tuscarawas River	400,000
Pennsylvania:	
Denver, Cocalico Creek	300,000
Everett, Juniata River, Raystown Branch	500,000
Huntingdon, Juniata River	500,000
Juniata River, Raystown Branch	500,000
Standing Stone Creek	300,000
Lake Carey, Lake Carey	600,000
Lancaster, Conestoga River	400,000
Lewistown Junction, Juniata River	400,000
Manns Choice, Juniata River, Raystown Branch	400,000
Shawnee Creek, Raystown Branch	400,000
Sellersville, Perkiomen Creek, Northeast Branch	300,000
Shaws, French Creek	400,000
Union City, State fish commission	*3,000,000
South Dakota:	
Gary, Lake Cochrane	200,000
Watertown, State fish commission	*25,000,000
Vermont:	
Barnet, Martins Pond	300,000
Barre, Sabin Pond	400,000
Barton, Crystal Lake	200,000
Boltonville, Ticklenaked Pond	300,000
Brandon, Lake Hortonia	250,000
Burlington, Lake Champlain	23,526,480
Cambridge, Lamoille River	500,000
Colchester, Colchester Pond	300,000
Danville, Ewells Pond	300,000
East Fairfield, Metcalf Pond	300,000
Enosburg Falls, Lake Carmi	500,000
Essex Junction, Great Power Pond	300,000
Fairlee, Lake Morey	500,000
Ferrisburg, Little Otter Creek	100,000
Greensboro, Long Pond	400,000
Groton, Lake Groton	300,000
Hardwick, Greenwood Lake	500,000
Hyde Park, Lake Eden	400,000
South Pond	300,000
Inwood, Wardens Pond	300,000
Milton, Lamoille River	750,000
Montpelier, Nelson Pond	300,000
Vermont—Continued.	
Morrisville, Big Pond	200,000
Lake Lamoille	500,000
North Ferrisburg, Lewis Creek	150,000
Little Otter Creek	150,000
Pittsford, Sugar Hollow Pond	100,000
Richmond, Hinesburg Pond	400,000
Rutland, Pine Hill Pond	100,000
Swanton, Lake Champlain	23,226,800
Vergennes, Otter Creek	250,000
Wells River, Halls Pond	300,000
West Burke, Newark Pond	200,000
Whitington, Sawdawga Lake	250,000
Wilmington, Lake Raponda	150,000
West Virginia: Harrisville, Hughes River, North Fork	1,100,000
Wisconsin:	
Amery, Blake Lake	60,000
Antigo, Tyre Lake	120,000
Centuria, Deer Lake	120,000
Durand, Eau Galle Lake	150,000
Eau Galle River	150,000
Elkhart Lake, Crystal Lake	120,000
Elkhart Lake	120,000
Elk Mound, Cedar Fall Lake	200,000
Fifield, Turner Lake	120,000
Fox Lake, Fox Lake	300,000
Frederic, Blom Lake	60,000
Hawkins, Gooseneck Lake	60,000
Skinner Creek, South Fork	60,000
Hudson, Lake St. Croix	120,000
Independence, Bugle Lake	200,000
Elk Lake	200,000
Ixonia, Rock River	600,000
Janesville, Rock River	800,000
Johnson Creek, Rock River	100,000
Kilbourn, Parker Lake	240,000
Wisconsin River	240,000
La Crosse, Black River	80,000
Blacksnake Creek	80,000
Broken Gun Creek	80,000
Chamberlin Slough Pond	80,000
Clarks Lake	80,000
Dark Slough Creek	80,000
French Slough Creek	80,000
Gibbs Chute Creek	80,000
Hammond Chute Creek	80,000
Jollivettes Bay	80,000
Jolyn Slough Creek	100,000
La Crosse River	79,000
Mississippi River	†800
Nicolls Bay	79,000
Rice Lake	79,000
Running Slough Creek	79,000
Spring Slough Creek	79,000
Swift Creek	79,000
Wigwam Slough Creek	79,000
Zeisler Lake	47,000
Lyndhurst, Gardner Lake	60,000
Schmidt Lake	60,000
Mattoon, Bakers Lake	60,000
Hutchins Lake	120,000
Johnson Lake	60,000
Moose Lake	120,000
Menomonie, Asylum Bend Lake	50,000
Atlasta Bay Lake	50,000
Bear Lake	50,000
Black Lake	50,000
Chippewa Lake	50,000
Colfax Lake	50,000
Cut Off Lake	50,000
Downsville Lake	50,000
Dunnville Lakes	100,000
Hunts Bay Lake	50,000
Manleys Bend Lake	50,000
New Haven Lake	50,000

[a] Eggs are indicated by an asterisk, thus (*); yearlings by a dagger, thus (†); all others are fry.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

PIKE PERCH—Continued.

Disposition.	Eggs, fry, and yearlings.[a]	Disposition.	Eggs, fry, and yearlings.[a]
Wisconsin—Continued.		Wisconsin—Continued.	
Menomonie, Red Cedar River	50,000	Sparta, Rock Lake	120,000
Sand Lake	50,000	Three Lakes, Green Bass Lake	120,000
Yellow Banks Lake	50,000	Planting Ground Lake	60,000
Merrill, Lake Pesobic	120,000	Trempealeau, Second Lake	200,000
Lake View	120,000	Turtle Lake, Horseshoe Lake	200,000
Owen, Black River	180,000	Waupaca, Chain of Lakes	120,000
Popple River	300,000	Silver Lake	120,000
Pelican Lake, Pelican Lake	60,000	Townsend Lake	120,000
Pembine, Lindquist Lake	120,000		
Reedsburg, Baraboo River	120,000	Total [b]	*222,160,000 [c] 214,536,740
Rhinelander, Moen Lake	60,000		
Sheboygan, Lake Ellan	120,000		

[a] Eggs are indicated by an asterisk, thus (*); yearlings by a dagger, thus (†); all others are fry.
[b] Lost in transit, 400,000 fry.
[c] Includes 3,460 yearlings.

YELLOW PERCH.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.	Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
Connecticut: East Hampton, Pocotopaug Lake		450	Maryland—Continued.		
Delaware: Wilmington, Circle Pond		100	Elk River, Chesapeake Bay	2,000,000	
District of Columbia: Washington, Potomac River	1,000,000		Hagerstown, Conococheague Creek	500,000	
Illinois:			Havre de Grace, Elk River	10,000,000	
Freeport, Pecatonica River		1,000	Mill Creek	7,000,000	
Polo, Pine Creek		375	Piscataway Creek, Potomac River	12,440,000	
Meredosia, Meredosia Bay		[b] 500	Pomonkey Creek, Potomac River	9,100,000	
Rockford, Rock River		225	Swan Creek, Potomac River	7,918,000	
Indiana:			Swan Creek, Susquehanna River	11,900,000	
Columbus, East White River		400	Massachusetts:		
Flat Rock Creek		200	Greenfield, Connecticut River		340
Indianapolis, White River	*2,000,000		Old River Bed		200
Iowa:			Lee, Greenwater Pond	200,000	
Bellevue, Mississippi River		[b] 15,575	Laurel Lake	200,000	
Eldora, Iowa River		225	Lower Goose Pond	200,000	
Lime Springs, Upper Iowa River		800	Shaw Pond	200,000	
Manchester, Maquoketa River		150	Stockbridge Lake	200,000	
North McGregor, Mississippi River		[b] 30,600	Upper Goose Pond	200,000	
Shenandoah, Walnut Creek Pond		1,100	Palmer, State fish commission	*15,000,000	
Steamboat Rock, Iowa River		150	Michigan:		
Kentucky:			Bitely, Woods Lake		300
Indian Fields, Lulbegrud Creek		300	Greenville, Blue Lake		300
Mount Sterling, Cockrell's pond		100	Newaygo, Spring Creek		100
Johnson's pond		100	Rose Centre, Fish Lake		300
Maryland:			Minnesota:		
Accokeek Creek, Potomac River	19,948,000		Homer, Mississippi River	390,000	[b] 104,546
Broad Creek, Potomac River	15,300,000		Simpson, Root River, North Branch	300,000	
Chase, Dundee Creek		100	Missouri:		
			Mansfield, Lake Crystal		100
			Neosho, Hearrall Branch		110
			Sloan Lake		100
			St. Louis, Poupenny Lake		375
			Montana:		
			Forsyth, Yellowstone River		200

[a] Eggs indicated by an asterisk, thus (*); all others fry.
[b] Rescued from overflowed lands and restored to original waters.

Details of distribution of fish and eggs, fiscal year 1916—Continued.

YELLOW PERCH—Continued.

Disposition.	Fry and eggs.[a]	Fingerlings, yearlings, and adults.
Montana—Continued.		
Miles City, Yellowstone River		275
New Jersey:		
Hackettstown, State fish commission	*10,000,000	
Millville, Union Lake		200
New Mexico:		
Cimarron, Antelope Valley Lakes		600
Dulce, Dulce Lake		100
New York:		
Cape Vincent, St. Lawrence River	13,600,000	
Fallsburgh, Alta Lake		600
Fishkill, Bennywater Pond		69
Brinckerhoff Pond		46
New York, Aquarium	*500,000	
Parish, Tutts Pond		600
Pine Bush, Paughcaughnaughsinque Creek		600
Wayland, Loon Lake		1,400
Whaley Lake, Whaley Lake		450
North Carolina: Siler City, Edwards's pond		100
North Dakota:		
Crete, Widmer's pond		200
Devils Lake, Devils Lake		400
Ohio:		
Lima, McBeth Lake (A)		200
McBeth Lake (B)		100
New Berlin, Marchand's pond		100
Oakwood, Moorman's mill pond		100
Pennsylvania:		
Ephrata, Bucher's pond	100,000	
Fahnestock's pond	100,000	
Goods Pond	100,000	
Lesher's pond	100,000	
Moyers Pond	100,000	
Wabash Pond	100,000	
Hanover, Basehoar Creek	400,000	
Hendricks, Perkiomen Creek	400,000	
Moscow, Lake Henry		300
Muncey Valley, Eagles Mere Lake	500,000	
Point Marion, Monongahela River		200
Pottstown, McFarland's pond	100,000	
Waterville, Big Pine Creek		200
Pennsylvania—Contd.		
Williamsport, Loyalsock Creek		200
Wysox, Susquehanna River		300
Texas: Denison, City Reservoir Lake		50
Vermont:		
Barre, Sabin Pond	300,000	
Brandon, Lake Hortonia	500,000	
East Wallingford, Patch Pond	400,000	
Spectacle Pond	300,000	
Ely, Fairlee Lake		100
Enosburg Falls, Lowle Pond	300,000	
Florence, Otter Creek	500,000	
Greensboro Bend, Flagg Pond		100
Hardwick, Greenwood Lake	500,000	
Lyndonville, Crystal Lake	400,000	
Pasture Pond	500,000	
Montpelier, Curtis Pond	300,000	
Mount Holly, Jackson Pond	300,000	
North Ferrisburg, Lewis Creek	400,000	
Little Otter Creek	400,000	
Plainfield, Nelson Pond	400,000	
Rickers, Wells River Pond	400,000	
Salisbury, Otter Creek	500,000	
Vergennes, Otter Creek	500,000	
Virginia:		
Dogue Creek, Potomac River	26,100,000	
Freeman, Lake Racume		200
Ivanhoe, New River	400,000	
Kents, Reedy Creek		300
Little Hunting Creek, Potomac River	23,894,000	
Pemberton, DeNoon's pond	100,000	
Pohick Creek, Potomac River	22,401,000	
Richmond, Browns Pond	400,000	
Licking Creek Pond	300,000	
Wytheville, New River		300
Reed Creek	400,000	300
Wisconsin: La Crosse, Mississippi River		[b]15,000
Total[c]	195,491,000 *27,500,000	183,111

[a] Eggs are indicated by an asterisk, thus (*); all others fry.
[b] Rescued from overflowed lands and restored to original waters.
[c] Lost in tranist, 900 fingerlings.

STRIPED BASS.

Disposition.	Fry.
North Carolina: Weldon, Roanoke River	10,071,000

Details of distribution of fish and eggs, fiscal year 1916—Continued.

WHITE PERCH.

Disposition.	Fry and eggs.[a]	Disposition.	Fry and eggs.[a]
Connecticut:		New Hampshire—Continued.	
Twin Lakes, Lake Washines	400,000	Keene, Spofford Lake	400,000
Waterbury, Ryan Pond	300,000	Lakewood, Ossipee Lake	800,000
Maine:		Manchester, Deering Pond	400,000
Belfast, Cross Pond	300,000	Hadley Pond	400,000
Brooks, Passagassawamkeag Pond	400,000	Kendall Pond	300,000
Prime Pond	300,000	Pine Island Park Pond	300,000
Randall Pond	300,000	Meredith, Lake Winnepesaukee	600,000
Lewiston, Tacoma Lake	500,000	Newport, Long Pond	300,000
South Paris, Big Concord Pond	300,000	Sanbornville, Lovell Lake	400,000
Westcott, Little Ossipee Lake	500,000	Winchester, Forest Lake	400,000
Maryland:		New York:	
Battery, Chesapeake Bay	200,000	Mamakating, Masten Lake	400,000
Elk River, Chesapeake Bay	18,200,000	Newburgh, Orange Lake	400,000
Mill Creek, Chesapeake Bay	20,000,000	Pawling, Willow Pond	100,000
Swan Creek, Chesapeake Bay	47,000,000	North Carolina:	
Massachusetts:		Edenton, Albemarle Sound	250,000
Lowell, Keyes Pond	300,000	Edenton Bay	600,000
Lynn, Lower Pond	400,000	Vermont:	
Medfield, Jewell Pond	200,000	Rickers, Rickers Pond	300,000
Palmer, State fish commission	*15,000,000	Vergennes, Otter Creek	500,000
New Hampshire:			
Bristol, Newfound Lake	600,000	Total	97,350,000
Concord, Contoocook River	300,000		*25,000,000
State fish commission	*10,000,000		

[a] Eggs are indicated by an asterisk, thus (*); all others are fry.

WHITE BASS.

Disposition.	Fingerlings.
Iowa: Bellevue, Mississippi River	[a] 4,950

[a] Rescued from overflowed lands and restored to original waters.

COD.

Disposition.	Fry.	Disposition.	Fry.
Maine:		Massachusetts—Continued.	
Boothbay Harbor, Boothbay Harbor	4,001,000	Gosnold, Buzzards Bay	21,488,000
Linekins Bay	1,425,000	Vineyard Sound	73,534,000
Massachusetts:		Manchester, Massachusetts Bay	9,530,000
Beverly, Massachusetts Bay	23,450,000	Marblehead, Massachusetts Bay	3,110,000
Chilmark, Vineyard Sound	19,228,000	Rockport, Atlantic Ocean	9,570,000
Falmouth, Buzzards Bay	3,493,000	Ipswich Bay	4,520,000
Nantucket Sound	34,279,000	Tisbury, Nantucket Sound	10,358,000
Vineyard Sound	6,500,000	Vineyard Sound	20,698,000
Gloucester, Atlantic Ocean	62,090,000	Woods Hole, Vineyard Sound	2,697,000
Ipswich Bay	8,620,000	Total	318,681,000

POLLOCK.

Maine, Boothbay Harbor, Boothbay Harbor	19,800,000	Massachusetts—Continued.	
Massachusetts:		Manchester, Massachusetts Bay	87,960,000
Beverly, Massachusetts Bay	141,970,000	Marblehead, Massachusetts Bay	58,200,000
Gloucester, Atlantic Ocean	506,680,000	Rockport, Atlantic Ocean	140,840,000
Ipswich Bay	78,990,000	Ipswich Bay	66,400,000
Massachusetts Bay	8,620,000	Total	1,107,460,000

Details of distribution of fish and eggs, fiscal year 1916—Continued.

MACKEREL.

Disposition.	Fry.
Massachusetts: Gloucester, Atlantic Ocean	1,946,000

HADDOCK.

Massachusetts:	
Gloucester, Atlantic Ocean	8,620,000
Rockport, Atlantic Ocean	7,330,000
Ipswich Bay	6,220,000
Total	22,170,000

FLATFISH.

Disposition.	Fry.
Maine:	
Boothbay Harbor, Boothbay Harbor	50,825,000
Linekins Bay	108,918,000
Lobster Cove	5,947,000
Mill Cove	15,124,000
Sawyers Isle Cove	47,131,000
Townsend Gut	75,284,000
West Harbor	3,898,000
East Boothbay, Linekins Bay	134,859,000
Southport, Ebencook Harbor	68,946,000
Pig Cove	26,467,000
Townsend Gut	46,308,000
Massachusetts:	
Chilmark, Menamaha Pond	19,634,000
Vineyard Sound	44,622,000
Falmouth, Buzzards Bay	28,602,000
Great Harbor	12,394,000
Nantucket Sound	245,081,000
Massachusetts—Continued.	
Gloucester, Annisquam River	34,040,000
Gloucester Harbor	102,000,000
Ipswich Bay	16,030,000
Gosnold, Buzzards Bay	60,383,000
Hadley Harbor	89,948,000
Vineyard Sound	117,306,000
Manchester, Manchester Harbor	9,540,000
Massachusetts Bay	39,070,000
Provincetown, Provincetown Harbor	19,116,000
Tisbury, Nantucket Sound	44,991,000
Woods Hole, Eel Pond	9,914,000
Rhode Island: Wickford, Wickford Harbor	56,569,000
Total	1,532,947,000

BUTTERFISH.

Disposition.	Fry.
Massachusetts: Gloucester, Atlantic Ocean	392,000

LOBSTER.

Disposition.	Fry.
Maine:	
Bass Harbor, Bass Harbor	6,000,000
Biddeford Pool, Biddeford Pool	3,000,000
Boothbay, Hodgdens Cove	3,000,000
Mill Pond	3,000,000
Boothbay Harbor, Boothbay Harbor	2,500,000
Bristol, Johns Bay	10,000,000
Round Pond	2,000,000
Cape Elizabeth, Cape Elizabeth Harbor	500,000
Cape Porpoise, Cape Porpoise Harbor	3,000,000
Cranberry Isle, Cranberry Isle Harbor	3,000,000
Dyers Neck, Yeaton Cove	4,000,000
East Boothbay, Linekins Bay	3,500,000
Edgecomb, The Eddy	3,000,000
Falmouth, Casco Bay	10,000,000
Friendship, Friendship Harbor	3,000,000
Georgetown, Gotts Cove	3,000,000
Love Cove	500,000
Kennebunk Port, Kennebunk Port Harbor	1,000,000
North Haven, Browns Cove	4,000,000
Pepperell, Pepperell Cove	1,000,000
Maine—Continued.	
Perkins, Perkins Cove	1,000,000
Port Clyde, Port Clyde Harbor	4,500,000
Portland, Peakes Isle Roads	500,000
Portland Harbor	500,000
Prospect Harbor, Prospect Harbor	2,000,000
Rockland, Rockland Harbor	6,000,000
Sebascodiggen, Quohog Bay	2,000,000
South Hancock, Skillings River	15,000,000
Southport, Pig Cove	2,000,000
Townsend Gut	500,000
South Thomaston, Seal Harbor	4,500,000
Stonington, Stonington Harbor	7,000,000
Vinal Haven, Mill River	6,000,000
York Harbor, York Harbor	5,000,000
Massachusetts:	
Gloucester, Atlantic Ocean	130,000
Manchester, Massachusetts Bay	70,000
New Hampshire:	
Little Harbor, Little Harbor	1,000,000
Portsmouth, Portsmouth Harbor	2,000,000
Washington: Anacortes, Bellingham Channel	[a] 3,325
Japan: Japanese Government	[a] 200
Total	128,703,525

[a] Adults.

ALASKA FISHERIES AND FUR INDUSTRIES IN 1916

By WARD T. BOWER, *Agent,* and HENRY D. ALLER, *Assistant*

Appendix II to the Report of the U. S. Commissioner of Fisheries for 1916

CONTENTS.

FUR SEAL INDUSTRY.

MINOR FUR-BEARING ANIMALS.

ALASKA FISHERIES AND FUR INDUSTRIES IN 1916.

By WARD T. BOWER, *Agent, Alaska Service*, and HENRY D. ALLER, *Assistant, Alaska Service.*

INTRODUCTION.

As in previous years, the activities of the Bureau of Fisheries in respect to Alaska have been directed chiefly toward the enforcement of the law for the protection of the fisheries proper, the fur seals, and the fur-bearing animals generally; the collection of statistics and information in regard to the methods of the fisheries industries; the operation of hatcheries; and the continuance of scientific investigations along various lines.

In enforcing the law for the protection of the fisheries proper, field work was continued throughout the year, the work being increased by additional patrols during the active fishing season. Canneries and other fishery establishments were inspected. Some attention was given to improvement of stream channels so as to facilitate the ascent of spawning salmon. Private salmon hatcheries were inspected. The Federal hatcheries in Alaska are under the immediate direction of the division of fish culture of the Bureau, but certain information in regard to them has been incorporated in this report in order to present properly fish-cultural operations in the Territory. A count was made of the salmon ascending Wood River, Nushagak Bay, in the breeding season.

In connection with the enforcement of the law, including the North Pacific Sealing Convention of July 7, 1911, for the protection of fur seals, the Bureau maintained its regular stations at the Pribilof Islands; attended to the support, education, and health of the natives of those islands; preserved the sealskins taken from seals killed for food for the natives; secured such skins from the blue-fox herds of the Pribilofs as could properly be taken; and made a census of the fur-seal herd. Attention was also given to the marking and authenticating of fur-seal skins legally taken by Indians of the State of Washington and to the suppression of traffic in sealskins not authenticated as to their legal status. The patrol of the North Pacific Ocean and Bering Sea for the protection of fur seals and sea otters was carried on as in previous years by vessels of the Coast Guard.

Field work was continued throughout the year to secure proper protection to the fur-bearing animals in Alaska generally. As far as practicable, information was obtained in reference to fur-farming operations. The collecting of statistics of the furs shipped from Alaska was continued.

In addition to regular duties, attention was given to various incidental matters, several of them of importance. Among these may be mentioned proposed legislation involving (*a*) revision of the general fisheries laws of Alaska, (*b*) preservation of the Pacific halibut fishery as a national industry, and (*c*) proposed joint action between the United States and Canada for the establishment of an annual close season for the Pacific halibut and of a reserved area as a nursery ground for this fish. Other matters had to do with (*a*) the joint administration with the Department of Agriculture of the Aleutian Islands Reservation, (*b*) cooperation with the Interior Department in connection with the Annette Island Fishery Reserve, (*c*) the leasing of islands for fur-farming purposes, (*d*) the construction of new boats for patrol work, and (*e*) the holding of a hearing at Seattle to determine the advisability of limiting fishery operations in the Situk River, southeastern Alaska.

In the compilation of the statistical tables of the fisheries proper appearing in this report valuable assistance has been rendered by Assistant Agent E. M. Ball. Assistant Agent H. J. Christoffers has assisted in compiling certain parts of the data pertaining to the fur seals and other fur-bearing animals.

EMPLOYEES, ALASKA SERVICE.

During the year 1916 the following regular employees have been identified with the Alaska service of the Bureau:

REGULAR EMPLOYEES IDENTIFIED WITH THE ALASKA SERVICE IN 1916.

Name.	Position.	Headquarters or chief place of duty.
Ward T. Bower	Agent, Alaska service	Washington, D. C.
Henry D. Aller	Assistant, Alaska service	Do.
Edward M. Ball	Assistant agent	Kodiak, Alaska.
Harry J. Christoffers	do	Unalaska, St. Paul Island, and Seattle.
Ernest P. Walker	Inspector	Wrangell.
James H. Lyman	Assistant agent	Cordova. (Transferred Sept. 16, 1916, from position of warden.)
Harry C. Fassett	Agent and caretaker	St. Paul Island.
A. H. Proctor	do	St. George Island.
G. Dallas Hanna	Storekeeper	St. Paul Island. (Transferred Sept. 16, 1916, from position of assistant agent.)
Robert H. Bishop	do	St. Paul Island. (Separated from service June 30, 1916.)
William B. Hunter	Physician	St. Paul Island. (Resigned July 31, 1916.)
William T. Miles	do	St. Paul Island. (Appointed Sept. 1, 1916.)
Henry P. Adams	do	St. George Island.
George Haley	School-teacher	St. Paul Island.
Cora Giles Haley	do	Do.
Arnold C. Reynolds	do	St. George Island.
Calvin F. Townsend	Warden	Fairbanks.
Fred H. Gray	do	Wrangell.
Shirley A. Baker	do	Dillingham.
Harry H. Brown	do	Nushagak.
Christian L. Larson	do	Chicken. (Transferred Sept. 1, 1916, from position of special warden.)
William P. Hemenway	do	Tanana. (Resigned July 31, 1916.)
Henry C. Scudder	do	St. Paul Island. (Appointed June 1, 1916.)
Edwin Hofstad	Master steamer Osprey	Wrangell.
Albert K. Brown	Clerk	Washington, D. C.
Mary S. Haines	do	Do.
William P. Rasin	do	Do.
E. Elaine Bell	do	Seattle.

REGULAR EMPLOYEES AT GOVERNMENT HATCHERIES IN ALASKA IN 1916.

Name and location.	Position.
Afognak:	
G. R. Hoffses	Superintendent. (Transferred Aug. 16, 1916, to superintendent, Washington stations.)
Edwin Wentworth	Superintendent. (Promoted Aug. 16, 1916, from foreman, Puget Sound Stations.)
Joseph Kemmerich	Foreman. (Promoted Mar. 1, 1916, from car service. Transferred Aug. 16, 1916, to foreman. Puget Sound stations.)
G. C. Robertson	Foreman. (Promoted Aug. 16, 1916, from skilled laborer, Yes Bay station.)
Jesse Robbins	Skilled laborer. (Drowned Feb. 9, 1916.)
John Naumoff	Skilled laborer.
W. E. Sullivan	Skilled laborer (Promoted Dec. 1, 1916, from apprentice fish culturist, Duluth, Minn.)
Frank S. Morton	Skilled laborer. (Promoted May 16, 1916, from apprentice fish culturist same station. Transferred Oct. 16, 1916, to fish culturist, Saratoga, Wyo.)
Alfred Nelson	Apprentice fish culturist.
Nicolai Boskofsky	Do.
Russell Noyes	Apprentice fish culturist. (Transferred Sept. 1, 1916, from Saratoga, Wyo.).
F. J. Stewart	Cook.
Yes Bay:	
Charles B. Grater	Superintendent. (Promoted July 1, 1916, from foreman, same station.)
William K. Hancock	Superintendent. (Transferred Mar. 1, 1916, to superintendent, Baird, Cal.)
Hugh C. Mitchell	Superintendent. (Promoted Mar. 1, 1916, from foreman, Baird, Cal. Transferred May 1, 1916, to superintendent, Clackamas, Oreg.)
C. H. Van Atta	Foreman. (Promoted Aug. 20, 1916, from fish culturist, Leadville, Colo.)
Kenneth P. Hutton	Skilled laborer. (Promoted Aug. 16, 1916, from apprentice fish culturist, same station.)
J. H. Tierney	Skilled laborer.
John H. Brunson	Apprentice fish culturist. (Promoted June 1, 1916, to skilled laborer. Clackamas, Oreg.)
Henry C. Scudder	Apprentice fish culturist. (Promoted June 1, 1916, to warden, Alaska Service.)
Clarence B. Rivers	Apprentice fish culturist. (Transferred from Clackamas, Oreg., June 1, 1916.)
C. N. Blystad	Apprentice fish culturist. (Transferred from Homer, Minn., Aug. 16, 1916.)
T. H. Morton	Apprentice fish culturist. (Appointed June 12, 1916.)
L. N. Robertson	Cook. (Resigned Aug. 31, 1916.)
M. T. Tierney	Cook. (Appointed Sept. 1, 1916.)

FISHERY INDUSTRIES.

As in similar reports for previous years, the Territory of Alaska is here considered in the four coastal geographic sections generally recognized as follows: Southeast Alaska, embracing all that narrow strip of mainland and the numerous adjacent islands from Portland Canal northwestward to and including Yakutat Bay; central Alaska, the region on the Pacific from Yakutat Bay westward, including Prince William Sound, Cook Inlet, and Chignik; western Alaska, the shores of Bering Sea, tributary waters, and the islands in Bering Sea; and arctic Alaska, all that portion of Alaska facing on or tributary to the Arctic Ocean.

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 which were the object of special investigation or inquiry.

WATERS CLOSED TO COMMERCIAL FISHING.

No additional waters were closed to commercial fishing in 1916. A hearing was held at Seattle on December 15, 1916, to determine the advisability of limiting fishing operations in the Situk River. It was not developed definitely that the red-salmon fishery of that stream is in any danger of depletion. After reviewing the facts brought out at the hearing, the Department decided to place no limitations upon fishing at present but to make a further investigation of conditions on the Situk River in 1917.

In accordance with previous orders the following waters have been set aside as salmon-breeding reserves, wherein all fishing for salmon or other fishing in the prosecution of which salmon are taken or injured is prohibited: In southeast Alaska—Anan Creek, Naha Stream, all waters tributary to Barnes Lake, Prince of Wales Island, Hetta Creek and its tributary waters and the region within 500 yards of the mouth of said creek, and Sockeye Creek, its tributary Boca de Quadra waters, and the region within 500 yards of the mouth of said creek; in central Alaska—all streams flowing into Cook Inlet, Eyak Lake, and a limitation on fishing in Eyak River; in western Alaska—Wood and Nushagak Rivers. In addition, limitations have been placed upon fishing by authority of Executive order and proclamation in the waters of Afognak Reservation, Aleutian Islands Reservation, and Yes Bay and Stream. Limitations upon fishing also exist in the Annette Island Fishery Reserve, which was created by Presidential proclamation of April 28, 1916. This reserve is discussed more fully elsewhere in this report.

PATROL BOATS.

One of the important duties of the Bureau in Alaska is the maintenance of a patrol for the enforcement of the fisheries laws and regulations. This work has been confined chiefly to the waters of southeast Alaska, where fishing operations are more intensive than in other parts of the Territory. Facilities and funds have been entirely inadequate for even most ordinary demands, although improvements are hoped for soon. As a step in this direction, Congress appropriated $10,000 in 1916 for the purchase or construction of two patrol boats for the Alaska fisheries service. In December a contract was made for the construction of these boats at Seattle. It is expected that they will be in readiness for service in the summer of 1917. These boats will be 48 feet in length and 12½ feet in breadth and will be equipped with 25–30 horsepower, heavy-duty engines of western make. These boats are to be of the seaworthy, purse-seine boat type familiar to the Pacific coast. There will be accommodations for a crew of three forward, and a cabin aft will accommodate three persons.

These boats will be of material assistance in the patrol work, but they ought to be supplemented by at least two other boats of similar construction for southeastern Alaska and by two boats approximately 65 feet in length for the more exposed waters of central Alaska, and still further by the addition of two larger vessels for the remote and exposed waters of western Alaska and Bering Sea. As in seasons past, it has been necessary for the Bureau's agents to accept gratuities in the way of transportation from companies engaged in the commercial fishery. This is objectionable in every way, but until such time as more boats are provided for the inspection service, it will be practically impossible to reach some of the sections without occasionally traveling on boats owned by the fishery companies.

The inadequacy of the Bureau's facilities for patrol work in the Afognak-Kodiak region is evidenced by the fact that one of the agents has been forced to use an open dory, with a small outboard motor, for inspection purposes in the waters of that region. On account of the heavy weather experienced frequently and the exposed character of these waters, it is expecting altogether too much of an employee to risk his life in the perils of such work.

The patrol work in southeast Alaska in 1916 was accomplished by the Bureau's steamer *Osprey* (23 tons) and the chartered power boats *Murrelet* (6 tons) and *Standard* (15 tons). Two smaller power boats were also chartered for brief periods. In central Alaska the auxiliary schooner *Nimrod* (8 tons) was under charter for a few weeks for use on Cook Inlet and to the westward, and the power boats *Shamrock* (7 tons) and *Prospector* (7 tons) were chartered for short periods for use in the Prince William Sound region. In western Alaska a small power boat was used for a short time to patrol the waters of Nushagak Bay. The Bureau's steamer *Osprey* cruised 4,180 miles in southeast Alaska in the calendar year 1916. Near the conclusion of active fishing operations, boiler trouble developed, and in October the vessel was towed to Seattle for repairs or other disposition. The vessel was at Seattle at the end of the year. The total cost of patrol work for the year, including salaries of regular employees while engaged in this service, was approximately $5,000.

VIOLATIONS OF LAWS AND REGULATIONS.

The violations of the fishery laws coming to the attention of the Bureau's agents in 1916 included fishing in the weekly close season, fishing in prohibited areas, and with apparatus set too close to other fishing gear. The wanton waste of fish was also charged in two instances not yet brought to trial.

Two indictments returned by the grand jury at Seward on October 15, 1914, against the Alaska Packers Association, charging it with the wanton waste of salmon in connection with its Kasilof cannery, were disposed of at the September, 1916, term of the United States district court at Valdez. The jury returned a verdict of guilty in the first case, whereupon an appeal was entered by the defendant. The second case was dismissed.

Two indictments against Libby, McNeill & Libby, returned by the grand jury at Valdez in 1915, for having wantonly wasted salmon, were consolidated, and the case was tried at Valdez in September, 1916. The defendant was acquitted.

The Deep Sea Salmon Co. was tried and acquitted at the September, 1916, term of the United States district court at Valdez on the first of the three indictments returned against it by the grand jury at Valdez in September, 1915. The two other indictments were dismissed.

An indictment, returned by the grand jury in September, 1915, against the Northwestern Fisheries Co. for unlawful fishing at Alaganik Slough, Copper River Delta, was tried at Valdez in September, 1916. The company entered a plea of guilty, and a fine of $100 was imposed.

Three indictments were returned by the grand jury at Valdez against Halmar Folvik and Ingwald Martinson for fishing on Sunday, June 25, 1916, with two anchored gill nets in the waters of Gumboot Creek, Eshamy Bay, and for fishing on two occasions within 100 yards of the mouth of that creek, it being a red-salmon stream less than 500 feet in width. Both pleaded guilty and were fined $5 each.

Two indictments were returned by the grand jury at Valdez against Hans Steinfeldt for having set two anchored gill nets in Mountain Slough on Sunday, May 28, 1916. The defendant was brought to trial on October 23, entered a plea of guilty, and was fined $10.

E. Paulson, of Ellamar, was indicted by the grand jury at Valdez for fishing with four anchored gill nets in Eshamy Bay and Lagoon on Sunday, July 9, 1916. When brought to trial at Valdez he pleaded guilty and was fined $1.

Peter Jackson was tried at Valdez in October on an indictment returned against him by the grand jury for stretching a gill net more than one-third the distance across Miners River, a red-salmon stream in Unakwik Inlet, on July 21, 1916, and for setting a gill net within 100 yards of another gill net at the same time and place. The defendant entered a plea of guilty and was fined $1.

Indictments returned by the grand jury at Valdez accused the Canoe Pass Packing Co. of having wantonly wasted salmon on July 22 and 23, 1916, in Windy Bay, Alaska. When brought to trial their counsel entered a plea of not guilty and asked for a continuance of the case, which was granted. The case will probably be taken up again at the spring term of court in 1917.

Indictments returned against Nils Nelson and the Carlisle Packing Co. for fishing with two gill nets in Eshamy Bay on Sunday, July 9, 1916, were not acted upon at the fall term of court, but will undoubtedly be taken up in the spring of 1917.

Indictments were returned by the grand jury at Valdez against Hjalmar Swanson, Ole Sandanger, Mat Jacoban, Nick Nilson, and the Carlisle Packing Co. for fishing with a purse seine within 100 yards outside of the mouth of Gumboot Creek, a red-salmon stream in Eshamy Bay less than 500 feet in width on July 18, 1916; for fishing within 100 yards of a gill net on the same day and place, and for fishing on July 20 within 100 yards of a gill net set in Eshamy Lagoon. The first four mentioned when brought to trial entered a plea of guilty and were each fined $10. The case against the Carlisle Packing Co. has not come to trial, but will probably be acted upon at the spring term of court in 1917.

Cases resulting from the indictments returned by the grand jury at Valdez in 1915 against George Osborn, Norman Erickson, John Jackson, and John Nockintah for placing a set net more than one-third the width of the stream in Mountain Slough, near Cordova, were not tried at the fall term of court, but may be taken up in the spring of 1917.

Complaint was made by a representative of the Bureau of Fisheries before the United States commissioner at Wrangell against Gus Lehner, Michael Gregoff, and I. Olsegwiego for fishing on Sunday, September 3, 1916, in Blind River, Wrangell Narrows. All pleaded guilty and were fined $5, $10, and $5, respectively, and costs. The costs in each case amounted to $7.35.

On July 1 action was brought in the United States commissioner's court at Wrangell against Olif Oleson for illegally fishing in the lagoon at Anan Creek on June 28, 1916. The defendant put in the plea that his net had drifted in with the tide. He was discharged by the court with an admonition.

On July 31, while visiting Anan Bay, southeast Alaska, a warden found the boat *Zora*, of Seattle, fishing for salmon with a seine one end of which was attached to the corner of a fish trap. This was in violation of section 4 of the fisheries act approved June 26, 1906, which forbids the setting of a seine or other net within 100 yards of any other fishing appliance. The warden took the boat and crew to Wrangell and made complaint before the United States commissioner against the captain, August Budnich. The defendant pleaded guilty and was fined $120 and costs.

On Sunday, August 20, 1916, one of the Bureau's wardens found three boats fishing in Chilkoot River. On the same day he discovered 31 set nets in Chilkoot Lake. The nets were taken to Haines and turned over to the United States marshal, and complaints were sworn out against the operators of the three boats and the 28 operators of the set nets. On August 21 the three boat cases were tried before the United States commissioner at Haines. All the defendants pleaded guilty, and each was fined $25 and costs. The trials of the set-net operators were held on August 23 and 24. All the defendants pleaded guilty and were fined from $1 to $250 each and costs.

On September 5, 1916, the circuit court of appeals at San Francisco affirmed the decision of the lower court in the case appealed by the Thlinket Packing Co. in respect to not closing certain pound nets in accordance with the weekly close period requirement of law.

WAR DEPARTMENT REGULATIONS.

In order to meet the requirements of law in regard to the erection of structures in navigable waters, the War Department issued, on March 15, 1916, the following regulations setting forth the conditions under which permission may be secured to construct pound nets in the waters of Alaska.

War Department,
Office of the Chief of Engineers,
Washington, March 15, 1916.

To whom it may concern:

The attention of those fishing in the waters of the coast of the Territory of Alaska, and in the navigable waters tributary thereto, is called to the provisions of section 10 of the river and harbor act of March 3, 1899, as follows:

Extract Section 10: "That the creation of any obstruction not affirmatively authorized by Congress to the navigable capacity of any of the waters of the United States is hereby prohibited; and it shall not be lawful to build or commence the building of any * * * weir * * * or other structure in any * * * navigable river or other waters of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War."

In accordance with the above provision of law, and until further notice, all fishermen who desire to operate in the waters above described, and under conditions stated as follows, but not otherwise, and whose written applications may receive the approval of the engineer officer of the United States Army in charge of the locality, are hereby authorized by the Secretary of War to construct and maintain fish weirs, traps, or pounds erected in the usual manner as heretofore, subject to the following conditions:

CONDITIONS.

1. All persons desiring to erect and maintain fish weirs, traps, or pounds, under this authority shall make application to the engineer officer of the United States Army, Seattle, Wash., giving their names, their addresses, the proposed location of their weir, trap, or pound, and evidence that the proper license has been granted by the Territory of Alaska.

2. That this authority does not give any property rights either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to private property or invasion of private rights, or any infringement of Federal, Territorial, or local laws or regulations, nor does it obviate the necessity of obtaining Territorial assent to the work authorized. *It merely expresses the assent of the Federal Government so far as concerns the public rights of navigation.* (See Cummings *vs.* Chicago, 188 U. S. 410.)

3. That all the apparatus used and the work herein authorized shall be subject to the supervision and approval of the aforesaid engineer officer, who may temporarily suspend the work at any time if, in his judgment, the interests of navigation so require.

4. That no weir, trap, or pound shall be located or built in such place or manner as to unreasonably obstruct or interfere with navigation.

5. That on the outer end of the weir, trap, or pound the grantee or owner shall maintain a sign inscribed with the license number in numerals not less than 6 inches in height capable of being readily read from passing vessels, and failure to keep such sign conspicuously displayed shall be sufficient reason for the cancellation of this authority and for prosecution as provided in the next paragraph. All renewals of the Territorial license shall be reported to the aforesaid engineer officer when they occur, together with the Territorial license number. All changes of ownership shall also be reported to him immediately, and the permit shall be returned to him for proper notation thereon of such changes.

6. That upon the abandonment of the location or upon ceasing to use any weir, trap, or pound as hereby authorized, the permit and the map or maps attached thereto shall be immediately returned to the aforesaid engineer officer with notice of the abandonment, and the owner shall immediately remove the structure at his own expense, including all piling, stakes, etc., to the satisfaction of the aforesaid engineer officer. Failure to so remove the same shall be considered good ground for prosecution of the grantee or owner for maintaining an illegal structure endangering navigation, as set forth in sections 10 and 12 of the river and harbor act of March 3, 1899. Provided, that if the use of said structure is suspended temporarily, it may be maintained in whole or in part if the license number is conspicuously displayed and the trap is properly lighted or otherwise marked as may be necessary to prevent unreasonable obstruction to navigation. Any fish weir, trap, or pound allowed to go into a condition of disrepair so that it can not be readily seen, or on which the license number is not conspicuously displayed, will be regarded as abandoned, and if not promptly removed or marked as above provided will subject the grantee or owner to prosecution, and any trap not in use on which the license number is not displayed will be subject to removal by the United States at any time.

7. That if future operations by the United States require an alteration in the position of the weir, trap, or pound, or if the latter, in the opinion of the Secretary of War, shall cause unreasonable obstruction to the free navigation of the said waters, the grantee will be required upon due notice from the Secretary of War and within 30 days thereafter, to remove or alter the weir, trap, or pound, or obstruction caused thereby, without expense to the United States, so as to render navigation reasonably free, easy and unobstructed. No claim shall be made against the United States on account of such removals or alterations.

8. That fishing structures and appliances in navigable waters of the United States shall be lighted for the safety of navigation, as follows:

"The lights shall be displayed between sunset and sunrise. They shall be placed at each end of the structure excepting where the inner end terminates in such situation that there is no practicable navigation between it and the high water line of the adjacent coast, in which case no inner light shall be displayed. The outer light shall be displayed. The outer light shall be white and the inner light shall be red. The size, capacity, and manner of maintenance of the lights shall be such as may be specified in the War Department permit authorizing the erection of the structure or appliance.

When several structures or appliances are placed on one line with no navigable passage between them, they will be considered, for lighting purposes, as one structure."[1]

9. That there shall be installed and maintained on the weir, trap, or pound by and at the expense of the grantee, such additional lights and signals as may be prescribed by the Bureau of Lighthouses, Department of Commerce, and that provision shall be made by watchman or otherwise for proper attendance of lights and signals, so that they will at all times be in effective condition.

10. That this authority is revocable at will by the Secretary of War and unless otherwise specified in the permit, or unless previously revoked under paragraph (7) above, shall cease and be null and void (date to be specified by district officer, not more than five years after date of issuance of permit).

By authority of the Secretary of War.

H. TAYLOR,
Colonel, Corps of Engineers,
Acting Chief of Engineers, U. S. Army.

TERRITORIAL LEGISLATIVE NOTES.

There has been much controversy between the fishery interests and the Territory of Alaska as to whether the Territory has the power under the terms of the enabling act of August 24, 1912, to levy license taxes upon the fisheries in addition to the license fees imposed by the Federal Government. The Territorial Legislature at its session in 1913, and again in 1915, imposed additional taxes upon the fishery industry. By the terms of the Territorial act of May 1, 1913, a license tax of 7 cents per case was levied on sockeye and king salmon, and one-half cent per case on humback, coho, and chum salmon; also cold-storage fish plants were required to pay a license tax of from $10 to $500 per annum in accordance with the amount of business transacted. This measure became effective July 30, 1913, or after most of the pack of salmon for that season had been put up, particularly in the Bristol Bay district, where the heaviest pack of red salmon is made.

The Territorial revenue act of April 29, 1915, repealed the act of May 1, 1913, except in so far as certain features were reenacted, but it was stipulated that the act of 1915 did not relieve any person or corporation from the payment of the license taxes and penalties due under the revenue and taxation act of 1913. The act of 1915 imposes a territorial tax of 4 cents a case on king and red, or sockeye, salmon, 2 cents a case on cohos or medium reds, and 1 cent a case on all other species canned; also fixed or floating traps or pound nets are required to pay $100 per annum, so-called dummy traps included; and gill nets $1 per hundred fathoms or fraction thereof. A license tax of 2½ cents per 100 pounds is also imposed on salted or mild-cured fish, except herring, and a tax of from $10 to $500 per annum is also levied on cold-storage plants according to the amount of business done.

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[1] Regulation of Department of Commerce, approved June 19, 1913.

If the Territorial license tax is a fixed sum, the amount thereof must accompany the application for license. If it is not a fixed sum, the applicant for a license must agree to pay the license tax on or before the 15th day of the next ensuing January. All Territorial license taxes, except those where the tax is a fixed one, are due and payable on December 31 of each year and must be paid on or before January 15 following. Thus the license fees on traps are payable in advance with the application, but the fees under the other fishery schedules in the act of 1915 are not due until December 31 and are not delinquent until after January 15. The penalty for failure to comply with the provisions of the act is a fine of the amount of the tax with 10 per cent added. Each month or fraction of a month in which business is carried on in violation of the act is deemed a separate offense.

The contention regarding the validity of the Territorial license acts mentioned finally led to an agreement between the fishery interests and counsel for the Territory to institute a test case with a view to having the matter settled definitely by the courts. The agreement was to the effect that no attempt would be made by the Territory to collect the fishery taxes until decision in court of last resort was reached, and in the event the decision was favorable to the Territory the license taxes in dispute were to be paid with interest at the rate of 8 per cent from date due to date paid in lieu of the heavier penalty provided by law. At Juneau in December, 1915, Judge Jennings of the district court rendered a decision in favor of the Territory. The case was taken to the circuit court of appeals for the ninth circuit at San Francisco, and on September 5, 1916, that court affirmed the decision of the lower court. The matter is now pending in the Supreme Court of the United States, where it was taken by writ of error, writ of certiorari having been denied. The case is set for hearing in the Supreme Court in October, 1917.

According to information furnished by W. G. Smith, Territorial treasurer of Alaska, the amounts of fishery license taxes claimed by the Territory for the years 1913 to 1916, inclusive, were as follows: For 1913, $10,144.22; for 1914, $102,005.89; for 1915, $130,698.26; and for 1916, $157,627.94; total, $400,476.31.[a] The comparatively small amount claimed for the year 1913 is accounted for by the fact that the act imposing the taxes did not become effective until July 30, 1913.

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[a] Under date of April 4, 1917, Mr. Smith advised that J. H. Cobb, who was counsel for the Territory of Alaska when the agreement was reached regarding disputed fishery license taxes, was succeeded by George Grigsby, who was elected attorney general of Alaska in the fall of 1916. Early in 1917, Mr. Grigsby claimed that the test case had reached the court of last resort and demanded the payment of the taxes with interest, threatening suit against each individual or company with all penalties provided by Territorial law unless the taxes were settled. It is understood that March 31, 1917, was the limit of the time given for settlement. Mr. Smith advises that settlements under protest began about March 21, and that to the date of his communication on April 4 practically a full collection had been made for the years 1913, 1914, 1915, and 1916.

Collections in part of these amounts were made on or before December 31, 1916, as shown by the following table, based upon the Territorial treasurer's report to the third session of the legislature of Alaska for the biennium ending December 31, 1916:

FISHERY LICENSE TAXES COLLECTED BY TERRITORY FOR YEARS 1915 AND 1916, THROUGH DECEMBER 31, 1916.

Schedule.	Division No. 1.		Division No. 2.		Division No. 3.		Division No. 4.		Total.
	1915	1916	1915	1916	1915	1916	1915	1916	
Canneries	$757.18	$800.60	......	......	$587.36	$436.44	......	......	$2,581.58
Salteries	69.85	82.93	$2.55	$0.20	734.07	35.94	......	......	925.54
Fish traps	13,800.00	22,034.28	......	......	7,700.00	14,336.68	......	......	57,870.96
Gill nets	165.01	92.00	7.10	2.00	15.00	59.00	......	$2.00	342.11
Cold storage plants	250.50	175.00	......	......	......	......	......	......	425.50
Total	15,042.54	23,184.81	9.65	2.20	9,036.43	14,868.06	......	2.00	62,145.69

PROPOSED FISHERY LEGISLATION IN CONGRESS.

With the object of broadening the scope of the Federal Alaska fisheries act of June 26, 1906, and for the purpose of defining the powers of the legislature of Alaska in respect to the levying of license taxes upon the fisheries, a bill (H. R. 9528) was introduced on January 20, 1916, by Representative Alexander, of Missouri, and referred to the Committee on the Merchant Marine and Fisheries, of which Representative Alexander was chairman. Extended hearings were conducted on this bill through the spring and summer of 1916, and as a result a substitute committee bill (H. R. 17499) was introduced by Representative Alexander on August 18, 1916. This measure was reported favorably on August 29 by the Committee on the Merchant Marine and Fisheries. It was discussed in the Committee of the Whole House on the state of the Union on December 13, 1916, but did not come to a vote.

The contention has been made by the fishery interests that the dual system of taxation which results if the Territory has the right to levy additional license fees is burdensome and as a matter of equity should be discontinued. A bill (H. R. 9527) having this object in view was introduced on January 20, 1916, by Representative Alexander, of Missouri, and referred to the Committee on Territories. Several hearings were held on the measure, but no further action was taken by the committee.

On February 22, 1916, Representative Nolan, of California, introduced a bill (H. R. 12029) the chief purpose of which was to limit the size of the mesh of gill nets used in the red salmon fishery of Bering Sea and tributary waters to 5¾ inches stretched mesh. This bill was referred to the Committee on the Merchant Marine and Fisheries. It was the purpose of the committee to offer the substance of this measure as an amendment to the general Alaska fisheries bill (H. R. 17499), referred to in the foregoing. The placing of a limitation upon the size of the mesh of nets, as contemplated by this bill, met with general approval.

On account of the peculiar conditions which obtain in respect to the halibut industry, and in order that a comprehensive review of the situation may be presented as a more complete unit, it has been deemed best to discuss proposed special legislation on the subject under the general topic of the halibut fishery.

EXPENDITURES FOR ALASKA FISHERIES.

From time to time there has been some interest in regard to the amount of money expended by the Federal Government in its fisheries work in Alaska. The statement which follows covers such expenditures for the period of the 10 fiscal years from 1906 to 1915, inclusive. This statement does not cover any expenditures on account of the fur seals or other fur-bearing animals. Under the caption of "Fish culture" will be found the amount expended at the two Government hatcheries, and the reference to protection represents expenditures chiefly for enforcing the fisheries laws and regulations. The figures regarding the steamer *Albatross* are in reality chiefly for work of a scientific nature, but for the purposes of this record are segregated from the figures referring to scientific and statistical investigations.

STATEMENT OF EXPENDITURES BY BUREAU OF FISHERIES ON ACCOUNT OF ALASKA FISHERIES FOR FISCAL YEARS 1906 TO 1915, INCLUSIVE.

Fiscal year.	Fish culture.	Protection.	Investigations, scientific and statistical.	Investigations, steamer Albatross.	Total.
1906	$25,832.66	$5,560.00		$6,000.00	$37,392.66
1907	24,598.98	7,000.00	$353.86		31,952.84
1908	50,181.38	7,000.00	307.75		57,489.13
1909	38,782.70	7,000.00	834.00		46,616.70
1910	28,314.49	7,000.00	1,626.39		36,940.88
1911	29,373.50	9,022.27	83.50	17,000.00	55,479.27
1912	31,838.77	14,111.45		7,500.00	53,450.22
1913	30,675.52	28,410.87	620.57		59,706.96
1914	31,485.96	25,991.42	738.13	8,000.00	66,215.51
1915	34,041.02	29,679.57			63,720.59
Total	325,124.98	140,775.58	4,564.20	38,500.00	508,964.70

WOOD RIVER CENSUS.

A census of the salmon ascending Wood River and entering Lake Aleknagik to spawn was again taken in 1916 by Warden H. H. Brown. This investigation was first started in 1908 and has been continued each year since, with the single exception of 1914.

The winter of 1915-16 was exceptionally cold in the Bristol Bay region. On June 15, at the time the equipment for the installation of the rack arrived at Lake Aleknagik, scattering blocks of ice were found on the shores and a few hundred feet inland large drifts of snow still remained. As a result, it was naturally expected that the first run of fish would be late.

The installation of the rack was completed on June 23. On the same day counting commenced and was continued daily up to and including August 12. The maximum count of 57,237 fish was made on July 7, the same day as in 1915. On July 17 a second large count was made, consisting of 55,864 fish. There were three distinct large runs, which reached their maxima on July 7, 13, and 17, respectively. This may have been due to a temporary cessation of fishing as a result of severe storms occurring on Nushagak Bay, thus giving a larger number of fish an opportunity to ascend Wood River.

The following table shows the tally of salmon at the Lake Aleknagik (Wood River) rack in 1916:

Date.	Number.	Date.	Number.	Date.	Number.
June 23	64	July 11	6,581	July 29	1,014
June 24	95	July 12	33,828	July 30	1,512
June 25	123	July 13	47,343	July 31	1,182
June 26	138	July 14	42,859	Aug. 1	897
June 27	1,041	July 15	5,235	Aug. 2	688
June 28	1,996	July 16	24,758	Aug. 3	247
June 29	1,156	July 17	55,864	Aug. 4	308
June 30	1,061	July 18	44,956	Aug. 5	392
July 1	1,274	July 19	26,418	Aug. 6	431
July 2	3,534	July 20	16,109	Aug. 7	66
July 3	5,436	July 21	8,279	Aug. 8	35
July 4	4,630	July 22	8,349	Aug. 9	482
July 5	4,202	July 23	11,621	Aug. 10	123
July 6	4,127	July 24	9,553	Aug. 11	....
July 7	57,237	July 25	9,916	Aug. 12	37
July 8	49,247	July 26	7,127		
July 9	38,741	July 27	2,589	Total	551,959
July 10	6,478	July 28	2,580		

A greater number of humpbacks entered Lake Aleknagik this season than during 1915, but the total would not materially affect the count. On July 9 a series of 20 counts showed about 3 humpbacks to each 100 fish passing through the rack. On July 22 a similar count gave an average of about 9 humpbacks to each 100 fish. Except when the three heavy runs were in progress, the salmon showing gill-net injuries were found to be slightly more numerous than during the preceding season. A number of red salmon having a wide fungoid stripe running from the dorsal fin to the tail were noted. At times the number of these diseased fish ranged from 1 to 7 for each 100 fish passing through the rack.

Operations at the rack, as heretofore, were made possible through the assistance rendered by the Alaska Packers Association and the

Alaska-Portland Packers' Association. The former furnished the entire equipment necessary for making the count, and the latter provided a tug for towing it to the lake. The Alaska Salmon Co. furnished a light skiff for use in making investigations on the lake.

ALEUTIAN ISLANDS RESERVATION.

The Aleutian Islands Reservation, which was created by an Executive order of March 3, 1913, includes all the islands of the Aleutian Chain, together with Unimak and Sannak Islands. The reservation is set apart as a preserve and breeding ground for native birds, for the propagation of reindeer and fur-bearing animals, and for the encouragement and development of the fisheries. These purposes, however, are not to interfere with the use of the islands for lighthouse, military, or naval uses or with the extension of the work of the Bureau of Education on Unalaska and Atka Islands. The reservation is jointly under the jurisdiction of the Departments of Agriculture and Commerce. The joint regulations effective March 15, 1914, promulgated by the two departments are still operative. Although the regulations provide that residents of the reservation desiring to engage in commercial fishing must first secure a permit, it is not the intention to require such permits from native residents of the reservation who take limited quantities of fish for local sale in addition to such fish as they may take for their own domestic purposes.

In 1916 six permits were issued for fishery operations in the Aleutian Islands Reservation. One of these was for the establishment of a cod-salting station on Tigalda Island; another was for the salting of salmon in the vicinity of Umnak Island; another related to the taking of Atka mackerel or greenlings in the vicinity of Attu Island and red salmon in the vicinity of Umnak Island; and the three remaining permits were for the operation of salmon canneries, one to be on Unalaska Island and the other two on the eastern end of Unimak Island. A feature of all permits is that in so far as possible employment must be given to native residents of the reservation. All permits have been made revocable at the pleasure of the Secretary of Commerce.

Since issuing these permits the Department has decided that on account of the small size of the streams to which salmon run within the reservation, and in view of the necessity of insuring a sufficient number of salmon for food for the natives, it will be necessary to withhold for a time the issuance of further permits for salmon-fishing operations.

AFOGNAK RESERVATION.

General supervision of fishing operations within the Afognak Reservation was exercised by Assistant Agent E. M. Ball. During June and July, Frank S. Morton patrolled the waters of the reservation, being assigned to this special detail from the Afognak hatchery.

Continuing the practice followed since the reservation was opened in 1912 to commercial fishing by the natives living therein, special rules were issued to assure greater protection to the more important streams of the island than is afforded by the general law and regulations. The streams at Malina and Paramanof were considered worthy of this special protection, in view of the fact that previously more salmon spawned in them than elsewhere about the island. Accordingly, a close season of five days at both places was established, Paramanof being closed from June 21 to 25, inclusive, and Malina from July 1 to 5. Litnik Bay was closed throughout the season.

In conformity with the terms of the Department's order of March 21, 1912, permits to fish in the waters of the reservation were granted upon application to 64 natives. About the end of May these natives repaired to the several streams of the island and dividing into gangs of from three to six men each waited for the appearance of the salmon. Malina and Paramanof were chosen by the greater number on account of larger catches at those places in previous seasons. In 1916, however, these streams attracted very few salmon, consequently the natives abandoned them and moved to other localities where the run was better. As a result of this elimination of the two important fields, operations at other places became congested by the influx of many more fishermen, and the catch of salmon per capita was correspondingly reduced.

The total catch of salmon from all streams of the island declined from 134,692 in 1915 to 73,181 in 1916. The greatest decline occurred at Malina and Paramanof, a result not wholly unexpected, as this was the fourth season after the volcanic disaster of 1912, when practically all salmon-spawning grounds on the west side of the island were temporarily ruined by the great fall of ashes from Mount Katmai. The stream at Little Afognak was the only one to show a considerable increase in production. In 1916 it yielded 53,582 salmon of all species, as against 21,971 in 1915, thus showing a gain of about 143 per cent. Furthermore, there was a marked change in the size of the salmon. Previously a large proportion of the red salmon taken at Little Afognak were undersized, two being counted as one, when sold by the fishermen. In 1916, however, there was a noticeable absence of the smaller fish. It is almost the unanimous opinion of the fishermen that the increased run of salmon in this region is the first unmistakable evidence of the beneficial effect of artificial propagation. Another striking circumstance observed at the Little

Afognak fishery was the prolonged season during which red salmon were taken. This species began running in June and continued without interruption until late in October.

The number of salmon taken from Afognak waters for commercial use in 1916 is shown, by localities and species, in the following table:

CATCH OF SALMON IN THE AFOGNAK RESERVATION, SEASON OF 1916.

Localities.	Kings.	Sockeyes.	Cohos.	Hump-backs.	Chums.	Total.
Malina		2,833		1,350	129	4,312
Paramanof		1,697				1,697
Seal Bay		6,883	51	117	2	7,053
Little Afognak	2	34,898	16,024	2,658		53,582
Izhut Bay			998			998
Danger Bay			4,194	1,345		5,539
Total	2	46,311	21,267	5,470	131	73,181

The entire catch was sold to the Kadiak Fisheries Co., operating a cannery at Kodiak, for approximately $2,700.

The following table shows the method of capture of each species and the approximate beginning and ending of the fishing season in each locality:

APPARATUS AND APPROXIMATE FISHING SEASON, AFOGNAK RESERVATION, 1916.

Localities.	Seined.					Sockeyes, gilled.	Fishing season.	
	Kings.	Sockeyes.	Cohos.	Hump-backs.	Chums.		Began.	Ended.
Malina		2,833		1,350	129		June 15	July 7
Paramanof		1,697					..do....	Do.
Seal Bay		6,151	51	117	2	732	June 20	July 25
Little Afognak	2	33,356	16,024	2,658		1,542	June 10	Oct. 20
Izhut Bay			998				Aug. 10	Sept. 10
Danger Bay			4,194	1,345			Sept. 4	Sept. 20
Total	2	44,037	21,267	5,470	131	2,274		

ANNETTE ISLAND FISHERY RESERVE.

Upon representations made by the Secretary of the Interior, with a view to assisting the native residents of Annette Island, a presidential proclamation creating the Annette Island Fishery Reserve was issued April 28, 1916, as follows:

(ANNETTE ISLAND FISHERY RESERVE, ALASKA.)

BY THE PRESIDENT OF THE UNITED STATES OF AMERICA.

A PROCLAMATION.

Whereas it is provided by section fifteen, of the act of Congress, approved March third, eighteen hundred and ninety-one, entitled "An Act To repeal timber-culture laws, and for other purposes," that "Until otherwise provided by law, the body of lands known as Annette Islands, situated in the Alexander Archipelago in southeastern Alaska, on the north side of Dixon's entrance, be, and the same is hereby, set apart as a reservation for the use of the Metlakahtla Indians, and those people known as Metlakahtlans, who have recently emigrated from British Columbia to Alaska, and such other Alaskan natives as may join them, to be held and used by them in common, under such rules and regulations, and subject to such restrictions, as may be prescribed from time to time by the Secretary of the Interior," and

Whereas the Secretary of the Interior, with a view to assisting the Metlakahtlans to self-support, has decided to place in operation a cannery on Annette Island; and

Whereas it is therefore necessary that the fishery in the waters contiguous to the hereinafter-described group comprising the Annette Islands be reserved for the purpose of supplying fish and other aquatic products for said cannery:

Now, therefore, I, Woodrow Wilson, President of the United States of America, by virtue of the power in me vested by the laws of the United States, do hereby make known and proclaim that the waters within three thousand feet from the shore lines at mean low tide of Annette Island, Ham Island, Walker Island, Lewis Island, Spire Island, Hemlock Island, and adjacent rocks and islets, located within the area segregated by the broken line upon the diagram hereto attached and made a part of this proclamation, also the bays of said islands, rocks, and islets, are hereby reserved for the benefit of the Metlakahtlans and such other Alaskan natives as have joined them or may join them in residence on these islands, to be used by them under the general fisheries laws and regulations of the United States as administered by the Secretary of Commerce.

Warning is hereby expressly given to all unauthorized persons not to fish in or use any of the waters herein described or mentioned.

In witness whereof, I have hereunto set my hand and caused the seal of the United States to be affixed.

Done at the City of Washington this 28th day of April, in the year of our Lord one thousand nine hundred and sixteen, and of the Independence of the United States the one hundred and fortieth.

[SEAL.] Woodrow Wilson.

By the President:

Robert Lansing,

Secretary of State.

Under the terms of this proclamation it has been regarded that the rights of fishing within the reserved area were reserved to the native residents of the reservation. With a view to utilizing the fish thus taken from the waters of the reservation by the natives, the Department of the Interior entered into a lease on May 4, 1916, with P. E. Harris, of Seattle, to operate the cannery used formerly by the Metlakatla Industrial Co. This plant had not been in service for several seasons, and it was contemplated that extensive repairs would be made. Before the fishing season opened the building, while being repaired, was destroyed by fire May 17, and it was considered too late to rebuild in time to operate during the season of 1916.

In the spring of 1916, just prior to the promulgation of the proclamation creating the Annette Island Fishery Reserve, the Alaska Pacific Fisheries began the construction of a pound net or fish trap near Cedar Point just off the western side of Annette Island. The Government felt that this undertaking was an unauthorized invasion of the reservation, and the company was accordingly requested to remove the structure. The company refused to do so, alleging that it had acquired vested rights in the net and that the proclamation had been issued without authority of law. Proceedings were instituted through the Department of Justice to cause the removal of the net. It was completed and fished for a few days, but on June 2 a temporary injunction was issued by Judge Brown of the United States district court, restraining the owners from using it. On July 7, Judge Jennings, of the same court, rendered a decree ordering the removal of the pound net and permanently enjoining the company from trespassing in or upon the waters of the reserve. Upon representations by the Alaska Pacific Fisheries the circuit court of appeals for the ninth circuit granted a supersedeas which allowed temporary operation of the pound net under bond. Near the end of the fishing season, on August 19, the court dissolved the supersedeas which it had issued. The Alaska Pacific Fisheries filed an appeal to the circuit court from the decree of the district court of July 7. On March 19, 1917, the court of appeals affirmed the decision of the lower court.

INJURY TO SALMON BY BIRDS.

Definite conclusions in regard to the effect upon the salmon supply caused by destruction of salmon fry and eggs by birds, especially gulls and terns, can not at present be formed. The making of accurate and reliable observations at the spawning grounds is attended with many difficulties. Such observations as have been made have been in connection with other work which demanded a large portion of the time of the employees concerned.

Observations made in regard to the habits of gulls on Afognak Island do not indicate that these birds are particularly destructive under ordinary conditions to salmon fry or eggs. Observations made in 1915 at the spawning grounds at Lake Aleknagik, Nushagak region, indicate that two of the principal enemies of the young salmon are gulls and terns. An examination of the stomachs of a number of these birds showed them filled with small salmon, the terns especially. The stomach of one tern contained six recently caught fry and a small quantity of partly digested fish.

The Bureau plans to continue investigations in 1917 in regard to the subject whenever opportunities are presented.

THE COPPER RIVER FISHERY.

In view of the unusual development of the Copper River salmon fishery in 1916, and as there are certain conditions peculiar to this stream which may have a most important bearing on the future of the fishery, it seems timely to review the situation at some length and make suggestions in regard to the best course to pursue in handling the matter.

The Copper River is a glacial stream about 300 miles long which empties into the Gulf of Alaska through a delta nearly 40 miles in width and extending upstream about 25 miles. Among its chief tributaries are the Klutina River, about 75 miles in length; the Chitina, approximately 100 miles long; and the Gulkana, some 80 miles in length.

For many years prior to 1915 the Copper River has been the scene of commercial fishing for salmon at the delta, and in a limited way there has been some salting of salmon above the delta. The Copper River & Northwestern Railway crosses the upper part of the delta about 20 miles out from Cordova and in a general way parallels the river to Chitina, 131 miles from Cordova. The railroad follows immediately along the river bank for a considerable part of this distance. The Copper River is unique in that it is the only stream in Alaska that supports a salmon fishery of any consequence entirely separate from and independent of coastal operations. In 1915 advantage was taken of the railroad facilities and a cannery was established at Abercrombie just above Abercrombie Canyon, 55 miles from Cordova and about 35 miles from the lower end of the delta. Fish were hauled to the cannery on the railroad from points along the river, and the finished product was transported in the same way to Cordova. The success of this undertaking attracted considerable attention to the region, and in 1916 there was a notable expansion of operations in the Copper River district. Prior to 1915 but one cannery had drawn on the river for its supply of salmon. In that year three canneries secured salmon from the stream, and in 1916 there were five canneries drawing in part or wholly upon that stream.

As a result of this expansion fishing was prosecuted with such vigor at certain localities as to occasion some concern regarding the effect it might have upon the future supply of salmon. This apprehension was stimulated somewhat by complaints of the Indians on the Copper River, presented through a representative of the Bureau of Education, to the effect that the unusual activity in fishing operations was causing a shortage in the supply of salmon used by the Indians for food. The native settlements, having a population of about 300 Indians, are well above the sections of the river where fishing for the canneries is carried on. In view of this condition, Assistant Agent James H. Lyman was directed to visit the upper waters and tributaries of the Copper River for the purpose of ascertaining, if possible, whether the complaints as to the scarcity of fish were justified and whether an examination would show that a sufficient number of salmon were reaching the spawning grounds to prevent any depletion in the future supply. This work was carried on in September, the particular waters visited being Long Lake tributary to the Chitina River, Klutina Lake on Klutina River, the headwaters of the Gulkana River, and the Copper River proper north of Chitina. On account of the extent and inaccessibility of the territory involved, results were rather incomplete, but it appeared from such information as was obtained that comparatively few salmon escaped the commercial fishermen lower down the stream and reached the spawning grounds. In some measure these observations confirmed the testimony of local fishermen at Chitina and of Indians at various places.

Observations covering one season, however, are of little value unless they are considered with and are a part of a series of investigations extending over several years. In this connection certain facts and known conditions are worthy of consideration, as they relate to the vital question of the effect of commercial fishing upon the permanency and preservation of the fishery in this stream. Among these may be mentioned the size of the run, as indicated by the number of salmon caught during a given season; the opportunity of the salmon to escape and ascend to the spawning grounds; whether the stage of the river is high or low; and the amount of gear employed and its efficiency. Consideration must also be given to the weekly close period of 36 hours, which affords an opportunity for salmon to ascend, and there must also be taken into account those intervals of daily occurrence while the fishermen are resting or for other reasons when operations naturally cease, and, further, there must be considered those periods when fishing is seriously interrupted for days at a time on account of high water.

That part of the Copper River where commercial fishing is carried on extensively is herein considered in three sections—viz, the delta, Miles Lake, and Abercrombie Canyon. The lake is about 5 miles above the upper end of the delta and is merely a widening of the river along the face of Miles Glacier. It is a rectangular body of water about 4 miles long and 2 miles wide. The entire eastern shore and part of the north and south shores of the lake are formed by the glacier, where it is impossible to fish. About 6 miles of the shore line is available, where fishery operations may be conducted by means of anchored gill nets. The length of the nets used in 1916 varied from 50 to 80 fathoms each. At frequent intervals during the fishing season the lake is so filled with icebergs that operations are interfered with very seriously.

Not far above the lake the Copper River is confined by precipitous banks for a distance of about 2 miles to a channel varying from 450 to 600 feet in width, where the current runs very rapidly. This section of the river is known as Abercrombie Canyon. Fishing in the canyon is by means of hand dip nets, each about 16 inches in diameter. The fishermen select the most advantageous points along the banks where there are eddies or where the current is not too strong. During the run of salmon dipping is carried on as steadily as conditions permit, although there are times when high water and sudden floods make it almost impossible to continue operations in the canyon. The fishermen dip blindly in the stream, the opening of the net sweeping downstream with the current. On account of the extremely turbid condition of the water the salmon can not be seen unless they rise to the surface, nor, on the other hand, are the fish able to observe the net. Sometimes many sweeps of the dip net produce no fish, but as many as five salmon have been taken at a single sweep of the net. One fisherman may dip as many as 1,000 salmon in a single day when the run is heavy.

In 1916 approximately 30,000 fathoms of gill nets were used at the delta and 5,000 at the lake, while 48 dip nets were operated in the canyon.

At the delta fishing for red and king salmon begins about the middle of May and continues until the middle of July, and for cohos and humpbacks operations extend from the first of July to the middle of September. At the lake and canyon fishing for red and king salmon begins the last of May and ends the last of July, while the coho season extends from the first of August to the end of September.

The following table shows, by localities and species, the approximate number of salmon taken from the Copper River in 1916:

CATCH OF SALMON FROM THE COPPER RIVER IN 1916.

Locality.	Kings.	Reds.	Cohos.	Humpbacks.	Total.
Delta	5,440	300,157	79,396	31,578	416,571
Lake [a]	3,440	279,504	25,120	....	308,064
Canyon	5,325	128,476	10,914	....	144,715
Total	14,205	708,137	115,430	31,578	869,350

[a] The catch of 15,826 reds and 3,637 cohos, a total of 19,463, gilled at mile 46, about 2 miles below the lake, and the 1,186 reds caught at mile 27 are included in the lake catch. Thus the actual lake catch was 277,415 salmon.

From the foregoing table it will be observed that operations about the delta produced nearly 48 per cent of the salmon taken from Copper River, while the lake yielded 35 per cent and the canyon nearly 17 per cent of the total take. The quantity of fishing gear was much greater at the delta than at the lake and canyon.

For the purposes of comparison it seems appropriate to record the Copper River catch for the years 1914 and 1915. In 1914 one cannery secured salmon from the delta as follows: Kings, 1,027; reds, 222,075; and cohos, 14,627. Also 1,730 kings were seined for mild-curing operations at the delta. At Abercrombie Canyon 240 kings were mild cured, and 60,000 reds were taken, chiefly by dip nets, for a saltery. The total catch in 1914 was 299,699 salmon of all species. In 1915 three canneries obtained salmon from the Copper River, the catch of two being from the delta, while that of the other was made at Miles Lake and Abercrombie Canyon. The catch of kings at the delta was 3,088 and the up-river catch was 3,828, a total of 6,916. The catch of reds at the delta was 196,922 and the catch upstream was 456,480, a total of 653,402. No cohos were taken at the delta, but 10,098 were caught up the river. Assembling these figures, the grand total of all species of salmon taken in 1915 at the delta and up river was 670,416.

To make further a matter of record the details of the salmon gilled at Miles Lake and caught by dip nets at the canyon in 1915, the following figures are noted:

CATCH OF SALMON IN THE COPPER RIVER ABOVE THE DELTA IN 1915.

	Gill nets.	Dip nets.
Kings	1,774	2,054
Reds	265,170	191,310
Cohos	10,098	....

With respect to the complaints of the Indians, it may be said that as long ago as 1905, when but one cannery was in operation in the Copper River district, the same story of a shortage of food was heard and the same cry of the destruction of the salmon fishery was made as at present when five canneries are in the field, yet the Indians have lived through the intervening years and have had an ample supply of salmon whenever they made reasonable efforts to get it.

SALMON HATCHERIES.

EXTENT OF OPERATIONS.

In 1916 fish-cultural operations were conducted at seven hatcheries in Alaska—two Government stations and five private hatcheries. One of the latter, the Karluk hatchery, was closed in the summer of 1916. Two small egg-collecting stations were also operated, the product of which was transferred to the Government hatchery at Afognak. The annual capacity of all hatcheries in Alaska is approximately 350,000,000 red-salmon eggs, of which the two Government stations can handle 150,000,000.

In 1915 the aggregate take of red or sockeye salmon eggs in Alaska was 171,627,100. In the corresponding report of Alaska Fisheries and Fur Industries for 1915 this number was stated to be 173,499,100, which was in error because of certain duplications in the returns from one of the stations which had not been discovered at that time.

The number of red or sockeye salmon liberated in Alaskan waters in the season of 1915–16 was 142,964,140, as compared with 121,784,330 in the previous season. The take of red-salmon eggs in 1916 totaled 171,566,000, or 61,100 less than in 1915. The Fortmann, Quadra, Klawak, and Afognak hatcheries show substantial gains for 1916, but the Yes Bay and Hetta hatcheries made smaller takes of red-salmon eggs in 1916. There was a notable increase in the number of humpback eggs secured in 1916, when the take aggregated 39,079,600, as compared with 16,976,000 in 1915, or a gain of 22,103,600 for 1916. The collections of humpback eggs in 1916 were made at Afognak station and its two subsidiaries, except for a very small take at Smeaton Bay in conjunction with the Yes Bay station.

OPERATIONS OF ALASKA HATCHERIES IN 1916.

Stations.	Red or sockeye salmon eggs taken in 1915.	Red or sockeye salmon liberated in 1915–16.	Red or sockeye salmon eggs taken in 1916.
Yes Bay	72,000,000	52,317,500	[a] 58,000,000
Afognak	[b] 6,353,000	[c] 22,933,640	[d] 17,044,000
Uganik	2,685,000		[e] 692,000
Seal Bay	3,232,100		[f] 4,678,000
Fortmann (Naha)	26,520,000	25,055,000	62,580,000
Karluk	41,135,000	23,948,000	[g] 1,016,000
Quadra	[h] 7,408,000	7,092,000	16,125,000
Hetta	8,114,000	7,598,000	3,271,000
Klawak	[i] 4,180,000	4,020,000	8,160,000
Total	171,627,100	142,964,140	171,566,000

[a] A collection of 29,600 humpback-salmon eggs also made at Smeaton Bay.
[b] Through duplication in returns from the station, inadvertently indicated as 8,183,000 in 1915 Report of Alaska Fisheries and Fur Industries.
[c] Includes young red salmon resulting from eggs received from Uganik, Seal Bay, and Yes Bay.
[d] A collection of 25,310,000 humpback-salmon eggs also made.
[e] A collection of 10,730,000 humpback-salmon eggs also made. Of these, 409,000 were lost before the transfer to Afognak. All eyed eggs, both red and humpback salmon, transferred to Afognak.
[f] A collection of 3,010,000 humpback-salmon eggs also made. Of these, 130,000 were lost before the transfer to Afognak. All eyed eggs, both red and humpback salmon, transferred to Afognak.
[g] Operations discontinued June 30, 1916, except transfer of 1,016,000 eyed eggs to Afognak in August. These eggs were collected in June before the Karluk station was closed.
[h] Incorrectly reported previously by hatchery superintendent as 7,500,000, which number appeared in the Alaska Fisheries Report for 1915.
[i] Indicated as 4,130,000 in Alaska Fisheries Report for 1915, which number was subsequently modified by company.

NOTE.—Of the Yes Bay collections of sockeye eggs in 1915, shipment of 15,000,000 was made to Afognak, 3,000,000 to the Oregon Fish Commission, 50,000 to Quinault, Wash., and 50,000 to Anderson Lake, B. C. Of the 1916 collection of sockeye eggs at Yes Bay, 2,000,000 were sent in October to the Oregon Fish Commission.

A total of 16,000,000 humpback-salmon eggs were sent from the Afognak station to the Bureau's stations in the New England States and in Washington and Oregon, each region receiving 8,000,000 eggs.

HATCHERY REBATES.

Operators of private hatcheries in Alaska are allowed a rebate of 40 cents for every thousand red or king-salmon fry released. This is the equivalent of the Federal Government license tax on 10 cases of canned salmon. Recommendations have been made to Congress that this system be discontinued and that all hatcheries in Alaska be operated by the Government.

It is required by law that the operators of private hatcheries in Alaska make affidavit of the number of salmon fry released in each fiscal year ended June 30. The following table shows the rebates due for the fiscal year ending June 30, 1916:

REBATES CREDITED TO PRIVATE SALMON HATCHERIES DURING THE FISCAL YEAR ENDED JUNE 30, 1916.[a]

Owners.	Location.	Red-salmon fry liberated.	Rebate due.
Alaska Packers Association	Naha Stream	25,055,000	$10,022.00
Do	Karluk River	23,948,000	9,579.20
Northwestern Fisheries Co	Quadra Lake	7,092,000	2,836.80
Do	Hetta Lake	7,598,000	3,039.20
North Pacific Trading & Packing Co	Klawak Lake	4,020,000	1,608.00
Total		67,713,000	27,085.20

[a] In the case of hatcheries where the seasonal distribution of fry is not completed before July 1, the remaining fry are shown in the subsequent fiscal year's report.

It seems appropriate to make a matter of record a statement as reported March 28, 1916, by the Treasury Department of the amounts, received from fishery taxes and the amount of hatchery rebates of taxes in Alaska for the last 10 years. The general fishery tax is collected by the clerks of the district court. This tax is handled through the Treasury Department in the Alaska fund, 65 per cent of which is available for roads and trails, 25 per cent for school purposes, and 10 per cent for the care of indigents in Alaska. The following statement has been submitted by the Treasury Department:

ALASKA FISHERY TAXES AND HATCHERY REBATES REPORTED BY TREASURY DEPARTMENT.

Year.	Cash.	Hatchery rebates.	Total.
1906	$58,832.79		$58,832.79
1907	73,417.09		73,417.09
1908	93,748.55	$8,498.80	102,247.35
1909	57,664.24	7,110.40	64,774.64
1910	134,940.47	29,703.48	164,643.95
1911	88,390.50	35,434.08	123,824.58
1912	116,508.11	39,746.00	156,254.11
1913	127,709.17	59,464.24	187,183.41
1914	146,296.85	43,044.84	189,341.69
1915	166,253.81	18,937.40	185,191.21
Total	1,063,761.58	241,919.24	1,305,710.82

HATCHERY INSPECTION.

In order to secure a proper check upon the operations of the private hatcheries in Alaska, they have been inspected from time to time by representatives of the Bureau. It may be stated in a general way that the operation of most of these stations compares favorably with the work conducted at the Government hatcheries.

HATCHERY OPERATIONS.

YES BAY.

In September, 1915, a collection of 72,000,000 red-salmon eggs was made at the Bureau's station at Yes Bay, from which 52,319,500 fry were hatched. Of this number, 32,915,000 were liberated as fry in the winter of 1915–16 and 19,402,500 as fingerlings in 1916, there being a loss of 2,000 fingerlings. Shipments of eggs were made in October, 1915, as follows: Oregon Fish Commission, 3,000,000; Quinault Lake, Wash., 50,000; and Anderson Lake, British Columbia, 50,000. In the report of Alaska Fisheries and Fur Industries for 1915 it was indicated that 100,000 eggs were transferred to Quinault Lake, but in reality 50,000 of these were diverted at Seattle and sent to Anderson Lake. In November, 1915, a shipment of 15,000,000 red-salmon eggs was sent to the Afognak station. The total loss of eggs and fry at Yes Bay was 1,580,500, or a little more than 2 per cent.

Spawning operations at Yes Bay in 1916 began September 1 and ended October 2. During that period 58,000,000 red-salmon eggs were taken. From this collection 2,000,000 eggs were transferred in October, 1916, to the Bonneville, Oreg., station of the Oregon Fish Commission.

A temporary substation for the collection of humpback-salmon eggs was established at Smeaton Bay, but there was a very small run of humpbacks in that locality and only 29,600 eggs were obtained, which were planted on the near-by spawning beds.

The Bureau's efforts to rear salmon to fingerling size before planting were continued at Yes Bay, but facilities for holding the young fish are still too limited to admit of more than part of the station's output being carried beyond the fry stage. The young fish were fed on raw salt salmon ground up after being freshened. The results obtained from the use of this food were better than in 1915, when cooked salmon was used. It was also noted that the young fish thrived better in the hatching troughs than in the rearing ponds.

The usual patrol of Yes Bay was maintained during the run of red salmon in order to enforce the order closing those waters to commercial fishing.

AFOGNAK.

In 1915 the collection of red-salmon eggs at Afognak was 6,353,000. In the Bureau's Alaska Fisheries and Fur Industries Report for 1915, it was inadvertently stated by reason of duplications in returns from the station that the take was 8,183,000. The collection in 1915 was augmented by the transfer of 2,600,000 eyed eggs from Uganik, 3,173,000 from Seal Bay, and 15,000,000 from the Bureau's station at Yes Bay, making a total of 27,126,000 red-salmon eggs handled at this station during the season of 1915–16. From this number there were planted in the period from February to June, 1916, 11,833,200 fry and 11,100,440 red-salmon fingerlings, or a total of 22,933,640 young salmon.

The red-salmon spawning season of 1916 began July 28 and ended October 18, in which period 17,044,000 eggs were taken. This number was increased by the transfer in August of 1,016,000 eyed eggs from the Karluk hatchery of the Alaska Packers Association, 681,000 from Uganik, and 4,600,000 from Seal Bay in October, thus making a total of 23,341,000 red-salmon eggs incubated at Afognak in the winter of 1916–17.

In October and November, 1916, there were planted 1,401,000 fry hatched from these eggs, and at the end of December there remained on hand 7,200,000 eggs and 13,021,000 fry.

In 1916 the first humpback-salmon eggs were taken August 11 and the last on September 11. During that period 25,310,000 eggs were obtained, which is more than double the take of 1915, when 12,355,000 were collected. The transfer in October of 10,321,000 eyed eggs from Uganik and 2,820,000 from Seal Bay increased the total number handled at Afognak to 38,451,000. From this number a shipment of 16,000,000 eggs was made to the Bureau's stations in the New England States and in Washington and Oregon, each region receiving 8,000,000 eggs.

Plants of humpback-salmon fry in November and December aggregated 15,756,000, while 3,095,000 eggs were lost, leaving a balance of 3,600,000 eggs on hand at the end of the year. Additional plants of fry hatched from eggs collected in 1915 totaled 2,336,500, thus making a grand total of 18,092,500 young humpback salmon released at Afognak in 1916.

A matter which invites comment is the greatly lengthened red-salmon egg-collecting period each year since the eruption of Mount Katmai in 1912 as compared with the period of such operations prior thereto from the beginning of fish-cultural work on Afognak Island in 1908. That year the first red-salmon eggs were taken on July 27, the maximum take was made August 17, and the last eggs were collected on August 26. The spawning season covered a period of 31 days. This was the approximate length of each season to and including that of 1912. Beginning with 1913 there has been a marked variation from this condition. Although the first eggs secured in 1913 were taken July 31, about the usual time, the last collection was not made until October 10, the length of the season being 72 days, almost two and one-half times that of 1910, the shortest season on record at this station. After 1913 the seasons were much longer than they had been in previous years, culminating in 1916 in one of 83 days' length, beginning as it did July 28 and closing October 18.

OPENING AND CLOSING DATE AND LENGTH OF SPAWNING SEASON OF RED SALMON AT LITNIK LAKE, AFOGNAK ISLAND, ALASKA, SINCE THE HATCHERY WAS ESTABLISHED IN 1908.

Year.	First eggs taken—	Last eggs taken—	Length of season.
1908	July 27	Aug. 26	31 days.
1909	July 30	Aug. 31	33 days.
1910	..do....	Aug. 28	30 days.
1911	July 21	Sept. 2	44 days.
1912	July 27	Aug. 31	36 days.
1913	July 31	Oct. 10	72 days.
1914	Aug. 1	Sept. 29	60 days.
1915	Aug 7	Sept. 30	55 days.
1916	July 28	Oct. 18	83 days.

UGANIK.

In 1916 there were collected at this field station 692,000 red and 10,730,000 humpback-salmon eggs, as compared with a take of 2,685,000 red and 2,461,000 humpback-salmon eggs in 1915. The loss of reds was 11,000 and of humpbacks 409,000, leaving 681,000 of the former and 10,321,000 of the latter as the number of eyed eggs transferred to Afognak in October. Some of the humpback-salmon eggs were later used in making up the shipment of 16,000,000 that was sent to Government hatcheries in the States.

The run of red salmon at Uganik in 1916 was very small, but a large number of humpbacks came to the stream, making it possible to have greatly increased the take of eggs of this species if the hatchery facilities had been adequate.

SEAL BAY.

The selection in 1915 of this place on the northeast coast of Afognak Island as an egg-collecting station was further justified in 1916 by the very gratifying increase in the take of eggs. Collections in 1915 aggregated 3,232,100 red and 1,235,000 humpback eggs, whereas in 1916 the take totaled 4,678,000 red and 3,010,000 humpback-salmon eggs. The taking of red-salmon eggs began August 18 and ended September 20. The first humpback-salmon eggs were taken August 18 and the last in the early part of September, when it became evident that the available hatching troughs could be filled easily in a short time with eggs of this species, leaving no space for the eggs of the more desirable red salmon that were ripening less rapidly. The spawning of humpbacks was therefore discontinued and operations were confined to the taking of red-salmon eggs until the troughs were filled. As no eggs were hatched at Seal Bay, and the losses amounted to 78,000 red and 190,000 humpback eggs, there were transferred to Afognak in October 4,600,000 red and 2,820,000 humpback-salmon eggs.

FORTMANN.

This hatchery is owned and operated by the Alaska Packers Association. It is located on Heckman Lake, Revillagigedo Island, southeastern Alaska. The hatchery was first operated in the season of 1901–2, and it has been operated each season since. The capacity of the hatchery is approximately 110,000,000 red-salmon eggs. The Alaska Packers Association has recently adopted the incision method of taking eggs at this hatchery.

In 1915 there were taken 26,520,000 red-salmon eggs in the period from August 21 to November 20. From this take 25,055,000 young salmon were released in 1916 in the Naha stream system. The loss was 1,465,000, or 5.52 per cent. In the same season 600,000 humpback-salmon eggs were taken at this hatchery for experimental purposes in the period from August 22 to November 22, 1915. From this take of eggs 560,000 fish were liberated in 1916. The loss was 40,000, or 6.66 per cent.

The take of red-salmon eggs in the period from August 22 to November 10, 1916, totaled 62,580,000. This is the largest take of eggs since the season of 1911–12 and the fourth largest in the history of the hatchery. The average number of eggs per female spawned was 2,932.

KARLUK.

The take of red-salmon eggs at Karluk in the period from June 26 to September 29, 1915, was 41,135,000. From this take there were released 23,948,000 fry. The loss in eggs and fry was 17,187,000, or 41.8 per cent. In June, 1916, before it was decided to close the hatchery at the end of that month, more than a million red-salmon eggs were collected, from which 1,016,000 eyed eggs were transferred to the Afognak hatchery in August.

The Karluk hatchery was built by the Alaska Packers Association in 1896 and has been in operation each season since until closed in 1916. It is located at the upper end of Karluk Lagoon at the head of tidewater, a distance of about 1¾ miles from Karluk Spit. In the period of its operation about 627,000,000 red-salmon eggs were taken, from which approximately 515,000,000 fry were hatched and liberated. Prior to the establishment of this station by the Alaska Packers Association fish-cultural work was undertaken in a limited way in 1891 by several companies engaged in canning operations at Karluk, who built a small hatchery near the site subsequently used by the Alaska Packers Association. This small hatchery, however, was operated only one season, the take being 2,500,000 red-salmon eggs, from which because of lack of suitable facilities and want of experience only about 500,000 fry were released.

QUADRA.

This hatchery is owned and operated by the Northwestern Fisheries Co. and is located at Quadra in southeastern Alaska. Its capacity is about 21,000,000 red-salmon eggs. In 1915 the taking of eggs was begun August 9, and was continued to November 13. In this period 7,408,000 red-salmon eggs were taken. Between December 13, 1915, and June 30, 1916, the number of young salmon released aggregated 7,092,000. The loss of eggs was 316,000, or 4.2 per cent. The take of eggs at Quadra in 1915 was previously incorrectly reported by the superintendent to be 7,500,000, which number was indicated in the Alaska Fisheries and Fur Industries Report for that year.

For the season of 1916–17 the taking of eggs was begun August 9 and ended on November 19, 1916. The take of red-salmon eggs was 16,125,000.

HETTA.

This hatchery is owned and operated by the Northwestern Fisheries Co. and is located on Hetta Lake near the southern end of Prince of Wales Island, southeastern Alaska. Its capacity is about 12,000,000 red-salmon eggs. For the season of 1915–16 the taking of red-salmon eggs was begun August 8, 1915, and was continued until late in December. The take of eggs was 8,114,000. Between August 15, 1915, and June 30, 1916, young salmon to the number of 7,598,000 were released. The loss of eggs for this season was 496,000, and in addition 20,000 young fish died, the total loss being 6.4 per cent.

For the season of 1916–17 the taking of eggs was begun August 21 and was completed December 20, 1916. The take aggregated 3,271,000 red-salmon eggs.

Further improvements were made in 1916 in respect to the condition of the water supplied to the hatchery. Arrangements were also made for installing in the winter of 1916–17 an additional retaining pond for fry.

KLAWAK.

This hatchery is operated by the North Pacific Trading & Packing Co. It is located on a lake a few miles above Klawak, on the west coast of Prince of Wales Island, southeastern Alaska. Its capacity is approximately 10,000,000 red-salmon eggs. In 1915 the taking of red-salmon eggs was begun July 24 and was continued to November 9. In this period 4,180,000 eggs were taken. Upon the basis of the company's original statement this number was indicated to be 4,130,000 in the Alaska Fisheries and Fur Industries Report for 1915. A later statement showed the take to have been 4,180,000. From July 24, 1915, to April 7, 1916, the loss of eggs was 160,000, or 3.8

per cent. The number of fry hatched and liberated from the 1915 take of eggs was 4,020,000. The young salmon were liberated in the period between October 6, 1915, and April 7, 1916.

In the season of 1916–17 egg taking began on July 20 and continued through September 26, 1916. The take of red-salmon eggs was 8,160,000.

During the winter of 1915–16 the North Pacific Trading & Packing Co. blasted out certain sections of the falls at the foot of the lake upon which the hatchery is situated, and there is now a better overflow for the water and the channel for the ascent of fish is improved. It is reported that since this change has been made no damaged salmon have been taken, which was common before the improvement at the falls. Another improvement in the work of this station in 1916 was the adoption of the incision method for taking red-salmon eggs.

The young salmon at this hatchery are liberated chiefly well up in small streams tributary to the lake. Some of the fry are retained in the small pond at the hatchery, where they have been observed to be in excellent condition, but the pond is too small to accommodate any large number. The construction of a series of small ponds in a stream near the hatchery would add materially to present facilities.

GENERAL STATISTICS OF THE FISHERIES IN 1916.

In 1916 the total investment in the Alaska fisheries amounted to $39,569,612, an increase of $2,253,052 over 1915. Approximately 88 per cent of this investment was in the salmon industry. The number of persons engaged in 1916 was 23,994, an increase of 1,532 over 1915. The total value of the products in 1916 was $26,156,559, an increase of $5,157,216 over 1915. In both quantity and value of the products this is the largest output of the fisheries in the history of Alaska. It exceeds by $4,913,584 the previous record of 1914, when the total value of the products was $21,242,975.

SUMMARY OF INVESTMENTS IN THE FISHERIES OF ALASKA IN 1916.

Industries.	Southeast Alaska.	Central Alaska.	Western Alaska.	Total.
Salmon canning	$12,730,402	$6,326,029	$15,044,422	$34,100,853
Salmon pickling	78,040	80,975	181,872	340,887
Salmon mild-curing	519,580			519,580
Herring fishery	509,046			509,046
Halibut fishery	2,149,311			2,149,311
Cod fishery		564,212		564,212
Whale fishery	386,300		705,171	1,091,471
Clam canning		157,943		157,943
By-products	124,709			124,709
Shark fishery	11,600			11,600
Total	16,508,988	7,129,159	15,931,465	39,569,612

SUMMARY OF PERSONS ENGAGED IN THE FISHERIES OF ALASKA IN 1916.

Races.	Southeast Alaska.	Central Alaska.	Western Alaska.	Total.
Whites	5,479	1,748	5,222	12,449
Natives	3,336	757	700	4,793
Japanese	970	441	420	1,831
Chinese	1,088	375	908	2,371
Miscellaneous [a]	399	310	1,841	2,550
Total	11,272	3,631	9,091	23,994

[a] Filipinos, Mexicans, Negroes, Porto Ricans, etc.

SUMMARY OF PRODUCTS OF THE ALASKA FISHERIES IN 1916.

Products.	Quantity.	Value.
Salmon:		
Canned ... cases	4,900,627	$23,269,429
Mild-cured ... pounds	3,920,400	397,628
Pickled ... barrels	17,734	212,667
Fresh (including local) ... pounds	1,713,848	136,983
Frozen ... do	863,406	34,408
Dry salt, dried, and smoked backs ... do	60,622	3,723
Halibut:		
Fresh (including local) ... do	5,672,118	407,422
Frozen ... do	5,724,023	268,319
Fletched ... do	68,958	2,368
Pickled and mild-cured ... do	30,458	1,354
Cod ... do	14,302,364	518,797
Herring ... do	6,839,200	216,640
Herring, canned ... cases	19,850	132,330
Herring oil ... gallons	188,926	47,231
Herring fertilizer ... tons	875	21,875
Whale oil ... gallons	717,500	291,500
Sperm oil ... do	90,500	29,750
Whale fertilizer ... pounds	2,272,000	41,000
Whalebone ... do	1,873	1,471
Trout:		
Frozen ... do	50,822	3,647
Pickled ... barrels	17	193
Canned ... cases	530	3,095
Sablefish ... pounds	304,141	11,185
Atka mackerel ... barrels	27	270
Red rock cod ... pounds	45,200	1,294
Miscellaneous fresh fish, local ... do	116,667	9,333
Clams ... cases	10,093	35,622
Shrimps ... pounds	72,005	3,636
Shrimp fertilizer (shells) ... do	3,880	114
By-products, oil ... gallons	40,750	20,150
By-products, fertilizer and meal ... pounds	1,438,000	27,775
Shark hides ... number	450	4,000
Shark oil ... gallons	2,700	1,350
Total	....	26,156,559

SALMON INDUSTRY.

The salmon industry of Alaska presents each year certain noteworthy features which serve to distinguish one season from another and which give rise to valuable comparisons in the development of the fisheries of the Territory. Viewed thus it may be recorded that the total production of the salmon fisheries in Alaska in 1916 exceeded in quantity and value that of any other year. An important factor in this development was the increase in the number of canneries operated, the total number being 100, as compared with 85 in 1915.

In the southeastern district the output of the canneries shows that the pack of cohos was more than double that in 1915 and the largest ever made; it shows the largest pack of chums in the history of the industry; the largest pack of humpbacks and kings save the season of 1915; and that the pack of reds was exceeded only by that of 1914. The mild-cure and frozen-salmon industries, which have their chief centers in southeastern Alaska, showed good gains over 1915. The fresh-salmon industry declined somewhat because of greater demands for canning purposes.

The events of largest moment in central Alaska were the tremendous run of humpbacks generally throughout the district and the particularly heavy run of red salmon at Karluk and the south end of Kodiak Island. The result was the largest pack of salmon ever made in central Alaska, the increase in this district over the previous high record of 1914 being more than 400,000 cases, made up chiefly of humpbacks, although there was a larger pack of all species except kings.

The western district of Alaska is the chief producer of red salmon. The season of 1916 shows a noteworthy increase over that of 1915. Beginning with 1912 the run of red salmon in western Alaska has been remarkably constant, and notwithstanding the lighter run of 1915 the average catch for the five seasons is 19,860,000. The approximate catch in 1916 was 19,600,000, which compares very favorably with the catch of 1913 and 1914, when approximately 21,500,000 were taken each season. The catch in 1916 was larger than in 1915 by about 3,000,000 red salmon. The salmon-pickling industry, which is confined chiefly to the western district, shows a substantial increase in the product as compared with 1915.

SALMON CATCH AND FORMS OF GEAR.

The principal kinds of fishing apparatus used in the salmon industry of Alaska are seines, gill nets, and pound nets. Purse and haul seines numbering 434 and aggregating 75,080 fathoms of webbing were operated in 1916. This is a gain of 72 over 1915, when 362 were used. Southeast Alaska is credited with an increase of 20, central Alaska with 17, and western Alaska with 35.

The total number of gill nets operated in the salmon industry was 3,051, of an aggregate length of 412,595 fathoms. Western Alaska leads with 1,986 gill nets, southeast Alaska is second with 560, while central Alaska takes last place with 505.

There were 306 driven and 67 floating pound nets, or a total of 373 pound nets operated in the salmon industry of Alaska in 1916, an increase of 89 over 1915. Of the aggregate number used, 188 driven and 67 floating pound nets, or a total of 255, were located in southeast Alaska, 94 driven pound nets were operated in central Alaska, and 24 driven pound nets in western Alaska. In 1916 the gains by districts were: Southeast Alaska, 51 driven and 19 floating pound nets, a total of 70; central Alaska, 10 driven pound nets; and western Alaska, 9 driven pound nets.

Of the total of 373 pound nets used in Alaska in 1916, 38 were operated by independents, who sold their catch to various canneries. Of these 38 independent pound nets, 17 were in southeast Alaska and 21 in central Alaska.

Seines caught 36 per cent of the total number of salmon taken from Alaskan waters in 1916, pound nets 33 per cent, and gill nets 30 per cent, while the remaining 1 per cent was taken by lines and dip nets. In 1915 the catch by the respective forms of gear was: Pound nets 42 per cent, seines 29 per cent, gill nets 27 per cent, and 1 per cent by other appliances. Further comparison shows that in 1916 the catch by pound nets declined 9 per cent and that it increased 7 per cent by seines and 3 per cent by gill nets. The proportionate catches by districts is shown in the following table, according to the principal kinds of apparatus used:

PERCENTAGE OF SALMON CAUGHT IN EACH DISTRICT BY PRINCIPAL FORMS OF GEAR.

Apparatus.	Southeast Alaska.		Central Alaska.		Western Alaska.	
	1915	1916	1915	1916	1915	1916
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Seines	39	43	32	58	6	7
Pound nets	57	52	52	35	7	7
Gill nets	3	3	15	6	86	85

The total catch of salmon in Alaska in 1916 was 72,055,971, as compared with 63,537,244 in 1915, an increase of 8,518,727. Southeast Alaska shows a decline of 6,400,967 salmon, but this falling off is more than balanced by the gain of 10,181,902 in central and 4,737,792 in western Alaska. Considering the Territory as a whole in 1916, the catch of cohos exceeded that of the preceding season by 1,121,747; chums by 2,561,206; humpbacks by 911,569; kings by 69,773; and reds by 3,854,432.

So much has been said about the remarkable efficiency of pound nets as compared with seines that figures upon the basis of official returns for the season of 1916 may prove of interest. Considering Alaska as a whole, 434 purse and haul seines were operated, which caught 25,725,808 salmon, an average of 59,276 per seine. In the same season 373 pound nets were operated, which caught 23,982,614 salmon, an average of 64,296 per pound net. It will thus be seen that the difference in the average catch of the two forms of apparatus is only 5,020 salmon. This disproves the oft-repeated statement of certain persons, chiefly those engaged in the purse-seine fishery, that the pound net catches such enormous quantities of salmon that it is the form of fishing apparatus upon which full responsibility must rest if there is any overfishing or depletion of the waters. As indicated in the foregoing, nearly 2,000,000 more salmon were caught by seines than by pound nets in Alaska waters in 1916.

SALMON TAKEN IN 1916, BY SPECIES AND APPARATUS, FOR EACH GEOGRAPHIC SECTION OF ALASKA.

Apparatus and species.	Southeast Alaska.	Central Alaska.	Western Alaska.	Total.
	Number.	*Number.*	*Number.*	*Number.*
Seines:				
Coho, or silver	351,756	91,461	1,174	444,391
Chum, or keta	2,940,657	291,975	66,405	3,299,037
Humpback, or pink	9,430,269	6,675,794	180,609	16,286,672
King, or spring	7,184	1,052	25,412	33,648
Red, or sockeye	787,480	3,454,378	1,420,202	5,662,060
Total	13,517,346	10,514,660	1,693,802	25,725,808
Gill nets:				
Coho, or silver	228,093	184,390	286,800	699,283
Chum, or keta	173,859	4,336	1,279,600	1,457,795
Humpback, or pink	99,640	69,212	153,089	321,941
King, or spring	34,421	37,874	103,833	176,128
Red, or sockeye	501,712	936,446	17,527,212	18,965,370
Total	1,037,725	1,232,258	19,350,534	21,620,517
Pound nets:				
Coho, or silver	811,069	262,947	22,630	1,096,646
Chum, or keta	1,783,113	503,761	335,942	2,622,816
Humpback, or pink	12,400,932	2,264,386	534,032	15,199,350
King, or spring	21,299	42,967	22,199	86,465
Red, or sockeye	1,111,351	3,225,446	640,540	4,977,337
Total	16,127,764	6,299,507	1,555,343	23,982,614
Lines:				
Coho, or silver	202,097	....	....	202,097
Chum, or keta	1,066	....	....	1,066
King, or spring	379,154	....	....	379,154
Total	582,317	....	....	582,317
Dip nets:				
Coho, or silver	....	10,914	....	10,914
King, or spring	....	5,325	....	5,325
Red, or sockeye	....	128,476	....	128,476
Total	....	144,715	....	144,715
Total:				
Coho, or silver	1,593,015	549,712	310,604	2,453,331
Chum, or keta	4,898,695	800,072	1,681,947	7,380,714
Humpback, or pink	21,930,841	9,009,392	867,730	31,807,963
King, or spring	442,058	87,218	151,444	680,720
Red, or sockeye	2,400,543	7,744,746	19,587,954	29,733,243
Grand total	31,265,152	18,191,140	22,599,679	72,055,971

SALMON CANNING.

NEW CANNERIES.

Fifteen new canneries were operated in Alaska in 1916—eight in southeast, three in central, and four in western Alaska. They were as follows: Southeast Alaska—Auk Bay Salmon Canning Co., Auk Bay; Beegle Packing Co., Northland Packing Co., and J. L. Smiley & Co., Ketchikan; Sanitary Packing Co., George Arm; Seattle Packing Co., floating plant at Idaho Inlet; Tenakee Fisheries Co., Tenakee; and Union Bay Fisheries Co., Union Bay. Central Alaska—Clark-Graham Co., on Eyak River, near Cordova; Hoonah Packing Co., on Bering River, near Katalla; and the Carlisle Packing Co., Cordova.

Western Alaska—Bering Sea Packing Co., Herendeen Bay; Pacific American Fisheries, Unalaska Island; Red Salmon Canning Co., Naknek; and the Alaska Fishermen's Packing Co., on Kvichak Bay, the plant of the latter having been rebuilt to replace the one destroyed by fire before the beginning of operations in 1915.

The cannery at Gambier Bay, acquired in 1915 by the Hoonah Packing Co., but closed in 1914 and 1915, was operated in 1916. This apparent gain of one more cannery for 1916 was offset by the loss of the cannery of the Northwestern Fisheries Co., at Kenai, which was destroyed by fire before operations began, thus making a net increase of 15 canneries over 1915. As the cannery of the Metlakatla Industrial Co. was not operated in 1915 and was burned before canning began in 1916, it is not counted in the foregoing categories, thus the net increase is not affected by its omission. The G. W. Hume Co. made a small pack of salmon before its plant was destroyed by fire, and therefore it is counted as having operated in 1916. At Metlakatla, Edward Verney & Son packed by hand about 200 cases of salmon. This plant is not included in the list of canneries.

CHANGES IN CANNERIES.

The Seldovia Salmon Co. discontinued business by the sale of its cannery at bankruptcy proceedings held in Seattle in March, 1916. The Columbia Salmon Co. was incorporated to take over and operate the cannery in 1916. The four canneries of the North Alaska Salmon Co. in western Alaska were acquired by Libby, McNeill & Libby. No change occurred in respect to the cannery of the St. Elias Packing Co., at Dry Bay, which, as for several seasons past, was not operated in 1916.

CANNERIES OPERATED IN 1916.

During the year 1916 there were 54 canneries in operation in southeast Alaska, 19 in central Alaska, and 27 in western Alaska—a total of 100 canneries for the Territory.

COMPANIES CANNING SALMON IN ALASKA, NUMBER AND LOCATION OF CANNERIES OPERATED, AND NUMBER OF POUND NETS OWNED BY EACH.

Names.	Canneries.	Location.	Pound nets.
Southeast Alaska:			
Alaska Fish Co	1	Waterfall	1
Alaska Pacific Fisheries	3	Chilkoot	[a] 8
		Chomly	[b] 8
		Yes Bay	[c] 8
Alaska Packers Association	2	Loring	[d] 9
		Wrangell	[e] 6
Alaska Sanitary Packing Co	1	do	5
Anacortes Fisheries Co	2	Kasaan	6
		Shakan	4
Astoria & Puget Sound Canning Co	1	Excursion Inlet	5
Auk Bay Salmon Canning Co	1	Auk Bay	1
Barnes, F. C., Co	1	Lake Bay	[f] 4

[a] 2 floating. [b] 4 floating. [c] All floating. [d] 6 floating. [e] 5 floating. [f] 1 floating.

COMPANIES CANNING SALMON IN ALASKA, NUMBER AND LOCATION OF CANNERIES OPERATED, AND NUMBER OF POUND NETS OWNED BY EACH—Continued.

Name.	Canneries.	Location.	Pound nets.
Southeast Alaska—Continued.			
Beegle Packing Co	1	Ketchikan	2
Deep Sea Salmon Co	1	Ford Arm	a 8
Doyhof Fish Products Co	1	Scow Bay	......
Fidalgo Island Packing Co	1	Ketchikan	7
George Inlet Packing Co	1	George Inlet	3
Harris, P. E., & Co	1	Hawk Inlet	10
Hidden Inlet Canning Co	1	Hidden Inlet	......
Hoonah Packing Co	2	Gambier Bay	2
		Hoonah	b 17
Hume, G. W., Co	1	Nakat Harbor	c 2
Karheen Packing Co	1	Karheen	2
Lindenberger Packing Co	2	Craig	1
		Roe Point	b 6
Myers, Geo. T., & Co	1	Chatham	6
Northland Packing Co	1	Ketchikan	2
North Pacific Trading & Packing Co	1	Klawak	......
Northwestern Fisheries Co	4	Dundas	5
		Hunter Bay	a 2
		Quadra	3
		Santa Ana	a 1
Pacific American Fisheries	1	Excursion Inlet	17
Petersburg Packing Co	1	Petersburg	3
Pillar Bay Packing Co	1	Pillar Bay	3
Point Warde Packing Co	1	Point Warde	a 3
Pure Food Fish Co	1	Ketchikan	c 3
Sanborn-Cram Co	1	Burnett Inlet	a 5
Sanborn-Cutting Co	1	Kake	a 5
Sanitary Packing Co	1	George Arm	......
Seattle Packing Co	1	Idaho Inlet	......
Smiley, J. L., & Co	1	Ketchikan	3
Starr-Collinson Packing Co	1	Moira Sound	a 3
Straits Packing Co	1	Skowl Arm	......
Sunny Point Packing Co	1	Sunny Point	1
Swift-Arthur-Crosby Co	1	Heceta Island	......
Taku Canning & Cold Storage Co	1	Taku Harbor	b 11
Tee Harbor Packing Co	1	Tee Harbor	9
Tenakee Fisheries Co	1	Tenakee	2
Thlinket Packing Co	1	Funter Bay	23
Union Bay Fisheries Co	1	Union Bay	......
Ward's Cove Packing Co	1	Ward Cove	......
Wiese Packing Co	1	Rose Inlet	2
Yakutat & Southern Railway Co	1	Yakutat	......
Central Alaska:			
Alaska Packers Association	4	Alitak	2
		Chignik	3
		Kasilof	16
		Larsen Bay	......
Canoe Pass Packing Co	1	Cordova	1
Carlisle Packing Co	1	....do	2
Clark-Graham Co	1	Eyak River	......
Columbia Salmon Co	1	Seldovia	7
Columbia River Packers' Association	1	Chignik	3
Copper River Packing Co	1	Abercrombie	......
Deep Sea Salmon Co	1	Knik Arm	5
Fidalgo Island Packing Co	1	Port Graham	5
Hoonah Packing Co	1	Bering River	......
Kadiak Fisheries Co	1	Kodiak	1
Libby, McNeill & Libby	1	Kenai	17
Northwestern Fisheries Co	3	Chignik	3
		Orca	......
		Uyak	d 4
Pacific American Fisheries	1	King Cove	4
Western Alaska:			
Alaska Fishermen's Packing Co	2	Koggiung	......
		Nushagak	......
Alaska Packers Association	8	Kvichak River (2)	......
		Naknek River (3)	......
		Nushagak Bay (2)	5
		Ugaguk River	......
Alaska-Portland Packers' Association	1	Nushagak Bay	3
Alaska Salmon Co	1	Wood River	......
Bering Sea Packing Co	1	Herendeen Bay	4

a All floating.
b 2 floating.
c 1 floating.
d The 4 pound nets credited to the Uyak cannery of the Northwestern Fisheries Co. were a part of the equipment of the company's cannery at Kenai which was destroyed by fire before canning operations began. Some of the fish were transferred to Uyak.

COMPANIES CANNING SALMON IN ALASKA, NUMBER AND LOCATION OF CANNERIES OPERATED, AND NUMBER OF POUND NETS OWNED BY EACH—Continued.

Names.	Canneries.	Location.	Pound nets.
Western Alaska—Continued.			
Bristol Bay Packing Co.	1	Kvichak Bay	
Columbia River Packers' Association	1	Nushagak Bay	
Midnight Sun Packing Co.	1	Kotzebue Sound	3
Naknek Packing Co.	1	Naknek River	
Nelson Lagoon Packing Co.	1	Nelson Lagoon	6
North Alaska Salmon Co.	4	Kvichak River (2) Nushagak Bay Ugaguk River	
Northwestern Fisheries Co.	1	Nushagak	
Pacific American Fisheries	2	Makushin Bay Port Moller	 3
Red Salmon Canning Co.	2	Naknek Ugashik River	

STATISTICS.

The number of canneries in operation in Alaska in 1916 was 100 as compared with 85 in 1915. The total investment was $34,100,853, an increase of $2,818,528 over 1915. The increase in investment in southeast Alaska was $962,118; in central Alaska, $551,650; and in western Alaska, $1,304,760.

In 1916 the canning industry gave employment to 19,240 persons, an increase of 1,499 over 1915, when 17,741 were employed. The following increases are noted: Whites, 1,140; Chinese, 181; Japanese, 225; and miscellaneous, 197. The number of natives employed was 244 less than in 1915, the falling off occurring in southeast and western Alaska; but in the central district there was a gain of about 50. Considering Alaska as a whole, it is noteworthy that more than 4,000 natives were employed in the salmon-canning industry.

The pack of canned salmon in 1916 was 4,900,627 cases, valued at $23,269,429, which is an increase of 400,334 over the 4,500,293 cases packed in 1915 and an increase of $4,616,414 over the $18,653,015 value of the 1915 pack. The pack of 1916 is the greatest both as to quantity and value in the history of Alaska, the previous record as to quantity being that of 1915, while the greatest value previously recorded was that of 1914, when the pack was worth $18,920,589, or $4,348,840 less than that of 1916. A comparison of the pack with that of 1915 is as follows: Southeast Alaska declined from 2,549,212 to 2,214,280, a decrease of 334,932 cases; central Alaska advanced from 632,848 to 1,075,913 cases, an increase of 443,065; and western Alaska also advanced from 1,318,233 to 1,610,434 cases, an increase of 292,201 cases over the pack of 1915. Continuing the comparison, it is observed that the pack of cohos more than doubled, increasing from 124,268 to 261,909 cases, a gain of 137,641 cases; chums increased from 479,946 to 724,115 cases, a gain of 244,169 cases; and reds increased from 1,932,312 to 2,110,937 cases, an advance of 178,625 cases. Humpbacks fell off from 1,875,516 to 1,737,793 cases, a decrease of 137,723 cases; and kings went down from 88,251 to 65,873 cases. a decrease of 22,378 cases in 1916.

INVESTMENT IN THE SALMON-CANNING INDUSTRY IN 1916.

Items.	Southeast Alaska.		Central Alaska.		Western Alaska.		Total.	
	No.	*Value.*	*No.*	*Value.*	*No.*	*Value.*	*No.*	*Value.*
Canneries operated	54	$3,764,083	19	$1,587,991	27	$3,462,688	100	$8,814,762
Working capital	....	4,505,058	....	2,083,650	....	6,284,941	....	12,873,649
Wages paid	....	2,219,105	....	1,313,497	....	2,642,596	....	6,175,198
Vessels:								
Power vessels over 5 tons	143	739,384	49	483,777	57	729,920	249	1,953,081
Net tonnage	2,757	....	1,587	....	4,501	....	8,835	....
Launches under 5 tons	67	87,220	65	53,438	32	123,625	104	264,283
Sailing	11	183,745	8	284,210	39	932,954	58	1,400,909
Net tonnage	9,444	....	13,882	....	50,589	....	73,915	....
Boats, sail and row	896	58,101	565	44,374	1,245	208,165	2,706	400,640
Lighters, scows, and house boats	316	148,062	184	113,595	172	191,089	672	452,746
Pile drivers	47	148,896	36	100,357	25	64,940	108	314,193
Apparatus:								
Haul seines	12	1,768	53	22,290	6	4,100	71	28,158
Fathoms	1,728	....	11,918	....	1,060	....	14,706	....
Purse seines	292	121,465	12	4,800	6	14,726	310	140,991
Fathoms	52,279	....	2,900	....	1,500	....	56,679	....
Gill nets	320	26,180	473	46,495	1,948	225,678	2,741	298,353
Fathoms	29,050	....	51,815	....	302,260	....	383,125	....
Pound nets, driven	187	573,343	94	187,430	24	69,000	305	830,773
Pound nets, floating	67	152,992	....	....	....	....	67	152,992
Dip nets	....	....	50	125	....	....	50	125
Total	....	12,730,402	....	6,326,029	....	15,044,422	....	34,100,853

PERSONS ENGAGED IN THE SALMON-CANNING INDUSTRY IN 1916.

Occupations and races.	Southeast Alaska.	Central Alaska.	Western Alaska.	Total.
Fishermen:				
Whites	998	943	2,733	4,674
Natives	1,232	288	158	1,678
Chinese	52	....	....	52
Japanese	46	1	....	47
Miscellaneous [a]	22	5	....	27
Total	2,350	1,237	2,891	6,478
Shoresmen:				
Whites	1,272	544	1,266	3,082
Natives	1,517	401	456	2,374
Chinese	1,036	375	908	2,319
Japanese	878	438	410	1,726
Miscellaneous [a]	374	305	1,841	2,520
Total	5,077	2,063	4,881	12,021
Transporters:				
Whites	309	175	219	703
Natives	13	13	3	29
Chinese	....	....	....	....
Japanese	5	2	....	7
Miscellaneous [a]	2	....	....	2
Total	329	190	222	741
Grand total:				
Whites	2,579	1,662	4,218	8,459
Natives	2,762	702	617	4,081
Chinese	1,088	375	908	2,371
Japanese	929	441	410	1,780
Miscellaneous [a]	398	310	1,841	2,549
Total	7,756	3,490	7,994	19,240

[a] Filipinos, Mexicans, Negroes, Porto Ricans, etc.

OUTPUT OF CANNED SALMON IN 1916.[a]

Product.	Southeast Alaska.		Central Alaska.		Western Alaska.		Total.	
	Cases.	*Value.*	*Cases.*	*Value.*	*Cases.*	*Value.*	*Cases.*	*Value.*
Coho, or silver:								
½-pound flat	11,599	$86,899	1,546	$12.372	....	....	13,145	$99,271
1-pound flat	2.127	12,673	6,064	30,725	....	....	8,191	43,398
1-pound tall	165,314	873,407	46,087	239,696	29,172	$143,719	240,573	1,256,822
Total	179,040	972,979	53,697	282,793	29,172	143,719	261,909	1,399,491
Chum, or keta:								
½-pound flat	1,423	7,989	....	....	....	....	1,423	7,989
1-pound tall	505,196	1,685,315	64,396	204.429	153,100	522,867	722,692	2,412,611
Total	506,619	1,693,304	64,396	204.429	153,100	522,867	724,115	2,420,600
Humpback, or pink:								
½-pound flat	39,921	221.442	1,570	8.774	....	....	41,491	230,216
1-pound flat	4,253	16.999	10,513	40.193	....	....	14,796	57,192
1-pound tall	1,286.650	4,613,786	357,939	1.296.990	36,917	132,001	1,681,506	6,042,777
Total	1,330,824	4,852.227	370,052	1,345,957	36.917	132.001	1,737,793	6,330,185
King, or spring:								
½-pound flat	937	7,509	295	3.086	1,385	7,758	2,617	18,353
1-pound flat	1,038	6,161	2.766	14,232	....	....	3,804	20,393
1-pound tall	16,256	90,332	18,952	102,087	24,244	122,255	59,452	314,674
Total	18,231	104,002	22,013	119,405	25.629	130,013	65,873	353,420
Red, or sockeye:								
½-pound flat	33,246	335.407	29,121	282.346	19,198	190,149	81.565	807,902
1-pound flat	21,613	142,640	30,416	210.103	34,366	223,666	86,395	576,409
1-pound tall	124,707	737,793	506,218	3,029,854	1,306,046	7,600,262	1,936,971	11,367,909
2-pound nominal	....	....	....	....	6,006	13,513	6,006	13,513
Total	179,566	1.215,840	565,755	3,522.303	1,365,616	8,027.590	2,110,937	12,765,733
Grand total	2,214,280	8,838,352	1,075,913	5,474,887	1.610,434	8,956,190	4,900,627	23,269,429

a Cases containing ½-pound cans have been reduced one-half in number and those containing 2-pound cans have been increased once in number. Thus, for the purpose of affording fair comparison, all are put upon the basis of forty-eight 1-pound cans per case.

OUTPUT OF CANNED SALMON, 1910 TO 1916.[a]

Product.	1910	1911	1912	1913	1914	1915	1916	Total.
	Cases.	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*
Coho, or silver:								
½-pound flat	163	1,574	2,719	3,587	4,579	2,050	13,145	27,817
1-pound flat	2,249	1,075	17	266	285	2,338	8,191	14,421
1-pound tall	111,614	131,259	163,462	71,926	152,199	119,880	240,573	990,913
Total	114,026	133,908	166,198	75,779	157,063	124,268	261,909	1,033,151
Chum, or keta:								
½-pound flat	....	....	2,795	985	373	....	1,423	5,576
1-pound flat	....	7,245	....	2,619	5,568	317	....	15,749
1-pound tall	254,218	316,550	661,838	287,314	657,918	479,629	722,692	3,380,159
Total	254,218	323,795	664,633	290,918	663,859	479,946	724,115	3,401,484
Humpback, or pink:								
½-pound flat	3,188	4,836	13,712	20,822	2,103	4,325	41,491	90,477
1-pound flat	7,900	9,437	....	3,258	9,286	3,508	14,796	48,185
1-pound tall	543,233	991,005	1,266,426	1,348,801	974,660	1,867,683	1,681,506	8,673,314
Total	554,321	1,005,278	1,280,138	1,372,881	986,049	1,875,516	1,737,793	8,811,976
King, or spring:								
½-pound flat	54	67	5,151	1,585	3,143	2,404	2,617	15,021
1-pound flat	....	....	....	....	4,804	3,755	3,804	12,363
1-pound tall	40,167	45,451	38,166	32,785	40,092	82,092	59,452	338,205
Total	40,221	45,518	43,317	34,370	48,039	88,251	65,873	365,589
Red, or sockeye:								
½-pound flat	22,320	13,601	28,024	29,041	53,825	52,033	81,565	280,409
1-pound flat	39,941	4,967	16,242	11,735	64,671	112,847	86,395	336,798
1-pound tall	1,388,006	1,296,750	1,856,089	1,924,461	2,083,147	1,765,139	1,936,971	12,250,563
1½-pound nominals	....	....	....	....	....	2,293	....	2,293
2-pound nominals	....	....	....	....	....	....	6,006	6,006
Total	1,450,267	1,315,318	1,900,355	1,965,237	2,201,643	1,932,312	2,110,937	12,870,069
Grand total	2,413,053	2,823,817	4,054,641	3,739,185	4,056,653	4,500,293	4,900,627	26,488,269

a The number of cases shown has been put upon the common basis of forty-eight 1-pound cans to the case.

AVERAGE ANNUAL PRICE PER CASE OF FORTY-EIGHT 1-POUND CANS OF SALMON, 1906 TO 1916.

Product.	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916
Coho, or silver	$3.63	$3.91	$3.98	$4.07	$4.89	$5.67	$4.44	$3.45	$4.39	$4.31	$5.34
Chum, or keta	2.87	2.97	2.53	2.28	3.04	3.72	2.37	2.21	3.37	2.59	3.34
Humpback, or pink	3.00	3.16	2.69	2.40	3.15	3.94	2.55	2.58	3.50	2.78	3.64
King, or spring	3.78	4.18	4.20	4.32	5.34	6.48	5.37	4.04	5.01	4.63	5.36
Red, or sockeye	3.77	4.59	4.52	4.53	5.30	6.33	5.45	4.54	5.58	5.82	6.04

FISHING SEASON.

It is regarded as a matter of interest to record the beginning and end of the fishing season in the canning industry for salmon in certain of the more important waters of the various regions of Alaska in the year 1916. The dates given in the table were taken from the statistical reports made by the canning companies, the earliest one reported by any company doing much fishing being accepted as an opening date, while the closing date was determined by taking the day nearest to which major operations ceased. The following table conveys this information:

FISHING SEASON IN THE CANNING INDUSTRY FOR SALMON CAUGHT IN CERTAIN IMPORTANT WATERS IN ALASKA IN 1916.

Locality.	Coho.		Chum.		Humpback.		King.		Red.	
	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—	Fishing began—	Fishing ended—
Southeast Alaska:										
Chatham Strait	June 1	Sept. 27	June 1	Sept. 30	June 1	Sept. 30	June 1	Sept. 22	June 1	Sept. 12
Prince of Wales Island, west side	June 15	Sept. 23	July 1	...do...	July 1	...do...	....	....	June 15	Sept. 23
Cordova Bay	...do...	...do...	...do...	...do...	June 15	...do...	....	....	...do...	Do.
Clarence Strait—										
Southern section	June 10	Sept. 29	June 27	Sept. 29	June 27	Aug. 16	....	....	June 8	Sept. 29
Northern section	July 20	Sept. 30	Aug. 13	Oct. 17	Aug. 13	Oct. 17	June 27	Aug. 30	July 13	Sept. 7
Behm Canal	June 15	Oct. 20	June 15	Oct. 20	June 15	Oct. 20	....	....	June 15	Oct. 16
Revillagigedo Channel	June 27	Sept. 29	June 27	Sept. 29	June 27	Sept. 29	June 16	July 16	June 27	Sept. 29
Stephens Passage	July 4	Oct. 4	June 22	Oct. 3	June 22	Sept. 21	May 9	July 12	June 21	Oct. 3
Peril and Sumner Straits	June 24	Sept. 27	July 1	Sept. 30	June 21	Sept. 30	....	....	June 27	Sept. 9
Frederick Sound	June 22	Sept. 21	Sept. 14	Sept. 23	....	....	....	....	June 22	Sept. 21
Icy Strait and Cross Sound	June 15	Sept. 20	May 29	Sept. 27	June 1	Sept. 27	May 21	July 15	May 21	Sept. 15
Lynn Canal	July 7	Oct. 1	July 7	Oct. 1	July 7	Aug. 24	....	....	June 24	Oct. 1
Baranof Island, west side	July 4	Sept. 20	June 20	Sept. 20	June 20	Sept. 20	....	....	June 8	Sept. 20
Chicagof Island, west side	Aug. 15	Sept. 15	Aug. 5	Sept. 15	Aug. 1	Sept. 15	....	....	Aug. 1	Sept. 1
Portland Canal	Aug. 16	Sept. 9	July 8	Sept. 3	July 8	Sept. 3	....	....	July 8	Aug. 18
Iphigenia Bay	June 8	...do...	....	....	June 8	Sept. 9	....	....	June 8	Sept. 9
Yakutat Bay and vicinity	Aug. 25	Sept. 28	....	....	July 15	Aug. 10	June 2	Aug. 4	June 2	Aug. 4
Central Alaska:										
Bering River	....	....	....	....	....	....	June 22	June 28	June 6	Aug. 7
Martin River	....	....	....	....	....	....	May 12	July 9	June 12	July 9
Copper River Delta	May 12	Sept. 24	May 12	Sept. 24	May 12	Sept. 24	...do...	...do...	May 12	Aug. 15
Copper River, lake and canyon	May 31	Sept. 16	May 31	Sept. 16	May 31	Sept. 16	May 31	Sept. 16	May 31	Sept. 16
Controller Bay	Aug. 24	Sept. 25	....	....	July 23	Aug. 8	....	....	May 27	Aug. 15
Cook Inlet	July 2	Aug. 27	June 24	Aug. 23	June 27	Aug. 27	May 27	Aug. 27	May 30	Aug. 27
Prince William Sound—										
Eastern section	July 1	Sept. 30	June 23	Sept. 24	June 28	Sept. 24	....	....	June 20	Sept. 24
Western section	....	....	July 7	Aug. 4	July 9	Aug. 1	....	....	June 17	July 23
Afognak streams—										
Western part	....	....			June 20	Aug. 15	....	....	May 15	July 31
Eastern part	Aug. 15	Oct. 20	....	....	July 15	Sept. 16	....	....	June 1	Oct. 20
Karluk	June 3	Oct. 2	June 3	Oct. 2	June 3	Oct. 2	June 3	Oct. 2	June 3	Oct. 2
Red River	....	....	June 8	July 21	June 8	July 21	....	....	June 8	July 21
Uganik	Aug. 15	Oct. 10	....	....	June 5	Oct. 10	....	....	June 5	July 27
Olga Bay	June 8	Sept. 1	June 8	Sept. 1	June 8	Sept. 1	June 8	Sept. 1	June 8	Sept. 1
Chignik Bay	June 28	Sept. 9	June 12	Sept. 8	June 12	Aug. 31	June 12	Aug. 31	June 12	Sept. 9
Ikatan Bay	May 22	July 25	May 22	July 25	May 22	July 25	May 22	July 25	May 22	July 25
Cold Bay, Thin Point, and King Cove	June 28	Aug. 15	June 28	Aug. 15	June 28	Aug. 15	....	....	June 28	Aug. 15
Morzhovoi Bay	June 9	Aug. 11	June 9	Aug. 11	June 9	Aug. 11	June 9	Aug. 11	June 9	Aug. 11
Pavlof Bay	....	....	....	....	Aug. 7	Aug. 15	....	....	....	....

Western Alaska:										
Kvichak Bay	June 11	Aug. 1	June 11	Aug. 1	June 11	Aug. 1	June 11	Aug. 1	June 11	Aug. 1
Naknek, Ugaguk, and Ugashik Rivers	...	...	June 21	July 31	...	...	June 21	July 31	June 21	July 31
Nushagak Bay	June 11	Aug. 4	June 11	Aug. 4	Jane 11	Aug. 4	June 11	Aug. 4	June 11	Aug. 4
Nushagak River	June 24	Aug. 6	June 23	Aug. 6	June 17	Aug. 6	June 8	July 28	June 13	Aug. 6
Port Moller	June 7	Aug. 9	June 7	Aug. 9	June 7	Aug. 9	June 7	Aug. 9	June 7	Aug. 9
Nelson Lagoon	...	...	July 1	Aug. 7	...	...	do.	July 21	do.	Aug. 7
Kotzebue Sound	July 20	Sept. 1	...	...	...	...	...	...	...	...

LOSSES AND DISASTERS IN THE SALMON-CANNING INDUSTRY.

Three disastrous fires occurred during the year, each of which destroyed a cannery and considerable other property. The first of these happened on May 17, when the cannery of the Metlakatla Industrial Co. on Annette Island was burned. This plant was owned by the natives of Metlakatla, who had leased it to P. E. Harris & Co., of Seattle. New machinery was to be installed by the company to bring the plant down to date, but fortunately none of it had been received at the cannery before the fire. A considerable quantity of gear was lost, however.

On May 22 the cannery of the Northwestern Fisheries Co. at Kenai was burned. Fire broke out about midnight in the can loft, and before it could be gotten under control the cannery and adjoining warehouses in which were stored cans for the season's pack and all new webbing for traps had burned. The superintendent's residence, several other small buildings, and most of the floating equipment were undamaged. The losses were approximately $190,000. As it was impossible to rebuild the cannery in time to operate during the season of 1916, all oriental laborers returned to Seattle. Most of the regular outside men remained at Kenai during the summer, clearing away the débris and laying the foundation for new buildings which will be erected early next season.

The last large fire of the season occurred on June 26 and destroyed the cannery of the G. W. Hume Co. at Nakat Harbor. The plant was valued at about $30,000 and the material and supplies for the operations of the season were worth $50,000, making a total loss of about $80,000.

The wharf of the North Pacific Trading & Packing Co. at Klawak was damaged by ice to the extent of $2,500.

The loss of fishing gear for the several districts was approximately $27,400. The Alaska Sanitary Packing Co. and the Canoe Pass Packing Co. lost one trap each. The Tee Harbor Packing Co. reported the loss of four traps, valued at $12,000.

The Hoonah Packing Co. lost a launch in southeast Alaska, valued at $1,200, and the Deep Sea Salmon Co. lost one on Cook Inlet having a book value of $2,500. Other losses of small boats and scows aggregated $3,250.

Three fishermen and one transporter were accidently killed while engaged in salmon fishing in southeast Alaska. One shoresman was drowned in central Alaska, and five fishermen, two shoresmen, and one transporter were drowned in western Alaska, while two shoresmen met accidental death otherwise in the same district.

The Alaska Fishermen's Packing Co. reported the loss at its Nushagak cannery of 2,060 cases of red salmon, valued at $7,828.

The steamer *Pavlof*, belonging to the Pacific American Fisheries, struck an uncharted rock off the south end of Kodiak Island on February 17 and lost her propeller. A wireless call for assistance was sent to Kodiak, and in response thereto the power schooner *Hunter* sailed immediately to the relief of the distressed vessel. Before the schooner reached the steamer a hard wind from the north drove her ashore on Tagidak Island, where she became a total loss. The *Pavlof* was engaged in transporting material to Herendeen Bay, western Alaska, where a new cannery was to be built.

MILD CURING OF SALMON.

The continuance of the war through 1916 made it impossible to ship mild-cured salmon to Germany, which in normal times has been the chief market for this product. This state of affairs caused a pronounced conservatism upon the part of producers, as they were at a loss to know to just what extent conditions warranted a pack over and above the requirements of the domestic market. It is noteworthy, however, that more recent reports show a growing demand for mild-cured salmon in those European countries of which the markets are not closed on account of the war and that there is also a stronger call for this product in the United States. The result has been reassuring, and conditions now indicate that the mild-cure industry will soon resume its normal proportions.

The mild-cure industry of Alaska in 1916 was centered almost wholly in the southeastern district. No salmon were mild cured in the central district, while in the western district only 12 tierces were packed. The principal operators were the Columbia & Northern Fishing & Packing Co. and the Dalmony Fish Co., at Wrangell; Ferguson & Reichwein, at Craig; Hunter & Dickinson, at Washington Bay; Pacific Mild-Cure Co., at Hoonah, Port Conclusion, Taku River, Tyee, and Waterfall; Vendsyssel Packing Co., at Tyee and Klawak; and the Northland Trading & Packing Co., at Saginaw Bay and Port Alexander.

The firm of Engelbr. Wiese (Inc.), which for a number of years had taken a leading position in the mild-cure industry of Alaska, was dissolved in the spring of 1916, and its business was transferred to the Pacific Mild-Cure Co.

The most important salmon-trolling grounds in the mild-cure industry have been in the waters near Port Conclusion, in the vicinity of Noyes Island and about Forrester Island. The last-named island is a Federal bird reserve under the jurisdiction of the Department of Agriculture. Game Warden Willett of the Bureau of Biological Survey of that Department had charge of affairs on the island. It was reported that at no time were there more than 200 fishermen camped on the island. During the early part of the summer the whites and natives were quite evenly divided, but by the 1st of July most of the natives had left to work in the canneries, leaving only about 75 whites on the island. The fishing season was poor, only part of the rowboat trollers making a little more than expenses and the power-boat trollers not doing much better. At one time in the season nearly 100 power boats were anchored off the island. A number of the fishermen filed a complaint with the Biological Survey that some of the birds, notably the puffins, interfered very seriously with fishing operations by frequently taking the bait from the hooks.

There was a decrease of one in the number of fixed plants operated, but the investment increased from $487,359 in 1915 to $519,580 in 1916. The number of persons employed in 1916 was 1,793, an increase of 68 over 1915. A pack of 4,745 tierces of king salmon, 49 tierces of cohos, and 104 tierces of chums, a total of 4,898 tierces, was made in 1916, as compared with 2,713 tierces of kings and 68 tierces of cohos, a total of 2,781 tierces, in 1915, or a net increase of 2,117 tierces. The value of the pack in 1916 was $397,628, as against $191,523 in 1915, the increase in value being $206,105. The pack of 1915 was unusually small.

INVESTMENT IN THE SALMON MILD-CURING INDUSTRY IN 1916.

Items.	Southeast Alaska.		Items.	Southeast Alaska.	
	No.	*Value.*		*No.*	*Value.*
Fixed plants	12	$75,805	Gear:		
Operating capital		142,924	Seines, purse	1	$80
Vessels:			Fathoms	80	
Power vessels over 5 tons	15	54,975	Gill nets	220	24,000
Net tonnage	237		Fathoms	23,000	
Launches under 5 tons	390	173,000	Troll lines	3,174	16,948
Boats, sail and row	1,011	27,915			
Sailing	1	1,233	Total		519,580
Net tonnage	14				
Lighters and scows	2	1,100			
House boats	1	1,000			

PERSONS ENGAGED IN THE SALMON MILD-CURING INDUSTRY IN 1916.

Occupations and races.	Southeast Alaska.	Occupations and races.	Southeast Alaska.
Fishermen:		Shoresmen:	
Whites	1,128	Whites	95
Natives	512	Natives	4
Total	1,640	Total	99
		Transporters: Whites	54
		Grand total	1,793

PRODUCTS OF THE SALMON MILD-CURING INDUSTRY IN 1916.

Species.	Tierces.	Pounds.	Value.
Southeast Alaska:			
King salmon	4,733	3,786,400	$388,248
Coho salmon	49	41,200	2,420
Chum salmon	104	83,200	5,880
Total	4,886	3,910,800	396,548
Western Alaska: King salmon	12	9,600	1,080
Grand total	4,898	3,920,400	397,628

SALMON PICKLING.

The salmon-pickling industry in Alaska in 1916, when compared with similar operations in 1915, shows only slight increase in investment and number of salteries operated. The central district leads with 11, a gain of 3 over 1915; the western district has 7, a decline of 2 from 1915; and the southeastern district has 2, which are new this year. The total number in operation in 1916 was 20, as compared with 17 in 1915. The investment in 1916 was $340,887, which is an increase of $4,275 over 1915. The number of persons engaged declined from 329 in 1915 to 277 in 1916.

Practically two-thirds of this product is red salmon and comes from western Alaska. A considerable part of this business is conducted in an incidental way by the companies engaged in canning salmon. The entire production of pickled salmon in Alaska in 1916 was 17,734 barrels, valued at $212,667, an increase of 4,441 barrels in quantity and $64,027 in value over the pack of 1915. The average value per barrel indicated by these figures was approximately $12 for 1916 and about $11.18 for 1915.

INVESTMENT IN THE SALMON-PICKLING INDUSTRY IN 1916.

Items.	Southeast Alaska.		Central Alaska.		Western Alaska.		Total.	
	No.	*Value.*	*No.*	*Value.*	*No.*	*Value.*	*No.*	*Value.*
Salteries	2	$16,325	11	$19,900	7	$44,637	20	$80,862
Operating capital		31,880		39,400		51,000		122,280
Vessels:								
Power vessels over 5 tons	1	20,000	5	13,000	3	26,000	9	59,000
Net tonnage	112		73		140		325	
Launches under 5 tons	1	1,650	4	2,500	3	5,800	8	9,950
Sailing			1	800	4	37,500	5	38,300
Net tonnage			20		1,427		1,447	
Boats, sail and row	17	905	35	1,635	51	7,785	103	10,325
Lighters and scows	2	1,350	2	300	6	4,400	10	6,050
Gear:								
Haul seines	1	100	9	1,160	31	1,250	41	2,510
Fathoms	150		880		1,550		2,580	
Purse seines	3	2,000	1	100			4	2,100
Fathoms	450		80				530	
Gill nets	20	725	32	2,040	38	3,500	90	6,265
Fathoms	875		1,940		3,655		6,470	
Lines	36	605	8	140			44	745
Pound nets, driven	1	2,500					1	2,500
Total		78,040		80,975		181,872		340,887

PERSONS ENGAGED IN THE SALMON-PICKLING INDUSTRY IN 1916.

Occupations and races.	Southeast Alaska.	Central Alaska.	Western Alaska.	Total.
Fishermen:				
Whites	15	14	74	103
Natives		34	19	53
Total	15	48	93	156
Shoresmen:				
Whites	6	3	77	86
Natives		3	6	9
Total	6	6	83	95
Transporters:				
Whites	12	4		16
Natives		5	5	10
Total	12	9	5	26
Grand total	33	63	181	277

BARRELS [a] OF SALMON PICKLED IN 1916, BY SPECIES.

Product.	Southeast Alaska.		Central Alaska.		Western Alaska.		Total.	
	No.	*Value.*	*No.*	*Value.*	*No.*	*Value.*	*No.*	*Value.*
Coho, or silver	1,832	$19,157	242	$3,107	2	$23	2,076	$22,287
Coho bellies			27	500			27	500
Chum, or keta			7	56	488	4,001	495	4,057
Chum bellies	126	1,004	159	2,552			285	3,556
Humpback, or pink	286	2,405	172	840	45	379	503	3,624
Humpback bellies			61	882			61	882
King, or spring	354	4,777	36	436	246	2,743	636	7,956
King bellies			2	23			2	23
Red, or sockeye	55	642	1,914	27,955	11,580	139,185	13,549	167,782
Red bellies			100	2,000			100	2,000
Total	2,653	27,985	2,720	38,351	12,361	146,331	17,734	212,667

[a] Barrels holding 200 pounds of fish.

SALMON FREEZING.

In 1916 seven companies engaged in the freezing of salmon in Alaska, though largely incidental to other business. They were the Columbia & Northern Fishing & Packing Co., at Wrangell; Booth Fisheries Co., at Sitka; Juneau Cold Storage Co., at Juneau; Taku Canning & Cold Storage Co., at Taku Inlet; New England Fish Co. and Washington Fish & Oyster Co., at Ketchikan; and the Glacier Fish Co., which operated a cold-storage plant on the barge *Glory of the Seas*, at Scow Bay.

The total quantity of salmon frozen was 863,406 pounds, valued at $34,408, thus showing an increase over 1915 of 142,615 pounds in quantity and $7,132 in value.

SALMON FROZEN IN ALASKA IN 1916.

Species.	Pounds.	Value.
Coho salmon	266,696	$10,783
Chum salmon	246,677	5,156
Humpback salmon	15,029	298
King salmon	323,718	17,788
Red salmon	11,286	383
Total	863,406	34,408

FRESH-SALMON TRADE.

The trade in fresh salmon declined somewhat from that reported in 1915. This was probably due to the greater demand for all species of salmon at the canneries. Customs records at Juneau show that 1,480,515 pounds of fresh salmon, valued at $118,316, were shipped from Alaska in 1916, as compared with 2,216,603 pounds, valued at $172,268, in 1915. These fish were boxed in crushed ice and transported by the regular steamship lines. The companies handling the greater part of the fresh salmon in Alaska were the Columbia & Northern Fishing & Packing Co. and the Dalmeny Fish Co., at Wrangell, and the Washington Fish & Oyster Co., at Ketchikan.

The local fresh-fish trade is also of importance. Although detailed figures for this business have not been compiled, close estimates place the quantity at 700,000 pounds, valued at $56,000. Of this, approximately one-half is halibut, one-third salmon, and the remainder miscellaneous species, including black cod, herring, eulachon, and bass.

DRYING AND SMOKING OF SALMON.

The drying and smoking of salmon is an industry that attracts but few operators, most of whom engage in it as a side issue. The constant demand for dried salmon as food for dogs and foxes would seem to assure good prices for the product and tend to establish the business on a firmer basis. There have been some discouragements, however, because of extended periods of dampness and rain, involving the risk of losing the fish before curing is complete. The capital invested in the business is small, and several of the establishments are of temporary construction, often used only one season. The plant having greatest permanency is the one at Seldovia, owned by Nordyke & Markle, and valued at $1,000. Arthur McConahay's plant at Three Mile Creek, on the western shore of Cook Inlet, probably represents an equal investment. Nordyke & Markle dried and smoked 8,070 pounds of humpback salmon, valued at $625, and 4,430 pounds of chum salmon, valued at $343. Linder & Olsen, at Dogfish Bay, Cook Inlet, dried 12,000 pounds of chum salmon, valued at $600. Johnson & Howitson, at Cold Bay, dried 9,000 pounds of humpbacks, valued at $450, and 10,000 pounds of red-salmon backs, valued at $500. The natives of Tatitlik cured 5,122 pounds of humpbacks, having a value of $205. Arthur McConahay, at Three Mile Creek, and T. D. Giezentanner, at Point Possession, on Cook Inlet, each smoked about 3 tons of salmon, having a total value of $1,000.

During the winter of 1915–16 dried salmon sold in Anchorage, Alaska, at 25 cents per pound, while the minimum price did not fall below 10 cents.

Accurate statistics of the quantity of salmon dried on the Yukon River and tributaries are not obtainable, but there is quite a catch, chiefly by small wheels, which is prepared as dog feed and finds ready sale at the interior towns of Alaska. The natives of the Bristol Bay region also dry large quantities of salmon for local use.

SALMON BY-PRODUCTS.

One of the most meritorious lines of work carried on in connection with the fishery industry of Alaska is the utilization of waste material from the canneries in the manufacture of oil and fertilizer. The Fish Canners By-Products Co., at Ward Cove, is engaged exclusively in this business and receives its material from a number of canneries in the Ketchikan region. The North Pacific Trading & Packing Co. continued the operation of its fertilizer and oil factory at Klawak, obtaining the raw material from its salmon cannery.

The Pacific American Fisheries installed in connection with its cannery at Excursion Inlet a small reduction plant at which the cannery offal was converted into meal. Of this material 214 tons were produced and shipped to the company's establishment at Eliza Island near Bellingham, Wash., for further treatment. The process employed for the extraction of oil from this material has not proved satisfactory.

The value of fish meal for use as a stock and poultry food is pointed out very well in Bulletin No. 378 of the Department of Agriculture, published August 22, 1916. This document is by F. C. Weber of the Bureau of Chemistry of that department, its title being "Fish meal: Its Use as a Stock and Poultry Food."

The investment in the by-products industry in 1916 amounted to $124,709, as compared with $127,879 in 1915. A total of 75 men, all whites, were employed in 1916, 65 shoresmen and 10 transporters, which is 10 less than in 1915. The output of the industry was less in quantity than in 1915, but there was a gain in value of $7,670.

OUTPUT IN BY-PRODUCTS INDUSTRY IN ALASKA IN 1916.

Items.	Quantity.	Value.
Oil ......gallons..	40,750	$20,150
Fertilizer ......tons..	505	22,425
Edible fish meal ......do....	214	5,350
Total	....	47,925

HALIBUT FISHERY.

The halibut fishery is next in importance to the salmon fishery in Alaskan waters. Not only is there the catch of halibut which goes to a number of shore stations in Alaska, but there is the still more extensive fishery in extraterritorial waters, the product of which is not handled at Alaskan ports, going instead either to British Columbia or Puget Sound ports. The statistical records elsewhere in this report show less than 12,000,000 pounds of halibut as credited to Alaska in 1916, a decrease of nearly 4,000,000 pounds as compared with 1915. But it is estimated that about 50 per cent of the entire Pacific coast catch in 1916, or upwards of 25,000,000 pounds, represents the combined catch of halibut from both extraterritorial and intraterritorial waters of Alaska. It is difficult to get precise statistics of the exact localities where catches are made, because occasionally the fishermen fear such information may invite undue competition. The fishery is prosecuted throughout the year, but it is more particularly through the summer and fall and especially in the winter that the Alaskan banks are most frequented by the fishermen. In the spring there is more activity on the banks off the coast of Washington, Oregon, and British Columbia.

Notwithstanding the lessened catch credited to Alaska in 1916, the inshore halibut fishery of southeastern Alaska was in a flourishing condition during a part of the season, especially in the vicinity of Petersburg, where a fleet of small vessels made headquarters, their catch being delivered chiefly to the floating cold-storage plant operated by the Glacier Fish Co. on the *Glory of the Seas*. This vessel was anchored for some time near that port and subsequently towed to Puget Sound. Also there was considerable shipping of boxed halibut from Petersburg to Puget Sound. Other important activities in the halibut fishery were prosecuted by the New England Fish Co. and the Ketchikan Cold Storage Co., at Ketchikan; the Booth Fisheries Co., at Sitka; the Juneau Cold Storage Co., at Juneau; and the Taku Canning & Cold Storage Co., at Taku Harbor; all of which companies operated cold-storage plants. The largest of these is that of the New England Fish Co. at Ketchikan, with a storage capacity of about 4,000,000 pounds of frozen halibut. Buyers representing Puget Sound firms were located at Ketchikan, Wrangell, Petersburg, and Juneau. It is reported that plans are taking definite form for the establishment of a large cold-storage plant at Seward for the handling of halibut. This seems a wise move, as each year the fishing vessels are going farther afield to make their catches, a noteworthy part of their operations in Alaskan waters now being conducted on Portlock Bank, less than 200 miles from Seward; thus if cold-storage facilities are provided at Seward or other towns near the principal fishing grounds much running time can be saved by the fishing vessels.

Certain losses were reported in the halibut fishery in 1916. On October 6 the halibut steamer *Independent* (151 tons net), owned and operated by the National Independent Fisheries Co., of Seattle, while fishing for halibut struck a rock off Middleton Island in central Alaska and foundered. The vessel was valued at $50,000. The halibut steamer *Roman* was wrecked on Key Reef in southeastern Alaska on November 18. This vessel was the property of the Columbia Cold Storage Co., of Steveston, British Columbia, and was valued at about $80,000. In addition the cargo and fishing gear was worth approximately $10,000. It is reported that the halibut schooner *San Jose* (14 tons net) was wrecked in Puffin Bay on the south end of Baranof Island on August 22. No loss of life was reported in any of these disasters.

Investigations were made in 1916 by Dr. Clarence W. Hahn at the bureau's laboratory at Woods Hole, Mass., with a view to determining the cause of the peculiar mushy condition of the flesh observed not infrequently in halibut on the Pacific coast. At times, notably in the early summer, this condition becomes so troublesome that the fishermen are forced to seek other grounds. Preliminary findings indicate that the trouble is due to a protozoan parasite which increases its numbers with great rapidity and causes a degeneration of the tissues. It is contemplated that further investigations will be made to determine, if possible, the cause of this disorder and to devise possible methods of control or remedies.

The season of 1916 has been remarkable on account of the very high price received by the fishermen for halibut. At Seattle in December the maximum price reached 16 cents a pound. The lowest price in the year was 5¼ cents, while the average was nearly 10 cents a pound. In 1915 the average was about 5¾ cents, the ranges being from a maximum of 12½ cents to a minimum of 2½ cents.

Certain unusual developments occurred in the halibut fishery of the Pacific coast in 1916. First may be mentioned the strike of the halibut fishermen, which began March 1 and was not settled until July 19. This strike grew out of a disagreement between the fishermen and the independent vessel owners. It did not affect the company vessels. As a result of the strike the production of halibut on the Pacific coast was curtailed considerably, the aggregate being only approximately 54,000,000 pounds as against about 66,000,000 pounds in 1915. The effects of the strike were felt to some extent in Alaskan waters. The reduction in the catch on account of the strike was offset to a certain degree by the entrance of a number of purse seine boats into the halibut fishery. The fact that the season in 1916 was poor for salmon on Puget Sound, coupled with the high prices prevailing for halibut, accounts for the entry of the salmon fishermen into the halibut industry.

The halibut fishery not only of Alaska, but of the entire Pacific coast, was in a very disturbed and unsettled condition throughout 1916 because of the alleged efforts of the Canadian Government to divert the trade through Prince Rupert, the terminus of the Grand Trunk Pacific Railway, which is approximately 90 miles southeast of

Ketchikan. Much apprehension has been felt by residents of Alaska and by the fresh fish interests of Puget Sound that unless the Government afforded relief through proper legislation the halibut fishery with its attendant incidental trade and benefits to American labor would be almost wholly assimilated by Canadian interests. It has also been felt that along with this would go the loss of American fishermen and their families who would take up their residence chiefly at Prince Rupert, and that most of the fishing vessels would soon be transferred to the British flag.

It has been said that there has been a well-studied effort upon the part of the Canadian authorities to effect this assimilation of the American halibut fishery. It is a matter of official record, as clearly set forth in the Canadian order in council of March 9, 1915, one part of the preamble of which in referring to fishing vessels registered in the United States says that under certain conditions a considerable number of such vessels "would transfer their base of operations from Seattle to Prince Rupert and would probably later transfer their vessels or boats to the Canadian registry and permanently operate from Prince Rupert."

Inasmuch as the full text of this order in council (P. C., 468) of March 9, 1915, has not heretofore appeared in any of the Bureau's publications, it seems proper in order to make it a matter of permanent record to reproduce it at the present time. It is as follows:

Whereas by order in council, dated 10th December, 1914, it is provided that for as period of twelve months, from the 1st of January, 1915, foreigners or foreign corporations bringing fresh fish in vessels registered in the United States of America to any port in British Columbia shall be permitted to land such fresh fish at such port without payment of duties, and tranship the same in bond to any port in the United States (without the right, however, to sell in Canada any of such fresh fish so landed), and foreigners and foreign corporations bringing fresh fish in vessels registered in the United States of America to any port in British Columbia, shall be permitted to purchase supplies at any port in the said Province of British Columbia, the whole under such regulations and conditions as the minister of customs shall determine;

And whereas the said privileges are restricted to foreigners or foreign corporations bringing fish in vessels registered in the United States of America and shipping such fish in bond direct from the vessels;

And whereas this prevents smaller vessels or boats, the catches of which will not make up a carload, or the owners or operators of which may not be in a position to themselves ship their fish to the eastern United States markets, from availing themselves of the privileges;

And whereas the minister of the naval service is informed that in view of the fact that Prince Rupert is several hundred miles nearer the fishing grounds than is Seattle, and as the Grand Trunk Pacific Railway is now operating, so that fish can as readily be shipped to the eastern United States markets from Prince Rupert as from Seattle, if such boats and smaller vessels were permitted to go to Prince Rupert and sell their catches to some person or corporation which would in turn ship them in bond to the United States, and if such vessels or boats were then permitted to purchase supplies for their fishing operations, a considerable number of them would transfer their base of operations from Seattle to Prince Rupert, and would probably later transfer their vessels or boats to the Canadian registry and permanently operate from Prince Rupert;

And whereas the bonding and outfitting privileges have been renewed to vessels shipping their own catches direct, and it is deemed advisable that such privileges should for this year be available to smaller vessels and boats;

Therefore, His Royal Highness the Governor-General in Council is pleased to order, and it is hereby ordered as follows:

The said order in council of the 10th December, 1914, is amended to provide that during the present calendar year (1915) foreigners or foreign corporations bringing fresh fish in vessels registered in the United States of America to any port in British Columbia shall be permitted to land such fresh fish at such port without payment of duties and tranship the same in bond to any port in the United States, or to sell such fish in bond to such local dealers or dealer as may be properly and duly licensed therefor, under the regulations and conditions hereinafter mentioned, which dealer or dealers shall export the same in compliance with the bonding requirements (without the right, however, in either instance, to sell in Canada for consumption therein, or otherwise except in bond, any of such fresh fish so landed); and such foreigners and foreign corporations bringing fresh fish in vessels registered in the United States of America to any port in British Columbia, shall be permitted to purchase supplies, and ship crews for such vessels, at any port in the said Province of British Columbia, the whole under such regulations and conditions as the minister of customs may determine.

The foregoing order in council, aside from the preamble, was renewed with additional provisions on January 31, 1916, as follows:

During the present calendar year 1916, foreigners or foreign corporations bringing fresh fish in vessels registered in the United States of America to any port in British Columbia, shall be permitted to land such fresh fish at such port without payment of duties, and tranship the same in bond to any port in the United States, or to sell such fish in bond to such local dealer or dealers as may be properly and duly licensed therefor under the regulations and conditions hereinafter mentioned, which dealer or dealers shall export the same in compliance with the bonding requirements (but without the right, however, in either instance, to sell in Canada for consumption therein or otherwise, except in bond, any of such fresh fish so landed); and such foreigners and foreign corporations bringing fresh fish in vessels registered in the United States of America to any port in British Columbia, shall be permitted to purchase bait and supplies, and ship crews for such vessels at any port in the said Province of British Columbia: Provided also, that such foreigners and foreign corporations before bringing fresh fish to a port in British Columbia, may be permitted to purchase bait at any port in the said Province of British Columbia, upon an undertaking to the satisfaction of the minister of customs that catches of fish made with any baiting so supplied shall be landed at a port on the mainland of British Columbia and be thence forwarded in bond to a port in the United States, the whole under such regulations and conditions as the minister of customs may determine.

That part of the order permitting the purchase of bait in British Columbia by American fishermen under an agreement to return their catch to a port in British Columbia was a new feature of this order.

Under the efforts of the Canadian authorities the halibut industry at Prince Rupert continued its development in 1916. The total landings of halibut at that port were approximately 19,000,000 pounds in 1916, as against about 16,000,000 in 1915. Of these totals, American vessels landed nearly 13,000,000 pounds in 1916, and about 7,000,000 pounds in 1915. A good part of the halibut landed at Prince Rupert would undoubtedly have been handled through Alaskan ports if steps had been taken to prevent the diversion of this business to British Columbia. It is noteworthy, however, that the loss of the halibut trade to Seattle was proportionately greater than it was to Alaskan towns.

This state of affairs has given rise to much protest from American fishing interests on the Pacific coast, including many of the fishermen as well as the companies engaged in handling halibut. The demand has been made that Congress should enact legislation to protect American interests and save an American industry, rather than allow its absorption by Canada. It has been argued that the product of the fishery is almost wholly of American origin and that more than 80 per cent of it is consumed in the United States. Therefore, it has been felt that Canada in the capacity of middleman should not be allowed to dictate terms and conditions and in effect control the industry in a way that would surely cause the American consumer to pay a higher price for this product.

On August 10, 1916, a communication asking for relief from the Prince Rupert situation was addressed to the President and to the State Department, Treasury Department, and the Department of Commerce, by the Alaska Bureau of the Seattle Chamber of Commerce, transmitting a statement signed by the Booth Fisheries Co., San Juan Fishing & Packing Co., National Independent Fisheries Co., Ripley Fish Co., and the Glacier Fish Co., which concerns are interested in the halibut fishery both of Puget Sound and Alaska. The result of a continuance of existing conditions was stated in that document to be as follows:

1. A purely American industry would be permanently diverted from American to Canadian ports.
2. The $5,000,000 capital investment of American citizens would become valueless and be absorbed by Canada.
3. The fishing fleet numbering hundreds of vessels would pass from American to Canadian registry.
4. Thousands of American fishermen would eventually be displaced by Canadian subjects.
5. American transportation companies—water and rail—would be robbed of the transportation of fish caught on our own coasts destined to American markets.
6. American commerce would lose the trade benefits incidental to operation of this $5,000,000 industry—yet in its infancy.
7. The control of a valuable American food supply and of its cost to American consumers would pass from the United States to Canada.

The demand of the fishery interests took definite form in a bill (H. R. 15839) introduced on May 20, 1916, by Representative McGillicuddy of Maine, to regulate the importation into the United

States of halibut or salmon taken in the north Pacific Ocean and tributary waters. This bill was as follows:

That from and after ninety days after the passage of this act no fresh or frozen halibut or salmon from the north Pacific Ocean or its tributary waters shall be admitted into the United States through any foreign country except when the same shall be in bond from an American port.

In July, 1916, Senator Chamberlain, of Oregon, proposed an amendment to the revenue bill (H. R. 16763) worded the same as the McGillicuddy bill. The amendment was referred to the Finance Committee and reported back as a part (Title IX, sec. 103) of the revenue bill. On September 5, Senator Chamberlain spoke in behalf of the amendment, and it was agreed to. On September 7, when the Senate had under consideration the report of the conference committee on the revenue bill, Senator Simmons, of North Carolina, stated that very reluctantly, after much discussion, the Senate conferees were forced to recede from the amendment.

Objection was made to the Senate amendment by the House conferees because of the alleged fact that if it passed it would be regarded as an unfriendly act by Canada and that retaliatory measures affecting the fisheries of the east coast would result. No convincing arguments have as yet been advanced to cause any feeling of apprehension that Canada can retaliate on the east coast in any way that will adversely affect American interests. The outstanding feature of this is that Canada needs the markets of the United States to absorb the Canadian catch of fish; hence retaliatory measures are highly improbable.

With a view to acquiring authentic information regarding the Prince Rupert situation, the Bureau directed its local agent at Seattle, E. J. Brown, to proceed to Prince Rupert in December, 1916. The following extract from Mr. Brown's report appears to be of general interest:

The struggle between Canadian and American fish houses and fishing vessels on the north Pacific coast for the control of the offshore fisheries of the north Pacific Ocean has reached a most acute stage. Under present laws regulating these fisheries, the advantage lies wholly on the side of Canadian concerns.

The Canadian advantage, however, is not regarded as one of geographic position, of superior fleets, fishermen, or methods, or of superior transportation facilities. Natural advantages favor American cities near the fishing grounds, and American houses in selling to and American vessels fishing for American markets. The Canadian advantage is considered to be the result of artificial stimulus by way of governmental regulations. The greater portion of the catch—at least 75 per cent—is caught on banks off the American and Alaskan coasts by American vessels and consumed by American people. The Canadian regulations are obviously a means to an end. The end is the ultimate assimilation, according to official Canadian documents, of the American fishing fleet on the north Pacific coast. Later, there are indications that it would lead to the control of the selling and marketing of the catch of the fishing fleets. At present the American fish houses, with the smallest investments possible in Prince Rupert, are, so to speak, sitting at the oars, watching events, and hoping that the artificial Canadian advantage will be broken. Once American houses are forced to install freezing and cold-storage plants on the Canadian side of the line in order to offset the present Canadian advantages in handling fish, and the American fishing vessels are compelled, as a result of Canadian orders in council, to change their base of operations to the Canadian side, a trade channel will be cut to the port of Prince Rupert that will permanently divert to that city this purely American business—an American product sold to the American people.

American concerns have to this time held off installing freezers and cold-storage plants, hoping that Canadian governmental regulations would be counteracted by at least similar governmental regulations on our own part.

PRESENT CONDITIONS.

There are at Prince Rupert the following fresh-fish concerns:

Canadian Fish & Cold Storage Co. (Ltd.), a Canadian corporation with freezers and cold storage; capacity, 14,000,000 pounds; authorized capitalization, $2,500,000; said to be subsidized by Canadian Government.

The Atlin Fisheries (Ltd.), a Canadian corporation subsidiary to the New England Fish Co.; no freezers or cold storage; have shipping house and ice boxes; approximate value, $10,000.

Goletas Fish Co. (Ltd.), a Canadian corporation; no freezers or cold storage; simply have local buying manager.

Rorvik Fish Co. (Ltd.); no cold storage or freezers; have only buying and shipping facilities.

The Booth Fisheries of Canada, a Canadian corporation, subsidiary to The Booth Fisheries Co. of America; no freezers or storage; have shipping house and ice boxes; approximate value, $10,000.

National Independent Fisheries Co.; no cold storage or freezers; have shipping house and ice boxes; approximate value, $10,000; subsidiary to the National Independent Fisheries Co., of Seattle.

The Pacific Fishery Co. (Ltd.), a Canadian corporation; no freezers or cold storage; shipping house and ice boxes; approximate value, $10,000; subsidiary to San Juan Fishing & Packing Co., of Seattle.

Prince Rupert Fisheries, a Canadian concern; no freezers or cold storage; have buying and shipping facilities only.

(*Note.*—All of the above companies, except The Booth Fisheries, are dependent upon the Canadian Fish & Cold Storage Co. for ice. The Booth Fisheries have an ice house at Lake Kathlyn, some 200 miles east of Prince Rupert on the Grand Trunk Pacific Railway.)

In southeastern Alaska there are the following fish-buying concerns:

Juneau.—Juneau Cold Storage Co.; estimated capacity, 200,000 pounds. National Independent Fisheries Co., of Seattle; maintains fish buyer.

Petersburg.—No cold storage. Glacier Fish Co., of Tacoma; maintains buyer. Ripley Fish Co., of Seattle; maintains buyer.

Wrangell.—Columbia & Northern Fishing & Packing Co.; estimated cold-storage capacity, 300,000 pounds. Ripley Fish Co., of Seattle; maintains local buyer.

Ketchikan.—Ketchikan Cold Storage Co.; capacity, 1,000,000 pounds. New England Fish Co.; cold-storage capacity, 4,000,000 pounds. San Juan Fishing & Packing Co., of Seattle; maintains local buyer. Washington Fish & Oyster Co., of Seattle; maintains local buyer. Ripley Fish Co., of Seattle; maintains local buyer. New England Fish Co., of Vancouver; maintains local buyer.

HANDICAPS TO AMERICAN CONCERNS AND AMERICAN FISHING VESSELS.

The handicaps imposed upon American fish houses are such that their competition with the Canadian concerns, particularly the Canadian Fish & Cold Storage Co., is only nominal. Without freezers and cold-storage capacity the American houses have no local market for American fish, on account of Canadian duties and the prohibition against American fishing vessels that their catches can not be sold direct into Canada, even on payment of duties, but must be shipped from some American port into Canada. American houses, until the 1st of December, were not allowed to ship their fish to Seattle, which is a prime factor in the halibut business, as a great portion of the catches—to wit, the "whales," "chickens," and "seconds"—have no market in the east, and American houses have no vessels for furnishing the same, consequently they are restricted in their buying to boats which make short and quick trips to the banks and which have a greater proportion of medium-sized, No. 1 fish, so that the other classes hereinabove mentioned can be thrown away and the trip handled at a profit.

It is not the custom in Prince Rupert to cull the catches of fish, as is the custom on the American side of the line; in fact, second-grade fish are shipped to the eastern markets and sold as first-grade fish. Second-grade, or white-meated halibut, can not be detected except by an incision, which is usually made close to the tail. White and blue-meated halibut, to all external appearances, are the same when landed, and it is not until they have been packed in ice for two weeks' time that the difference in grade is apparent. At that time the blue-meated fish is firm; the white-meated becomes mushy. Much advertising has been done by Canadian firms to the effect that they land fresher fish in the eastern markets than can be done at American ports. This does not seem possible, as there are but three trains leaving Prince Rupert per week—Wednesday, Friday, and Saturday. Fish landed at Prince Rupert on Saturday must wait, therefore, until the following Wednesday. Fish can not be landed in the eastern American markets, under normal existing conditions, as soon as they can be transported by either fishing vessel or steamer to Seattle, and then sent east by rail. The boat time between Prince Rupert and Seattle is two days; train time three days to Chicago, four days to New York or Boston. The fastest time ever made by Grand Trunk Pacific is five days to Chicago; six days to New York and Boston. The fish arriving there on any day prior to the day upon which trains leave must remain there until transportation as per above schedule is available.

Every possible inducement is made to the American fishing vessels not only to buy their supplies at Prince Rupert when not compelled to buy bait there, but also to induce them to change their registry to the Canadian flag.

The baiting restrictions and regulations imposed upon American fish houses in bringing American fish into their own country, together with Canadian tariff laws and the absence of tariff on Canadian fish in this country, have resulted in the catches of Canadian fishermen being worth from one to two cents a pound more than that of American fishing vessels. The Canadian fish can be used in both American and Canadian markets, can be used to fill up a car that is short, and can also be shipped in lots of less than 20,000 pounds, which is the capacity of a single car. It would not pay an American concern to ship a carload of fish in bond into the United States of under that weight.

Other restrictions have been imposed upon American fishing vessels. For instance, on November 23 the American fishing schooner *Venus*, Capt. A. Bernhoft, sold her catch at Prince Rupert. On the solicitation of the Canadian supply houses to purchase gear and bait there, the captain stated that he could buy his supplies cheaper in Ketchikan and would purchase there. He then went to the Canadian Fish & Cold Storage Co. for ice, but was refused ice unless he would purchase his other supplies in Prince Rupert. He refused both, went to Ketchikan for his supplies and ice, and returned south of Prince Rupert to do his fishing in Hecate Strait.

Emphasis should be put upon the effect of the interpretation of the Canadian order in council which has heretofore prohibited American branch houses at Prince Rupert from shipping to Seattle their "chickens" (halibut under 12 pounds), their "whales" (halibut over 80 pounds), and their "seconds," usually the white-meated fish. As will be remembered, this is an interpretation of the order in council of January 31, 1916, which reads "tranship to a port in the United States." This clause has been construed (on June 7, 1916) by Canadian authorities to refer to rail shipments only. Prior to the time of this interpretation, the American fish houses at Prince Rupert had purchased over 50 per cent of the catches of American vessels landing at that port. Since the interpretation they have purchased less than 20 per cent; in fact, the Canadian Fish Co., the subsidiary concern of the San Juan Fish Co., has not purchased a pound of fish at Prince Rupert since October 6—that is, for two months prior to this investigation there.

PRINCE RUPERT STATISTICS FOR THE YEAR 1916.

The following is a statement of the amount of fish shipped from Prince Rupert to the markets of the United States during the calendar year of 1916. The statistics were taken from the records of the United States consular office at Prince Rupert. It is estimated that about 80 per cent thereof are the catches of American vessels; about 75 per cent thereof were caught on banks lying off the United States proper in the Territory of Alaska.

Calendar year 1916.	Species.	Pounds.	Value.
Jan. 1 to Mar. 31	Halibut	3,817,648	$364,705
	Salmon	124,479	8,574
	Miscellaneous	90,123	4,362
Apr. 1 to June 30	Halibut	2,914,007	342,330
	Salmon	156,588	17,871
	Miscellaneous	84,756	3,086
July 1 to Aug. 25	Halibut	2,948,262	334,904
	Salmon	122,416	13,964
	Miscellaneous	45,500	1,464
Aug. 26 to Sept. 30	Halibut	4,398,097	509,958
	Salmon	137,890	7,532
	Miscellaneous	45,500	1,464
Oct. 1 to Oct. 31	Halibut	1,295,030	177,226
	Salmon	28,833	3,794
	Miscellaneous	....	....
Nov. 1 to Nov. 30	Halibut	1,018,826	163,779
	Salmon	100,944	10,188
	Miscellaneous	....	....
Total	Halibut	16,391,870	1,892,902
	Salmon	671,150	61,923
	Miscellaneous (largely black cod).	265,879	10,376

I hereby certify that this report is authentic and correct to the best of my knowledge. Nearly all totals shown are recorded in the consular office here. For this reason the above data may be relied on with the assurance that there is no clerical error in the same.

Respectfully,

HERMAN HILL,
Deputy Collector, United States Customs.

The totals for the year 1916 will show that over 18,000,000 pounds of fish, of the value of over $2,000,000, were landed at the port of Prince Rupert and shipped via the Grand Trunk Pacific Railroad for consumption into the United States. The freight and express received by the Canadian transportation companies thereon is approximately $540,000. By far the greater proportion was landed by American vessels from banks adjacent to the American coast. The statistics do not cover American fish landed at Prince Rupert and sold in Canada or shipped through Canada to Europe.

THE BAIT SITUATION.

Broad claims have been made that British Columbia has a greater supply of and superior facilities for obtaining bait, and that if the United States attempted by way of legislation to alter existing conditions Canada would retaliate by refusing American fishermen bait.

As the result of a careful study of the bait situation, it is believed that the Canadian claims are unfounded, and that the advantages with respect to the supply of bait lie with the United States and not with the Dominion of Canada. Fresh herring, practically the only bait used by the North Pacific offshore fleet, run in the waters of Puget Sound from January to May. They run in southeastern Alaska around Ketchikan and Yes Bay from November until April, and from March until October and November in the waters north of Ketchikan, such as Chatham Strait and Icy Strait. There is no place on the west coast of North America that herring are so plentiful the year round as in southeastern Alaska. In Canadian waters the herring are plentiful in the Straits of Georgia and thereabouts from January until May. In the northern waters—or those in the Prince Rupert region—the run is from the middle of December until the middle of April. In the late summer and fall of the year, bait is very scarce in Canada. The fact of the matter is, that at Prince Rupert on December 6, the fall herring had not yet put in their appearance, and for two months prior thereto the Canadian fishermen had been getting their bait in southeastern Alaska. The Alaskan cold-storage plants are now freezing herring and are providing for furnishing fishermen with bait at any time the herring are scarce.

It appears that the herring runs are not established with the same regularity as is the case of the salmon and other fishes. Occasionally there may be a week or a month when herring are plentiful in Canadian waters and are scarce in American waters, but the fact is that there are months when there are no available herring in Canadian waters, to weeks in American waters. The advantage that Canada has had in the bait situation has simply been the advantage to the fisherman of being able to buy bait where he sells his fish. If he wishes to fish south of Dixon Entrance, it is more convenient to buy bait at Prince Rupert than to run north to Ketchikan and then south again to the fishing banks. Were an American market definitely established at Ketchikan, or any other southeastern Alaskan port, the fishermen would have no trouble in getting bait. In fact, as above stated, during the months of October and November, 1916, the Canadian fishing vessels have been compelled to go to southeastern Alaska for fresh herring.

The thing that interests the fishermen and fishing vessels at present is a competitive buying market in southeastern Alaska, as they admit, and it is plain on the face of existing conditions, that either Ketchikan, Wrangell, or Petersburg is more convenient as a year-round proposition than is Prince Rupert, or any other Canadian port.

The fish on the Oregon and Washington banks, and those off Cape Flattery, the west coast of Vancouver Island, together with those from the southern part of Hecate Strait, such as Cape Scott or the Goose Island grounds, will undoubtedly be landed at Seattle, as it is the nearest port, supplies are cheaper, and a higher price can be paid for the fish as laid down at the companies' plants and freezers. Bait is always obtainable at Seattle, either fresh or frozen. The Hecate Strait grounds, adjacent to Prince Rupert, have already reached a serious state of depletion, so that only the smaller boats of 10,000 pounds and less can get paying catches there.

Canada can not retaliate against American fishermen in the matter of bait without the greatest injury to herself. By making similar regulations restricting their rights to purchase bait on the American side of the line they would be at a decided disadvantage. As a country she can not consume the fish caught by her own vessels, nor can her own vessels use the bait caught by her herring fishermen. At Ketchikan

American concerns are already making preparations for supplying American fishermen with bait. At this port there is located not only the New England Fish Co. with its 4,000,000-pound freezer and storage, but also the Ketchikan Cold Storage Co., a quasi-public concern. This company will store bait for fish for any one applying. Since preparations have been made in southeastern Alaska for supplying our fishermen with bait, any thought of Canadian retaliation by way of bait restrictions on this coast need not be considered seriously.

AMERICAN FIRMS CAN NOT COMPETE AT PRINCE RUPERT.

American firms can not much longer compete at Prince Rupert in the face of existing conditions. They can not compete at all without the erection of cold-storage and freezing plants, which entail investments of hundreds of thousands of dollars. Under present conditions they are not making interest upon their investments, meager as they are. If a remedy is not provided in the immediate future, conditions will compel American fish houses to make such investments, and once made they will not be duplicated in southeastern Alaska.

It seems to be the uniform opinion among American fish houses that so long as one American concern maintains a buying branch there and erects freezers and cold storage that the rest will be forced to do so. It will really establish the market at Prince Rupert. As above stated, the fear of ultimate Canadian assimilation and unfavorable conditions because of subsidies and other governmental regulations favorable to Canadian interests, has to date kept American houses from really establishing themselves at that port.

It is hoped that action will be taken soon to settle the very perplexing problem which has presented itself as a result of the entry of Prince Rupert into the Pacific Coast halibut fishery. It is also hoped that the matter will be adjusted so that Canada may enjoy to the fullest the advantages of her own fishery, but at the same time it is, however, of the greatest importance to the United States that American rights and interests be fully safeguarded in this industry which supplies American markets from American sources. Legislative action as advocated in 1916 would not prevent the Grand Trunk Pacific Railway from continuing to transport large quantities of halibut to eastern markets, but under the terms of this suggested legislation it will be necessary for fishing vessels first to land their catch at an American port where there would be competition for the transportation beneficial to the American public, which competition does not now exist at Prince Rupert.

A bill (S. 4586) was introduced February 21, 1916, by Senator Johnson, of Maine, for the protection and conservation of the halibut fisheries of the Pacific Ocean, including the establishment of a close season for halibut fishing in certain waters thereof, and placing restrictions upon the landing of halibut in the United States and the Territory of Alaska during the close season. The close season proposed by the bill included the months of December and January of each year. It was provided that a reserved area of approximately 290 square nautical miles was to be set aside off the coast of southeast Alaska between Cape Lynch and Cape Addington, where fishing for halibut would be prohibited at all times of the year. In the absence of concurrent action by Canada the bill authorized the Secretary of Commerce to suspend the operations of the measure. The bill passed the Senate on June 3, 1916. It was reported favorably to the House of Representatives by the Committee on the Merchant Marine and Fisheries on January 29, 1917, but was not passed.

STATISTICAL SUMMARY.

In 1916 the investment in the halibut fishery of Alaska amounted to $2,149,311, as against $2,842,800 in 1915. The number of persons engaged in 1916 was 1,116, as compared with 1,455 in 1915. The production of the halibut fisheries in 1916 was 11,495,557 pounds, valued at $679,463. This is 3,922,232 pounds less than in 1915, when 15,417,789 pounds were produced, valued at $781,011.

INVESTMENT IN THE ALASKA HALIBUT FISHERIES IN 1916.

Items.	Number.	Value.	Items.	Number.	Value.
Fishing vessels:			Dories and scows	410	$23,270
Steamer and power	163	$890,500	Fishing apparatus		67,555
Tonnage	3,039		Shore and fixed property		323,486
Sailing	1	130,000			
Tonnage	2,247		Total		2,149,311
Outfit		714,500			

PERSONS ENGAGED IN THE ALASKA HALIBUT FISHERIES IN 1916.

Races.	Number.
Whites	1,076
Natives	40
Total	1,116

PRODUCT OF THE ALASKA HALIBUT FISHERY IN 1916.

Products.	Pounds.	Value.
Halibut:		
Fresh (including local)	5,672,118	$407,422
Frozen	5,724,023	268,319
Fletched	68,958	2,368
Pickled	25,658	1,162
Mild cured	4,800	192
Total	11,495,557	679,463

COD FISHERY.

The cod industry in 1916 was very prosperous. The fishing vessels made excellent catches and the price received for the product was higher than that obtained for many years. It is reported that the Norwegian cod fishery did not measure up to its normal production, hence there was a very strong export demand for cod from Alaskan waters. The chief markets were the West Indies, South America, Hawaiian Islands, and Australia. This condition of affairs would undoubtedly have caused many others to go into the cod business but there was a scarcity of vessels, and moreover the attractive rates offered for general freighting business induced some of the cod companies to charter their vessels in the season when they were not required in Alaskan waters.

VESSEL FISHERY.

Two changes from the previous year are noted in regard to the concerns engaged in cod fishing off the Alaskan coast in 1916. The Northern Codfish Co., of Seattle, did not operate, but its schooner *Fortuna* went to the Bering Sea banks under charter to the Pacific Coast Codfish Co. The Pacific States Trading Co., of San Francisco, retired from business early in the year and its shore station at Northwest Harbor, Herendeen Island, was taken over by the Union Fish Co. The schooners *Ottilie Fjord* (247 tons) and *Bertha Dolbeer* (230 tons), of the Pacific States Trading Co., did not go north and are not listed in the fishing fleet of 1916.

ALASKA COD FLEET, 1916.

Names.	Class.	Net tonnage.	Operators.
Azalea	Schooner	327	J. A. Matheson, Anacortes, Wash.
Fanny Dutard	do	252	Do.
Wawona	do	413	Robinson Fisheries Co., Anacortes, Wash.
Alice	do	220	Do.
John A	do	235	Pacific Coast Codfish Co., Seattle, Wash.
Charles R. Wilson	do	328	Do.
Maid of Orleans	do	171	Do.
Fortuna	do	138	Do.
Glendale	do	281	Alaska Codfish Co., San Francisco, Cal.
Allen A.[a]	do	266	Do.
City of Papeete[b]	do	370	Do.
Maweema	do	392	Do.
Sequoia	do	324	Union Fish Co., San Francisco, Cal.
Vega	do	233	Do.
Galilee[b]	do	328	Do.
Martha	do	14	Do.
Golden State[c]	Power schooner	223	Do.
Pirate	do	30	Do.
Union Flag	do	7	Do.

[a] Transporting vessel for shore station catch; also made one fishing voyage.
[b] Made one fishing voyage and one voyage as a transporting vessel.
[c] Transporting vessel.

SHORE STATIONS.

The following shore stations were operated: Alaska Codfish Co.—Kelleys Rock and Unga, on Unga Island; Company's Harbor and Murphys Cove, on Sannak Island; and Dora Harbor, on Unimak Island. Union Fish Co.—Pirate Cove, on Popof Island; Unga, on Unga Island; Sanborn Harbor and Eagle Harbor, on Nagai Island; Northwest Harbor, on Herendeen Island; Pavlof Harbor and Johnson Harbor, on Sannak Island; Dora Harbor, on Unimak Island; and Tigalda Lagoon, on Tigalda Island. Independents operated the following shore stations on Unga Island: N. H. Johnson, at Hardscratch; John H. Nelson, at Squaw Harbor; and J. P. Fratus and A. Komedal, near Unga.

The Pacific American Fisheries put up 700 cases of canned cod at its Port Moller cannery. Of this number 463 cases were packed in one-half pound flat cans, while the other 237 cases were packed in 1-pound flat cans. The value of this product was $2,337.

On June 11 the Union Fish Co., of San Francisco, lost the bunk house and cookhouse at its Sanborn Harbor station on Nagai Island. The buildings were set afire by the Japanese cook, who had just previously killed two fishermen and wounded three others, and who then took his own life by remaining in one of the burning buildings. This loss of property was estimated at $2,000. J. A. Matheson lost gear valued at $1,500. Four fishermen were drowned in Bering Sea while engaged in cod fishing.

STATISTICAL SUMMARY.

The investment in the Alaska cod fishery in 1916 was $564,212, which is $6,778 less than in 1915. The number of persons engaged was 778, being an increase of 31 over 1915.

The total production of this fishery in Alaskan waters in 1916 was 14,302,364 pounds of cod, valued at $518,797. The increase in product over 1915 was 106,589 pounds and in value $128,598.

INVESTMENT IN THE COD FISHERY IN ALASKA IN 1916.

Items.	Number.	Value.	Items.	Number.	Value.
Vessels:			Apparatus:		
Power vessels	3	$37,000	Gill nets	1	$25
Tonnage	263		Hand lines	4,408	2,092
Launches under 5 tons	3	3,000	Drag seines	1	200
Sailing vessels	16	155,732	Cash capital		215,333
Tonnage	4,292		Value of shore stations		136,600
Boats, row	365	13,980			
Pile drivers	2	250	Total		564,212

PERSONS ENGAGED IN THE ALASKA COD FISHERY IN 1916.

Occupations and races.	Number.	Occupations and races.	Number.
Fishermen:		Transporters: Whites	17
Whites	720	Grand total	778
Natives	20		
Total	740		
Shoresmen:			
Whites	19		
Natives	1		
Japanese	1		
Total	21		

PRODUCT OF ALASKA COD FISHERY IN 1916.

Products.	Pounds.	Value.	Products.	Pounds.	Value.
Vessel catch:			Canned:		
Salted cod	10,562,977	$375,060	In ½-pound flats (463 cases)	11,112	$1,389
Tongues	16,200	1,230	In 1-pound flats (237 cases)	11,376	948
Total	10,579,177	376,290	Total	22,488	2,337
Shore-station catch:			Total:		
Salted cod	3,657,499	133,830	Salted cod	14,220,476	508,890
Stockfish	37,100	6,035	Stockfish	37,100	6,035
Tongues	6,100	305	Tongues	22,300	1,535
Total	3,700,699	140,170	Canned cod	22,488	2,337
			Total	14,302,364	518,797

HERRING FISHERY.

The herring industry of Alaska in 1916 shows a large increase as compared with that of 1915. The chief impetus to the business was the anticipation early in the season of a heavy demand for pickled herring in the United States because war conditions had greatly limited importations of Holland and Norwegian herring. Along in the season, however, announcement was made of an agreement between the British Government and Dutch interests whereby Great Britain was to pay a bonus of 30 shillings per barrel to Dutch fishermen for herring sold to neutral countries. It was stipulated in the agreement that from September 1, 1916, the Dutch fleet could operate unmolested provided 60 per cent of the catch went to neutrals, 20 per cent was for domestic use, and 20 per cent for unrestricted export.

Those engaged in the Alaska herring industry believed that the United States would furnish the chief market for the herring to be exported from Holland under bonus from Great Britain, and when reports were received that quantities of Holland herring arriving in Chicago were selling for about $14 per barrel, it caused the business in Alaska to wane, for those engaged realized that importations of Holland herring under the conditions stated would force the price of the Alaska product so low as to leave a very uncertain margin between profit and loss. If it had not been for this state of affairs, undoubtedly there would have been a much more active continuation of the Alaska herring industry through the fall of 1916.

Large quantities of herring were sold fresh and frozen for food purposes and for bait in halibut fishing, while a considerable quantity was converted into oil and fish meal. The number of companies and individuals engaging in this industry was larger in 1916 than in 1915, though in several instances their herring operations were incidental to other business. The Alaska Fish Salting & By-Products Co., formerly known as the Alaska Oil & Guano Co., continued the manufacture of oil and fish meal at Killisnoo, and also furnished bait to 22 fishing vessels during the season. Another important change in ownership and transfer of interests is noted in the sale of the A. W. Thomas Co.'s business and property at Port Walter to the Alaska Herring & Sardine Co. This company engaged primarily in the canning of kippered herring.

METHOD OF CANNING HERRING.

Kippered herring, as a canned article, is one of the new products of the Alaska fisheries in 1916. It is believed, therefore, that a brief description of the method followed in its preparation at Port Walter will be of interest. When the herring are delivered at the cannery, usually at night or early in the morning, they are spread on the floor in a thin layer and sprinkled with salt, where they remain until such time as the cannery workers are ready to clean them. The fish are then placed on tables around which are gathered Scotch women, who dress them by cutting off the head and removing the viscera. After being cleaned in this manner, they are immersed for a short time in a tank of salt solution. The herring are then taken to the smoking room and hung by the tails on sticks studded on both sides with rows of sharpened nails. These sticks when filled with fish are placed side by side and tier above tier in the smokehouse where they are exposed to alder-wood smoke over night. During this process all surplus moisture has drained from the body cavity and surface of the fish, and the natural oil commences to appear. While in this condition, they are packed by hand in 1-pound oval cans, 1½ inches deep, 7½ inches long, and 4½ inches wide. Each can holds from five to eight fish. The cans are then sealed without the addition of any oil or dressing and are cooked about two hours by immersion in boiling water heated by steam. A most excellent article of food is thus prepared.

STATISTICAL SUMMARY.

In 1916 the total investment in the herring fishery in Alaska was $509,046, as compared with $211,640 in 1915. The number of persons engaged was 392, as against 158 in 1915. The products were valued at $418,076, which is a gain of $262,497 over 1915.

INVESTMENT IN THE HERRING FISHERY OF ALASKA IN 1916.

Items.	No.	Value.	Items.	No.	Value.
Vessels:			Purse seines	20	$13,400
Steamers and launches	11	$40,800	Drag seines	4	2,050
Tonnage	304		Gill nets	3	50
Sailing	3	16,000	Cash capital		273,056
Tonnage	440		Shore and accessory property		142,825
Launches under 5 tons	6	9,800	Total		509,046
Boats, row and seine	39	3,265			
Lighters and scows	9	6,400			
Pile drivers	2	1,400			

PERSONS ENGAGED IN THE ALASKA HERRING FISHERY IN 1916.

Occupations and races.	Number.	Occupations and races.	Number.
Fishermen:		Shoresmen—Continued.	
Whites	115	Japanese	7
Natives	4	Filipinos	1
Japanese	4	Total	263
Total	123	Transporters: Whites	6
Shoresmen:		Grand total	392
Whites	241		
Natives	14		

PRODUCT OF ALASKA HERRING FISHERY IN 1916.

Products.	Quantity.	Value.
Herring:		
Fresh, for bait ... pounds	2,124,600	$31,100
Frozen, for bait ... do	841,800	5,448
Pickled, for food [a] ... barrels	18,079	166,062
Smoked, for food ... do	300	4,200
Canned ... cases	19,850	132,330
Dry salted, for food ... pounds	197,000	9,830
Oil ... gallons	188,926	47,231
Meal ... tons	875	21,875
Total	....	418,076

[a] Includes 1,590 barrels, valued at $15,855, pickled in central Alaska.

WHALE FISHERY.

SHORE STATIONS.

The whaling industry in Alaska is represented chiefly by the operations of two companies—the United States Whaling Co., at Port Armstrong, and the North Pacific Sea Products Co., at Akutan. Whaling operations were conducted in a limited way in the vicinity of Nome by Ben Nygren and S. Torkensen, who, as in previous seasons, hunted the beluga, or white whale, principally for its skin. Similar work was undertaken on Cook Inlet by the Beluga Whaling Co., which was incorporated at Anchorage, Alaska, in 1916.

The United States Whaling Co. operated the same steamers in whale killing as in 1915—namely, *Star I* (133 tons), *Star II*, and *Star III* (97 tons each). The North Pacific Sea Products Co. operated, in addition to the steamers *Unimak* and *Kodiak* (99 tons each), the steam whaler *Tanginak*, of 71 net tons.

OFFSHORE WHALING FLEET.

The steamer *Herman*, of 229 net tons, was converted into a motor-power vessel and was chartered to Capt. L. A. Pedersen, who sailed her from San Francisco early in 1916 on a trading trip to Siberian waters, from which she returned in November. Incidentally, some whaling was done, netting a small quantity of oil and bone. The auxiliary whaling schooner *Belvedere* (400 tons net) sailed from Seattle in the spring of 1916 on a similar voyage to northern waters and returned to the same port in the fall with a small cargo of whale and walrus products. This vessel has heretofore been listed as a steamer.

STATISTICAL SUMMARY.

The shore whaling industry of Alaska in 1916 shows total investment of $1,091,471, as compared with $1,453,850 in 1915. This decline is explained by the fact that the cash capital and value of plants reported are considerably less than last year. The number of persons employed was 233, which is a gain of 29 over 1915. In 1916 the value of the product was $363,721, as compared with $381,750 in 1915, a decline of $18,029. The shore stations took 389 whales in 1916, or 81 less than were taken the previous year. But notwithstanding the smaller catch, the value of the products in 1916 almost equalled that of 1915, as there was a good advance in the price of oil.

Whales Taken in Shore Operations in 1916.

Species.	Number.	Species.	Number.
Bowhead	1	Right	1
Finback	161	Sei	21
Humpback	121	Total	389
Sulphur-bottom	64		
Sperm	20		

Investment in Shore Whale Fishery in Alaska in 1916.

Items.	Number.	Value.	Items.	Number.	Value.
Vessels:			Pile drivers	1	$200
Steamers	6	$280,000	Value of plants		490,000
Tonnage	596		Cash capital		180,000
Barge	1	30,000	Wages paid		94,171
Tonnage	1,149		Whale lines and harpoons		15,000
Launches under 5 tons	2	1,900	Total		1,091,471
Lighters and scows	2	200			

Persons Engaged in the Shore Whale Fishery in Alaska in 1916.

Races.	Number.
Whites	162
Natives	32
Japanese	39
Total	233

Products of Alaska Shore Whaling Operations in 1916.

Products.	Quantity.	Value.
Whale oil ... gallons	717,500	$291,500
Sperm oil ... do	90,500	29,750
Fertilizer, meat ... tons	976	37,000
Fertilizer, bone ... do	160	4,000
Whalebone ... pounds	1,873	1,471
Total		363,721

CLAM FISHERY.

Clam canning as an independent industry is a new feature in the development of the Alaska fisheries. Although some clams have been canned in southeast Alaska in past years, such operations were merely incidental to the larger business of canning salmon and did not warrant separate classification. As the demand for clam products increased, the known though undeveloped beds of razor clams in the vicinity of Mummy Island and Boswell Bay about 10 miles southeast of Cordova, attracted attention, and the first attempt to use them commercially was made in 1916 by two companies that equipped canning establishments at Cordova.

The known beds cover an area of approximately 30 square miles, extending in a belt 5 miles wide from Mummy Island to and including Boswell Bay on the northeast end of Hinchinbrook Island. It is reported that in addition to this known area the beds extend eastward in a belt 5 miles wide to Katalla Bay, a distance of about 60 miles, and are located for the most part in unprotected waters.

The Lighthouse Canning & Packing Co. was the first concern to engage in clam canning in central Alaska. In December, 1915, it acquired possession of a warehouse on the city dock at Cordova and installed therein the necessary canning machines. These were ready for operation by the end of January, but actual canning did not begin until some time later, as the work of clam digging was delayed by stormy weather. At this point it is pertinent to state that although the clams secured in the Cordova region are unsurpassed anywhere for quality, the business is more hazardous than in the Pacific Coast States because of extended periods of unfavorable weather.

The Pioneer Packing Co., a subsidiary of the Sea Beach Packing Co., of Aberdeen, Wash., built a two-line cannery near the dock of the Copper River & Northwestern Railway Co., at Cordova. The plant consists of a cannery building 32 by 165 feet and a two-story warehouse 32 by 100 feet, and has a capacity of approximately 800 cases per day. It was not ready for operation until about September 1, and for that reason only a small pack was made.

METHOD OF CANNING.

As this industry is new in Alaska, a brief outline of the canning process will be given. The first operation is the removal of the clams from the shells. This is done by immersing them in boiling water, either in vats especially designed to receive the wire baskets in which the clams are placed or the clams are passed through the water on an endless belt. After remaining in the water several minutes, they are thrown on a table and the shells fall away from the meat. The clams are then passed on to women workers, who open the stomachs and necks, remove the sand and sediment therefrom, and sever the black part of the neck. The cleansing process is continued by placing the meat in a cylindrical perforated washing machine, which revolves automatically half a turn both ways in a tank filled with water. Any sediment that may have remained after the hand operations were completed is thus removed. The clams are now ready to be canned and are taken directly to the filling tables if whole clams are packed, or to the grinder if the minced variety is desired. The cans are filled by hand with both meat and juice, after which they pass through the topping and sealing machines and are sealed. The process is completed by cooking the canned product in retorts at a temperature of about 245° F. from one to one and a half hours, depending upon the size of the container used. The juice which is thrown off in the process is used in preparing the finished product, the surplus being sealed in cans.

INVESTMENT IN THE CLAM-CANNING INDUSTRY IN ALASKA IN 1916.

Items.	Number.	Value.
Canneries operated	2	$52,123
Working capital		85,000
Wages paid		11,915
Vessels:		
Over 5 tons, power	1	7,000
Tonnage	25	
Launches under 5 tons	1	1,250
Row boats and skiffs	13	655
Total		157,943

PERSONS ENGAGED IN THE CLAM-CANNING INDUSTRY IN ALASKA IN 1916.

Occupations and races.	Number.
Diggers: Whites	35
Shoresmen:	
Whites	26
Natives	13
Total	39
Transporters: Whites	4
Grand total	78

PRODUCT OF CLAM CANNERIES IN ALASKA IN 1916.

Products.	Number cases.	Value.
Clams:		
½-pound flat cans	5,098	$17,867
No. 1 tall cans	a 4,161	15,098
2-pound tall cans	443	1,422
10-pound tall cans	367	1,178
Clam juice: No. 2 tall cans	24	57
Total	10,093	35,622

a Includes 30 cases that were packed in southeast Alaska.

MINOR FISHERIES.

TROUT.

Dolly Varden and steelhead trout were taken commercially in Alaska to the value of $6,935, which is a substantial gain over the production of 1915, which was valued at $3,420. The largest items are those of 504 cases of Dolly Vardens canned by the Midnight Sun Packing Co., at Kotzebue Sound, and 39,297 pounds of frozen Dolly Vardens shipped from southeast Alaska. A few barrels of the same species were pickled in southeast and central Alaska, while 11,525 pounds of steelheads were frozen and shipped from southeast Alaska.

PRODUCTS OF THE ALASKA TROUT FISHERY IN 1916.

Section and species.	Frozen.		Pickled.		Canned.	
	Pounds.	*Value.*	*Barrels.*	*Value.*	*Cases.*	*Value.*
Southeast Alaska:						
Dolly Varden	39,297	$3,262	9	$108		
Steelhead	11,525	385			3	$12
Total	50,822	3,647	9	108	3	12
Central Alaska:						
Dolly Varden			8	85		
Steelhead					23	59
Total			8	85	23	59
Western Alaska: Dolly Varden					504	3,024
Grand total	50,822	3,647	17	193	530	3,095

SABLEFISH.

The sablefish, heretofore known as the black cod, has not yet attained that importance as a product of Alaskan waters to which its very excellent food properties justly entitle it; but the hope that proper recognition will soon be given to it and that a permanent and profitable industry in the sablefish fishery will be established, finds encouragement in the increased quantity and value of the catch in 1916 over that of the preceding year. The total production in 1915 was 142,550 pounds, valued at $3,971, while in 1916 it was 304,141 pounds, valued at $11,185, the increase in quantity being 161,591 pounds and in value $7,214.

SHIPMENT OF SABLEFISH FROM ALASKAN WATERS IN 1916.

Condition.	Pounds.	Value.
Frozen	162,891	$3,652
Pickled	116,215	6,746
Fresh	25,035	787
Total	304,141	11,185

ATKA MACKEREL.

This is a valuable food fish which is found throughout the extent of the Aleutian Islands. Practically nothing has been done as yet to exploit this fish commercially, but it is hoped that there may be early expansion along this line. The fish are easily taken by hook and line and are of good size, and in every way well adapted to pickling. A. C. Goss, of Unalaska, was granted a permit to fish for Atka mackerel within the Aleutian Islands Reservation, and as a result the natives of Attu fished one day, June 6, 1916, and took 6,500 of this species, from which Mr. Goss packed 27 barrels, valued at $270.

RED ROCK COD.

The red rock cod, or rockfish, is now attracting more attention in Alaska than formerly. It is a good food fish and in addition to being consumed locally should merit more extensive exportation to Puget Sound. The flesh is firm and shipments to Puget Sound can be made in ice in the same way that salmon are shipped fresh. This species may also be pickled, or it may be frozen. The red rock cod takes the hook freely. Heretofore it has been caught in some numbers by halibut fishermen, who until recently have not regarded it as worth saving. In 1916 rock cod to the amount of 36,000 pounds, valued at $1,080, was sold fresh, and 9,200 pounds, valued at $214, was pickled. The total product was thus 45,200 pounds, valued at $1,294. These shipments were from southeastern Alaska.

CRABS.

Crabs of excellent quality are found in many places in Alaskan waters. Their use so far has been almost wholly to supply local demands. They are on sale usually at local markets in Ketchikan, Juneau, and other towns. Some shipments of crabs have been made to Puget Sound and it is not unlikely that before long this industry may be developed more extensively.

MUSSELS.

Attention is invited to the extensive deposits of mussels in the waters of Alaska. They are of good quality and when the American trade develops the demand for mussels, Alaska will afford a profitable field for the prosecution of the industry. Mussels are used as extensively in Europe as oysters are used in the United States. It is believed that in due course of time there may also be similar demand for mussels in this country.

SHRIMPS.

The shrimp industry has begun to develop in Alaska. Certain waters in the southeastern section are known to yield shrimp of excellent quality and large size. In 1916 there was some activity in this work in the vicinity of Petersburg. There is every reason to believe that the business may be expanded very materially. According to the customs records the exportations from Alaska in 1916 were 68,845 pounds of shrimps in brine, valued at $2,770; 3,060 pounds dried shrimps, valued at $831; 100 pounds shrimp meat, valued at $35; and 3,880 pounds shrimp fertilizer (shells), valued at $114. The total value of the shrimp products in 1916 was $3,750.

SHARKS.

Recently there has been considerable progress in the utilization of shark skins in the manufacture of leather, thus opening up an opportunity to utilize more fully another aquatic resource heretofore practically neglected. With a view to taking advantage of this opportunity a company was formed by Messrs. J. H. Scott and James Lee, with headquarters at Ward Cove, to engage in the taking of mud sharks in southeastern Alaska between Petersburg and Juneau. The motor scow *Elliott* (139 tons net) was utilized in the work, which resulted in the capture of 450 sharks. The carcasses were not used, but it is hoped that in future operations they may be converted into fertilizer. The hides were valued at $4,000, and the livers yielded 2,700 gallons of oil, valued at $1,350. The total value of the shark products was therefore $5,350. The investment in this fishery was $11,600, and employment was given to 12 persons, all whites. Certain preliminary steps have been taken by J. F. Lavarne, with a view to establishing this industry in the vicinity of Seward.

FUR-SEAL INDUSTRY.

PRIBILOF ISLANDS.[a]

GENERAL ADMINISTRATIVE DUTIES.

The chief duties of the Bureau in connection with the fur-seal fisheries was, as in former years, the administration of the affairs of the Pribilof Islands Reservation. The general oversight of the fur-seal herd; the support, care, and education of the native inhabitants; the preservation of the skins of the seals taken for food purposes; the care of the fox herds and the taking and preservation of fox pelts; and the maintenance and upkeep of the Bureau's property on the islands are regular duties which tax to the utmost the limited number of employees available for detail to these islands. In addition some attention is given to scientific work. In 1916 additional information was secured in regard to seals of known ages, seals branded in 1912 affording the basis for the observations. A census of the seal herd was again taken. Owing to the rapid increase in the size of the herd the work of taking the census becomes increasingly complicated from year to year and was attended with particular difficulties in 1916.

PERSONNEL.

A list of the statutory employees on the Pribilof Islands is shown in the introduction. The following additional information is given regarding the activities of certain employees:

Assistant Agent Harry J. Christoffers, who had been temporarily detailed to St. Paul Island since September, 1915, to relieve Agent and Caretaker Fassett, returned to Unalaska in June, Mr. Fassett having returned to St. Paul May 31. Assistant Agent Hanna reached St. Paul May 31. He was appointed storekeeper, effective September 16. Storekeeper Bishop left St. Paul May 31. Dr. Miles reached St. Paul in September; Dr. Hunter left in October. Agent and Caretaker Proctor, who had been at the Pribilof Islands continuously for a period of over five years, left for the States in October. Storekeeper Hanna was detailed to St. George Island to take charge of the Department's work there during Mr. Proctor's absence. Warden Scudder was detailed from southeast Alaska to St. Paul, arriving there in September, to assist with work in Mr. Hanna's absence. Mrs. A. H. Proctor was employed temporarily in connection with the schools on St. George for a portion of the year. Later her work was taken up by Mrs. G. Dallas Hanna.

[a] The reports of H. C. Fassett, A. H. Proctor, and others have been drawn on freely in the preparation of this section.

PURCHASE AND TRANSPORTATION OF SUPPLIES.

The natives of the Pribilof Islands, who on June 30, 1916, numbered 311, have to be supplied in large measure from outside sources with the necessities of life. There is, of course, an abundance of seal meat available at the islands, and fish, sea lions, wild birds, and birds' eggs are utilized to some extent. The seal meat, while unlimited in quantity so far as the requirements of the natives are concerned, must be used with moderation and not to the exclusion of other foods. The reindeer herds which were placed on the islands in 1911 have not yet contributed any material quantity of food. Driftwood, which is found along the beaches, is available as fuel to only a limited extent. It follows that considerable quantities of food and fuel for the natives must be taken to the islands. In addition, clothing, shelter, and household furniture must be provided. The purchasing and transportation of these supplies, together with those required for the conduct of the Bureau's general business on the islands, require a large amount of work and attention.

A small quantity of supplies was purchased at Seattle in April by an agent of the Bureau and transported to the Pribilofs through the courtesy of the Coast Guard.

Following the plan of the previous year, schedules of the general supplies to be purchased were printed and distributed to prospective bidders. The proposals received were made the basis for the subsequent purchases.

The steamer *Elihu Thomson* was chartered from the Pacific Cold Storage Co., of Tacoma, Wash., for the purpose of transporting the supplies to the islands. The vessel was loaded at Seattle and left there September 5. Dutch Harbor was reached September 16. From Dutch Harbor the vessel went to Unalaska on the 17th, left there on the 18th, and arrived at St. George Island the morning of the 19th. Unfavorable weather conditions delayed the discharging of the cargo and the loading of miscellaneous outgoing freight, including the annual shipment of fur-seal skins, and it was not until October 12 that the vessel was able to leave the islands. Direct passage was made to Taku Harbor, where, in accordance with previous arrangements, a cargo of canned salmon was placed aboard the vessel for the account of the Pacific Cold Storage Co. The ship arrived at Taku Harbor October 19, left there the 21st, and arrived at Seattle on the 26th.

No landing can be made at either St. Paul or St. George Islands by vessels of any size. Ships visiting these islands must anchor offshore, and any merchandise to be landed must be taken ashore in lighters. In the past the native bidarras have been used for this work. The decrease in the available supply of sea-lion skins, used for covering the bidarras, made it necessary in 1916 to provide some other form of boat to supplement the bidarras. Two flat-bottom skiffs, built somewhat after the pattern of the Karluk skiff, were shipped from Seattle and used in connection with the unloading of supplies at St. Paul Island. They were satisfactory in smooth water, but were not as good as the bidarras in rough water. At St. George a canvas-covered bidarra was tried out with fairly satisfactory results. The canvas used was No. 0. By using heavier canvas and placing chaffing strips of iron bark on the bottom and sides it is believed that a canvas cover will be as satisfactory as one made from sea-lion skins.

NATIVES OF THE PRIBILOF ISLANDS.

No important changes took place among the native inhabitants of the islands in 1916, either in respect to their numbers or mode of life. The isolation of the islands naturally tends to keep the existing populations intact, and they have remained approximately the same in numbers for many years.

SUPPORT.

Very little opportunity exists for the natives of the Pribilofs to secure for themselves the means of a livelihood. They were originally taken to the islands to assist in sealing operations, and with the decline of the sealing industry their most important occupation was lost to them. The soil and climate do not permit the raising of agricultural products except to a very slight extent, and natural resources susceptible of exploitation at present are almost nonexistent. The result is that in recent years the Government has been obliged to contribute largely to the support of these people. The Bureau is endeavoring to develop as far as possible opportunities whereby the natives may assist themselves. Among the possibilities which have been suggested are the development of the local fishery, the making of souvenirs and curios for sale to tourists and others, the development of the reindeer herds, and the introduction and utilization of various domestic animals.

In recent years the natives have received some assistance in the way of employment given them by the Navy Department in connection with the local radio stations. As a result of a decision by the Comptroller of the Treasury, they will be paid in cash for services performed in the taking of fox skins at the islands, payments to be made from the proceeds of the sales of the skins at the rate of $5 for each skin taken.

HEALTH.

The services of a physician were available on each island throughout the year. The appropriations provide for only two physicians for the Pribilof Islands, and since it is manifestly essential that one be on duty at all times on each island it is impossible to grant either a leave of absence at any time. This condition in connection with the impracticability of employing physicians temporarily as reliefs for the permanent ones makes it generally necessary for a physician to resign in order to obtain a leave of absence. Some method whereby this difficulty may be overcome should be evolved. It has been suggested that it might be possible to secure the services of physicians for limited periods from some other branch of the Government service.

In these primitive communities on St. Paul and St. George Islands the work of the physicians is in no small degree that of preventing disease and of improving general sanitary conditions. In addition to purely professional work they are called upon to give attention to the condition of the houses of the natives, to their food, clothing, and methods of living in general. While much has been accomplished in raising the standard of living among these people, and while conditions as a whole are probably on a more desirable plane than ever before, much remains to be done, and a large field for useful work is open to physicians who are sufficiently interested in this kind of work to undertake it with enthusiasm.

St. Paul Island.—The health of the natives was on the whole satisfactory during the year. With the exception of an epidemic of gastroenteritis in February and March, there was very little real sickness. During this period two deaths occurred; one from acute gastroenteritis and one from chronic pulmonary tuberculosis with acute gastroenteritis.

The hospital which was opened in 1915 has proved a decided success and of great help to the resident physician. In the period from September 1, 1915, to September 1, 1916, eleven cases were treated there. Among these were a patient from the navy collier *Saturn* and two from the Navy radio station. In this connection it may be stated that in the same period the physician on numerous occasions rendered services, including dental work, to persons employed by the Navy Department.

In cooperation with the school-teachers, attention was given to sanitary conditions in the school, and the children were instructed in elementary principles of hygiene and in breathing and other healthful exercises. It is hoped that the instruction given in the school will have a beneficial influence upon the home life of the children, in which the field for improvement is large.

In the latter part of 1915 a physical examination was made of each native on St. Paul. This examination gave the physician an opportunity to inform himself quite thoroughly in regard to the physical condition of each one and was especially valuable in bringing to light defects and weaknesses which in many cases would otherwise have remained unsuspected. Each native was given instruction in bodily hygiene and special treatment whenever the circumstances required it. The Bureau plans to have these examinations repeated from time to time.

In connection with the physical examinations, special efforts were made to inculcate in the natives an appreciation of the value of proper care of the teeth. Dr. Hunter had some knowledge of dentistry, and during the period of his work at St. Paul attended to such dental work as was practicable under the circumstances.

It is worthy of mention that certain insanitary practices formerly common among the natives in connection with their religious ceremonies have been discouraged. The natives as a whole have not proved obstinate in this matter, and while they have not discontinued the practices altogether much has been accomplished.

St. George Island.—In addition to the treatment of specific cases of illness, attention was given to sanitary matters about the village, the condition of the natives' houses, the condition of seal meat preserved by the natives for food, and to other matters of hygienic importance.

Quarters should be fitted out on St. George Island for use as a hospital. Facilities for the proper treatment of patients are as necessary there as on St. Paul Island, where the benefits accruing from a small but well-planned hospital are unquestionable.

SCHOOLS.

The Bureau is charged with the education of the native children on the Pribilof Islands and three teachers are regularly employed, two on St. Paul and one on St. George. In addition, a temporary assistant is employed at a nominal salary to assist with the work on St. George. The opportunities which the children have for acquiring useful knowledge and right methods of living are so limited that the responsibility placed upon the teachers is one which should be assumed only by those who are actually interested in the work for its own sake. The Bureau feels that the present teachers are fully awake to the situation and are accomplishing much good.

St. Paul Island.—The 1915–16 session began September 13, 1915, and ended May 26, 1916. Sixty pupils were in attendance. The courses prescribed for ordinary schools were kept in mind and followed in all the essentials as far as was possible and practical. Special effort was made to have the children speak and read English and to think in that language, and much ingenuity was displayed by the teachers in their efforts to secure the desired results. Attention was given to the health of the pupils and gymnastics were made a part of the regular program. Music, games, and nature-study work were interspersed with the more formal phases of school routine. The increased facility in the use of English on the part of the children and the marked improvement in their conduct and general appearance have been made the subject of very favorable comment.

During the summer months of 1916 efforts were made along lines suitable to the vacation period to keep the children interested in their work.

The 1916–17 session began September 12, with an enrollment of 64 pupils.

St. George Island.—Senior and junior schools were maintained on this island during the 1915–16 school year. The senior school was opened on September 6, 1915, and was continued until May 26, 1916. Twenty-four children, ranging in age from 7 to 17 years, were in attendance. In addition to the usual courses of instruction, special efforts were made to promote the use of English by the children in their ordinary conversation. Instruction was given the girls in plain sewing and darning and the boys in cobbling. During the vacation period in the summer season of 1916, with the exception of a short period when the teacher was detailed to St. Paul Island to assist with the seal census, the children were assembled one-half day each week for supplementary instruction.

The junior school was opened on September 8, 1915, and was continued through July, 1916. At the beginning of the term 23 children, ranging from 3 to 6 years of age, were in attendance. It was soon found that those 3 years of age were too young and they were excused from further attendance. Kindergarten methods were employed, and it is felt that the benefits which these small children receive through intelligent direction of their activities fully justify the continuance of this kind of instruction.

Attendance at Salem Indian Training School.—Most of the Pribilof Islands natives who were in attendance at the Salem Indian Training School, at Chemawa, Oreg., in 1915, continued their studies there in 1916. Two other natives, Ioaniky Emanoff and Peter Tetoff, of St. Paul Island, came on the supply ship to Seattle in the fall and entered the school in October.

NATIVES OF THE PRIBILOF ISLANDS IN ATTENDANCE AT THE SALEM INDIAN TRAINING SCHOOL, CHEMAWA, OREG., IN 1916.

Name.	Attendance began—	Remarks.
George Lekanof	August, 1914	From St. George Island.
Constantine Lestenkof	do	Do.
Alexey Emanoff [a]	October, 1915	From St. Paul Island.
Agrafina Fratis	do	Do.
Julia (Ouliana) Fratis	do	Do.
Martha Fratis	do	Do.
Ioaniky Emanoff	October, 1916	Do.
Peter Tetoff	do	Do.
Alexander Melovidov	July, 1911	Entered from St. Paul Island, but no longer a resident of the Pribilofs.

[a] Left the Chemawa school on February 29, 1916, for the school at the Fort Lapwai Sanitarium, Lapwai, Idaho, on account of condition of health.

SAVINGS ACCOUNTS.

The Washington Loan & Trust Co., Washington, D. C., has remained throughout the year the depositary of the natives' personal funds in the custody of the United States Commissioner of Fisheries as trustee. Interest is paid on these funds at the rate of 3 per cent per annum and is calculated on monthly balances. It is credited on the last days of December and June (or on the first days of the months following) of each year for the preceding periods of six months.

On January 1, 1916, the amount of the funds including interest, $75.39, credited December 31, 1915, was $5,068.61. Interest credited June 30, 1916, amounted to $74.84. The amount withdrawn for the natives in the year was $484.87. The balance on January 1, 1917, including interest, $70.78, credited on that date, was $4,729.36.

The account is subject to an audit by the disbursing clerk for the Department twice each year.

PRIBILOF ISLANDS NATIVES' SAVINGS ACCOUNTS IN THE CUSTODY OF THE UNITED STATES COMMISSIONER OF FISHERIES, AS TRUSTEE, JANUARY 1, 1917.

Funds of—	Amount.	Funds of—	Amount.
St. Paul Island:		St. Paul Island—Continued.	
Bourdukofsky, Apollon	$221.95	Merculief, Marian	$34.36
Bourdukofsky, Peter	133.30	Merculief, Paul A	13.46
Diakanof, Auxenia	22.88	Merculief, Terrenty	34.36
Emanoff, Alexey	262.48	Oustigof, Peter	98.04
Fratis, Agrifina	82.51	Pankof, Agrifina S	305.26
Fratis, Akalina	486.24	Rookavishnikof, Elizabeth	27.02
Fratis, Martha	82.49	Stepetin, Marina	15.09
Fratis, Ouliana	82.49	St. George Island:	
Gromof, Ouliana	843.05	Merculiof, Agrifina[a]	159.48
Hanson, John	73.48	Galanin, Mary	276.36
Kozlof, Parascovia	174.35	Lestenkof, Dimitri	115.15
Krukof, Julia B	105.69	Lestenkof, Michael	280.78
Melovidov, Alexandra	38.32	Merculiof, Joseph	104.42
Melovidov, Alfay	38.32	Philomonof, Mary [b]	105.32
Melovidov, Anton	15.04	Prokopiof, Peter	66.41
Melovidov, Joseph	38.32	Shane, Michael	74.31
Melovidov, Marcia	38.32	Philomonof, Zoya [c]	143.90
Melovidov, Salome	1.02	Zacharof, Emanuel	28.36
Melovidov, Vincent	38.31		
Merculief, Dosofoy	34.36	Total	4,729.36
Merculief, Macar	34.36		

[a] Formerly Agrifina Bogadanof, of St. Paul Island.
[b] Deceased, estate undivided.
[c] Formerly Zoya Swetzof.

CENSUS.

A recapitulation of the census of native inhabitants of St. Paul Island as of June 30, 1916, is as follows:

Total native population June 30, 1915	193
Births during year ended June 30, 1916	6
Returned to island from school, year ended June 30, 1916	1
Departures during year ended June 30, 1916	5
Deaths during year ended June 30, 1916	3
Total native population June 30, 1916	192

A recapitulation of a similar census for St. George Island follows:

Total native population June 30, 1915	121
Births during year ended June 30, 1916	6
Deaths during year ended June 30, 1916	8
Total native population June 30, 1916	119

From the foregoing it will be noted that the total native population of the Pribilof Islands on June 30, 1916, was 311, as compared with 314 on June 30, 1915.

INTRODUCTION OF DOMESTIC ANIMALS.

With the view of determining whether Angora goats might not be successfully introduced on the Pribilof Islands, a number were sent from Seattle on the supply ship. Nine were delivered to St. Paul Island and six to St. George Island.

It is felt that if the experiment proves successful the animals will not only contribute to the support of the natives, but will afford an opportunity for them to acquire personal ownership of live stock and to profit through their own individual efforts. It is hoped that the animals will be able to subsist themselves, though shelter will have to be provided for the winter season. The live stock owned by individual natives on the islands is at present limited to poultry.

FUR-SEAL HERD.

KILLING OF SEALS.

The law limiting the killing of fur seals on the Pribilof Islands to the number required for the use of the native inhabitants remained in effect throughout the year. The Department decided tentatively upon 5,000 3-year-old male seals as a proper allowance for this purpose, but authorized the killing of additional seals up to 7,500 if that number could be properly utilized. It was also arranged that a limited number of seals of other ages might be taken in place of 3-year-olds as needed for special purposes. It was also provided that the seals should be taken at St. Paul Island and St. George Island approximately in proportion to the native population of the two islands. On this basis about 5,000 of the 7,500 would be allowed for the uses of the St. Paul natives and 2,500 for the St. George natives. Circumstances later made it desirable to change this ratio by increasing the percentage which might be taken at St. George. Under present conditions the only use made of seals by the natives is to supply meat for food. The number of seals killed in the calendar year 1916 for food was 3,483 on St. Paul Island and 2,983 on St. George Island, a total of 6,466 for both islands.[a]

[a] In arriving at the total number of seals killed on each island the Bureau has had to depend upon telegraphic advices in respect to the number killed after the close of navigation in the fall of 1916. Subsequent reports may indicate very slightly different totals.

The number of seals reported as killed for food purposes does not necessarily correspond with the number of skins secured, for from time to time individual seals are found dead from which merchantable skins are obtained.

RECORD OF FUR SEALS KILLED ON ST. PAUL ISLAND, ALASKA, IN THE CALENDAR YEAR 1916.

Date.	Hauling ground driven.	Number.	Date.	Hauling ground driven.	Number.
Mar. 3	Sivutch (Sea Lion Rock)	59	July 24	Reef	e 195
May 27	Reef	a 101	26	Reef and Gorbatch	f 284
30	Northeast Point	1	27	Northeast Point	1
June 3	Reef	67	29	Gorbatch	b 178
3	Polovina	1	29	Northeast Point	1
7	Northeast Point	1	Aug. 1	Tolstoi	241
10	Polovina	1	4	....do	b 117
12	Reef	209	9	Northeast Point	1
14	Northeast Point	1	11	Gorbatch	59
17	Polovina	1	Sept. 3	Northeast Point	1
22	Northeast Point	1	4	Gorbatch	61
23	Reef	60	12	Northeast Point	1
27	Northeast Point	1	Oct. 12	....do	1
30	Reef and Gorbatch	366	17	Tolstoi	53
July 5	Northeast Point	1	17	Northeast Point	1
6	Gorbatch	b 113	27	Reef Peninsula	113
10	Reef and Parade Ground	c 272		Subsequent killings through Dec. 31	g 343
15	Reef and Gorbatch	481			
18	Northeast Point	1			
20	Reef and Gorbatch	d 1		Total	3,483
22	Reef	93			

a Includes 1 which died on drive and 11 which were suffocated on killing field.
b Includes 1 which died on drive.
c Includes 2 which died on drive.
d Found dead on line of drive of July 15.
e Includes 5 which died on drive.
f Includes 18 which died on drive.
g Details not available owing to close of navigation in the fall of 1916. It is contemplated printing them in the corresponding report for 1917.

RECORD OF FUR SEALS KILLED ON ST. GEORGE ISLAND, ALASKA, IN THE CALENDAR YEAR 1916.

Date.	Hauling ground driven.	Number.	Date.	Hauling ground driven.	Number.
June 9	East Cliffs	32	July 27	Zapadni	22
13	Zapadni	2	29	East Cliffs	103
15	North	34	Aug. 1	North	120
22	Staraya Artil	49	3	East Cliffs	213
22	Zapadni	1	5	North	145
24	East Cliffs	123	8	East Cliffs	40
27	North	201	10	North	94
29	Staraya Artil	55	10	Zapadni	1
July 1	East Cliffs	115	Oct. 16		1
5	North	169	20	Staraya Artil	40
7	East Cliffs	109	23	East	78
11	Staraya Artil	71	27	Staraya Artil and North	88
12	North	295		Subsequent killings through Dec. 31	a 297
15	East Cliffs	355			
16	Zapadni	1			
22	....do	1		Total	2,983
24	North	128			

a Details not available, owing to close of navigation in the fall of 1916. It is contemplated printing them in the corresponding report for 1917.

WASTE SEALING PRODUCTS.

The suggestion having been made that the deposits of bones of fur seals and sea lions on the Pribilof Islands might be sufficient in quantity and in quality to warrant their exploitation commercially, an investigation was undertaken in 1916 in order to obtain the salient facts.

The work was taken up along two lines—first, to ascertain the extent of the deposits on the islands and, second, to ascertain the commercial value of the bones. It was not practicable to undertake field work for the purpose of ascertaining the quantity of bones until late in the summer. Various areas were examined in a systematic manner, but the season's work was completed so late that a full report could not be completed before the departure of the last vessel leaving the islands in the year. A preliminary report received by the office indicated that on the fields which were examined there are about 6,000 tons of bones and that other fields not examined would also prove to be productive of material. A considerable quantity of bones was also collected and forwarded to Seattle on the supply ship. Portions of this consignment were subsequently forwarded to various persons and firms who were interested in the matter and desired to have an opportunity to examine and analyze the material. An analysis of a quantity of the bones by the Bureau of Soils, Department of Agriculture, showed that they contained from 24.85 to 25.26 per cent of phosphoric acid and from 4.57 to 4.80 per cent of nitrogen.

When the commercial killing of seals is again resumed the surplus carcasses will be available as a source of fertilizer material and possibly of other products. Use is made of waste meat and bones in the preparation of food products for domestic farm animals, and the possibility of utilizing seal carcasses for these products should receive careful consideration. It has been estimated roughly that the amount of raw material available will be about 50 pounds per seal.

Seal throats.—The natives of the Pribilofs are accustomed to utilizing to a limited extent the tough, leathery throats of the fur seals in the manufacture of cardcases and other small articles, chiefly for sale as souvenirs. In 1915 and 1916 efforts were made by the Bureau to determine whether a product could not be made from these throats which would meet with a steady demand in some industry. Quantities of the throats were secured at the islands and steps were taken to bring the subject to the attention of various firms which might be interested in experimenting with the material. A few samples were tanned by the Helburn Leather Co., Salem, Mass. The quality of the product was satisfactory, but the expense of tanning the throats, due to their small size, made it questionable whether they could be marketed in competition with other products. However, the Bureau has not suspended its efforts, and it is hoped that sooner or later some one will find an economic use for what remains otherwise largely a waste product.

CENSUS OF THE FUR-SEAL HERD.

As in previous years, a census of the fur-seal herd at the Pribilof Islands was taken in 1916. A census has been taken annually since pelagic sealing was abolished, and the results show clearly the rapid recuperation of the herd when relieved from the disastrous effects of pelagic sealing.

The censuses of 1912 and 1913 were taken by George A. Clark. The 1914 census was taken by Messrs. Osgood, Preble, and Parker in connection with a special investigation made by them, the results of which were published in Bureau of Fisheries Document No. 820. The 1915 and 1916 censuses were taken under the direction of G. Dallas Hanna, assisted by other officers of the Alaska service. Owing to the different circumstances under which the censuses were taken, the development of additional information in regard to the herd from year to year, including a better understanding of the annual percentage of mortality in the younger animals, the figures for those components of the herd which can not be actually counted in their entirety are not exactly comparable. The classes whose numbers may be obtained by actual count are harem bulls and pups of the season. The idle bulls may be counted with considerable accuracy. The number of breeding cows in any season, which class includes all females 3 years of age and upwards, is equal to the number of pups born that season.

In computing the number of young seals of various classes in 1915 and 1916, by making deductions from the number of pups born in preceding years, the natural mortality of young seals at sea was placed at 35 per cent for the first year, 20 per cent for the second year, and 4 per cent for the third year. This assumption calls for a survival to the end of the third year of approximately 50 per cent of the seals born. The loss in the fourth, fifth, and sixth years is known to be small, and it is believed that the deductions made for the losses in the first three years are sufficiently ample to cover those of the fourth, fifth, and sixth years. In 1914 the assumed percentages of loss were 50 per cent for the first year, 15 per cent for the second, 10 per cent for the third, and 5 per cent for the fourth year.

In 1916 the class of seals which was designated as young bulls in the censuses of 1912, 1913, and 1914 was divided into 5 and 6 year-old classes. The young bulls of the 1915 census were considered as 5-year-olds, and in the table which follows they have been referred to that class. At the time the 1915 census was taken it was believed that the 6-year-old bulls were included among the harem and idle bulls. Deductions from studies subsequently made indicate that when the number of idle bulls is equal to more than 50 per cent of the number of harem bulls, as was the case in 1916, the 6-year-old males are properly excluded from these classes.

GENERAL COMPARISON OF RECENT CENSUSES OF THE SEAL HERD.

Class of seals.	1912	1913	1914	1915	1916
Breeding bulls	1,358	1,403	1,559	2,151	3,500
Breeding cows	81,984	92,269	93,250	103,527	116,977
Idle bulls	113	105	172	673	2,632
Young bulls (chiefly 5-year-olds)	199	259	1,658		
6-year-old males				....	11,167
5-year-old males	....	....	....	11,271	15,494
4-year-old males	100	2,000	9,939	15,848	15,427
3-year-old males	2,000	10,000	13,880	18,282	19,402
2-year-old males	11,000	15,000	17,422	23,990	24,169
Yearling males	13,000	20,000	23,068	30,307	33,645
2-year-old cows	11,000	15,000	17,422	23,990	24,245
Yearling cows	13,000	20,000	23,067	30,306	33,646
Pups	81,984	92,269	93,250	103,527	116,977
Total	215,738	268,305	294,687	363,872	417,281

The following information in regard to the 1916 census is taken from Mr. Hanna's report:

Pups.—An enumeration of all the pups born in the season was made between July 26 and August 15, both dates inclusive. The work was carried on with considerably greater difficulty than in former years. Not only was there a much larger number of animals to be counted, but other conditions resulting from the increase in the size of the herd contributed to the difficulty. The work of completing the count was delayed until August 15, when some of the pups had taken to the water, and this, together with the unfavorable conditions for counting pups on the breeding grounds due to the presence there of more bulls than in previous years, may have resulted in an error in the count amounting to as much as 3 or 4 per cent. It is not believed that the error was more.

DISTRIBUTION OF PUPS AT THE PRIBILOF ISLANDS IN 1916.

Rookery.	Date of counts.	Living pups.	Dead pups.	Total pups.
ST. PAUL ISLAND.				
Kitovi	Aug. 3	2,445	27	2,472
Lukanin	Aug. 1	2,055	86	2,141
Gorbatch	Aug. 3	8,612	252	8,864
Ardiguen	....do	693	7	700
Reef	July 27	16,148	183	16,331
Sivutch	July 26	4,951	69	5,020
Lagoon	July 29	385	3	388
Tolstoi	....do	11,919	146	12,065
Zapadni	Aug. 2 and 14	9,535	147	9,682
Little Zapadni	Aug. 14	6,127	150	6,277
Zapadni Reef	Aug. 2	262	4	266
Polovina	Aug. 1	4,631	113	4,744
Polovina Cliffs	....do	1,663	20	1,683
Little Polovina	....do	1,059	15	1,074
Morjovi	July 30	2,717	44	2,761
Vostochni	{....do {Aug. 15	23,483	904	21,387
Total		96,685	2,170	98,855
ST. GEORGE ISLAND.				
North	Aug. 6	6,122	124	6,246
Staraya Artil	....do	5,460	85	5,545
Zapadni	Aug. 7	957	8	965
South	....do	19		19
East Reef	Aug. 5	1,568	17	1,585
East Cliffs	....do	3,684	78	3,762
Total		17,810	312	18,122
St. Paul Island		96,685	2,170	98,855
St. George Island		17,810	312	18,122
Total, both islands		114,495	2,482	116,977

PERCENTAGE OF INCREASE OR DECREASE IN THE NUMBER OF PUPS IN 1916 FROM 1915.

Rookery.	Total pups, 1915.	Total pups, 1916.	Percentage of increase (+) or decrease (−).
ST. PAUL ISLAND.			
Kitovi	2,475	2,472	− 0.12
Lukanin	1,954	2,141	+ 9.57
Gorbatch	6,978	8,864	+27.02
Ardiguen	632	700	+10.75
Reef	14,750	16,331	+10.71
Sivutch	4,535	5,020	+10.69
Lagoon	394	388	− 1.52
Tolstoi	11,623	12,065	+ 3.80
Zapadni	8,740	9,682	+10.77
Little Zapadni	5,682	6,277	+10.47
Zapadni Reef	219	266	+21.46
Polovina	4,161	4,744	+14.01
Polovina Cliffs	1,553	1,683	+ 8.37
Little Polovina	1,065	1,074	+ .84
Morjovi	2,395	2,761	+15.28
Vostochni	20,981	24,387	+16.23
Total	88,137	98,855	+12.16
ST. GEORGE ISLAND.			
North	5,731	6,246	+ 8.98
Staraya Artil	4,450	5,545	+24.60
Zapadni	989	965	− 2.42
South	26	19	−26.92
East Reef	1,047	1,585	+51.38
East Cliffs	3,147	3,762	+19.54
Total	15,390	18,122	+17.75
St. Paul Island	88,137	98,855	+12.16
St. George Island	15,390	18,122	+17.75
Total, both islands	103,527	116,977	+12.99

PERCENTAGE OF ANNUAL INCREASE OF PUPS, 1912 TO 1916.

Year.	Number of pups.	Percentage of increase.
1912	81,984	....
1913	92,269	12.54
1914	93,250	1.06
1915	103,527	11.02
1916	116,977	12.99

These figures suggest that the normal rate of increase is about 12 per cent. No good reason is known for the small percentage of increase in 1914.

The dead pups were counted at the same time as the live ones. In 1916 the proportion of dead pups to the total number born was somewhat larger than in previous years. No evidence of *Uncinaria* was seen. Mange, which was observed on a large number of pups in 1915, appeared to a lesser extent in 1916.

NUMBER AND DISTRIBUTION OF DEAD PUPS IN 1916.

Rookery.	Total pups.	Dead pups.	Percentage of dead.	
			1916	1915
ST. PAUL ISLAND.				
Kitovi	2,472	27	1.09	1.86
Lukanin	2,141	86	4.01	1.43
Gorbatch	8,864	252	2.84	1.37
Ardiguen	700	7	1.00	1.42
Reef	16,331	183	1.12	1.65
Sivutch	5,020	69	1.37	1.23
Lagoon	388	3	.77	1.78
Tolstoi	12,065	146	1.21	1.05
Zapadni	9,682	147	1.51	2.19

NUMBER AND DISTRIBUTION OF DEAD PUPS IN 1916—Continued.

Rookery.	Total pups.	Dead pups.	Percentage of dead.	
			1916	1915
ST. PAUL ISLAND—continued.				
Little Zapadni	6,277	150	2.38	1.69
Zapadni Reefs	266	4	1.50	1.37
Polovina	4,744	113	2.38	1.73
Polovina Cliffs	1,683	20	1.18	.58
Little Polovina	1,074	15	1.39	1.13
Morjovi	2,761	44	1.59	1.58
Vostochni	24,387	904	3.70	2.75
Total	98,855	2,170	2.19	1.82
ST. GEORGE ISLAND.				
North	6,246	124	1.98	1.90
Staraya Artil	5,545	85	1.53	1.19
Zapadni	965	8	.82	1.11
South	19	....	....	....
East Reef	1,585	17	1.07	.28
East Cliffs	3,762	78	2.07	.89
Total	18,122	312	1.72	1.32
St. Paul Island	98,855	2,170	2.19	1.82
St. George Island	18,122	312	1.72	1.32
Total, both islands	116,977	2,482	2.12	1.74

The number of pups which were killed as a result of counting this class of animals was 27. It was impossible to control the pups so as to obviate all danger to them, part of the difficulty arising from the large number of vicious bulls present. The proportion of those killed in taking the census to the number born was less than 1 to 4,000.

LOCATION AND NUMBER OF PUPS WHICH DIED AS DIRECT RESULT OF COUNT IN 1916.

Rookery.	Number killed.	Cause.
Lukanin (St. Paul)	1	Smothering.
Reef (St. Paul)	1	Trampling by bull.
Do	16	Drowning and smothering.
Tolstoi (St. Paul)	2	Smothering.
Do	2	Drowning.
Polovina (St. Paul)	1	Smothering.
Vostochni (St. Paul)	2	Do.
East Cliffs (St. George)	2	Drowning.
Total	27	

Breeding cows.—This class of seals is made up of females 3 years of age and upward. Since no cow gives birth to more than one pup in a year, the number of animals in this class in a given year can not be less than the number of pups born that year. The number of pups born in 1916 was found to be 116,977, which may be taken as the number of breeding cows. While taking the pup census, 79 dead cows were found.

Considerable numbers of cows which were branded in 1912, when they were pups, were seen on the rookeries in 1916.

Harem bulls and idle bulls.—The counts of these animals on the rookeries were made for St. Paul Island on July 16, 17, 18, and 19 and for St. George Island on July 19 and 20. The dates on which the corresponding counts were made in 1915 were July 17, 18, 19, and 21 and July 19 and 20. The close correspondence of the dates makes the results properly comparable.

The counting of the bulls was attended with considerable difficulty and danger, and resort was had to various methods of procedure in order to secure accurate results. A great deal of fighting among the bulls was observed on all the rookeries.

The boundaries of the breeding areas were plotted on Coast and Geodetic Survey charts.

Harem and Idle Bulls in 1916.

Rookery.	Date.	Harem bulls.	Idle bulls.	Total.
ST. PAUL ISLAND.				
Kitovi	July 16	95	44	139
Lukanin	...do....	64	45	109
Gorbatch	July 17	234	110	344
Ardiguen	...do....	33	9	42
Reef	...do....	490	269	759
Sivutch	...do....	162	111	273
Lagoon	July 18	13	8	21
Tolstoi	...do....	361	335	696
Zapadni	...do....	309	332	641
Little Zapadni	...do....	178	157	335
Zapadni Reef	...do....	8	1	9
Polovina	July 19	162	90	252
Polovina Cliffs	...do....	59	47	106
Little Polovina	...do....	31	21	52
Morjovi	...do....	95	88	183
Vostochni	...do....	654	611	1,265
Total	....	2,948	2,278	5,226
ST. GEORGE ISLAND.				
North	July 20	200	103	303
Staraya Artil	...do....	142	109	251
Zapadni	July 19	31	47	78
South	...do....	3	....	3
East Reef	July 20	73	44	117
East Cliffs	...do....	103	51	154
Total	....	552	354	906
St. Paul Island	....	2,948	2,278	5,226
St. George Island	....	552	354	906
Total, both islands.	....	3,500	2,632	6,132

Comparison of Harem and Idle Bulls in 1916 with 1915.

Rookery.	Harem bulls.			Idle bulls.			Total.		
	1915	1916	Gain.	1915	1916	Gain.	1915	1916	Gain.
ST. PAUL ISLAND.			*Per ct.*			*Per ct.*			*Per ct.*
Kitovi	67	95	41.79	24	44	83.33	91	139	52.74
Lukanin	46	64	39.13	18	45	150.00	64	109	70.31
Gorbatch	152	234	53.94	35	110	214.28	187	344	83.95
Ardiguen	25	33	32.00	6	9	50.00	31	42	35.48
Reef	294	490	66.66	59	269	355.93	353	759	115.01
Sivutch	96	162	68.75	23	111	382.60	119	273	129.41
Lagoon	15	13	a 13.33	4	8	100.00	19	21	10.52
Tolstoi	237	361	52.32	46	335	628.26	283	696	145.93
Zapadni	173	309	78.61	92	332	260.86	265	641	141.88
Little Zapadni	106	178	67.92	26	157	503.84	132	335	153.78
Zapadni Reef	7	8	14.28	6	1	a 83.33	13	9	a 30.76
Polovina	70	162	131.42	31	90	190.32	101	252	149.50
Polovina Cliffs	33	59	78.78	11	47	327.27	44	106	140.90
Little Polovina	21	31	47.62	9	21	133.33	30	52	73.33
Morjovi	51	95	86.27	21	88	319.04	72	183	154.16
Vostochni	396	654	65.15	135	611	352.59	531	1,265	138.22
Total	1,789	2,948	64.78	546	2,278	317.21	2,335	5,226	123.81
ST. GEORGE ISLAND.									
North	141	200	41.84	53	103	94.33	194	303	56.18
Staraya Artil	89	142	59.55	31	109	251.61	120	251	109.16
Zapadni	23	31	34.78	10	47	370.00	33	78	136.36
South	3	3		....	....		3	3	....
East Reef	30	73	143.33	18	44	144.44	48	117	143.75
East Cliffs	76	103	35.52	15	51	240.00	91	154	69.23
Total	362	552	52.48	127	354	178.74	489	906	85.27
St. Paul Island	1,789	2,948	64.78	546	2,278	317.21	2,335	5,226	123.81
St. George Island	362	552	52.48	127	354	178.74	489	906	85.27
Total, both islands	2,151	3,500	62.71	673	2,632	291.08	2,824	6,132	117.13

a Loss.

The average harem.—The average number of breeding cows in the harems for the entire herd, or for subdivisions thereof, may be ascertained by dividing the number of breeding cows, which is equal to the number of pups, as ascertained by count, by the number of harem bulls present on the area considered. In 1914 the number of cows in the average harem, for the herd as a whole, was 59.8; in 1915, 48.13; and in 1916, 33.42.

The following table shows the size of the average harem, together with the percentage of idle bulls to harem bulls for the herd and for various subdivisions thereof in 1915 and 1916:

AVERAGE HAREM AND PERCENTAGE OF IDLE BULLS TO HAREM BULLS, 1915 AND 1916.

Rookery.	1915				1916			
	Breeding cows.	Harem bulls.	Average harem.	Percentage idle bulls to harem bulls.	Breeding cows.	Harem bulls.	Average harem.	Percentage idle bulls to harem bulls.
ST. PAUL ISLAND.								
Kitovi	2,475	67	36.9	35.8	2,472	95	26.0	46.3
Lukanin	1,954	46	42.5	39.1	2,141	64	33.4	70.3
Gorbatch	6,978	152	45.9	23.0	8,864	234	37.9	47.0
Ardiguen	632	25	25.3	24.0	700	33	21.2	27.3
Reef	14,750	294	50.2	20.0	16,331	490	33.3	54.9
Sivutch	4,535	96	47.3	23.9	5,020	162	31.0	68.5
Lagoon	394	15	26 3	26.7	388	13	29.8	61.5
Tolstoi	11,623	237	49.0	19.4	12,065	361	33.4	92.8
Zapadni	8,740	173	50.5	53.2	9,682	309	31.3	107.4
Little Zapadni	5,682	106	53.6	24.5	6,277	178	35.3	88.2
Zapadni Reef	219	7	31.3	85.7	266	8	33.2	12.5
Polovina	4,161	70	59.4	44.3	4,744	162	29.3	55.5
Polovina Cliffs	1,553	33	47.1	33.3	1,683	59	28.5	79.7
Little Polovina	1,065	21	50.7	42.9	1,074	31	34.6	67.7
Morjovi	2,395	51	46.9	41.2	2,761	95	29.1	92.6
Vostochni	20,981	396	53.0	34.1	24,387	654	37.3	93.4
Total	88,137	1,789	49.27	30.52	98,855	2,948	33.53	77.27
ST. GEORGE ISLAND.								
North	5,731	141	40.6	37.6	6,246	200	31.2	51.5
Staraya Artil	4,450	89	50.0	34.8	5,545	142	39.0	76.8
Zapadni	989	23	43.0	43.5	965	31	31.1	151.6
South	26	3	8.7	....	19	3	6.3	....
East Reef	1,047	30	34.9	60.0	1,585	73	21.7	60.3
East Cliffs	3,147	76	41.4	19.7	3,762	103	36.5	49.5
Total	15,390	362	42.51	35.08	18,122	552	32.82	64.13
St. Paul Island	88,137	1,789	49.27	30.52	98,855	2,948	33.53	77.27
St. George Island	15,390	362	42.51	35.08	18,122	552	32.82	64.13
Total, both islands	103,527	2,151	48.13	31.28	116,977	3,500	33.42	75.20

Yearlings.—Few yearlings were noted at the islands in 1916 prior to August 20. Many were smaller in body than the pups at the time the latter were just beginning to acquire the silvery gray pelage.

The number of yearlings in 1916 was calculated by making certain deductions from the number of pups born in 1915, as will be shown later in the statement of the complete census.

Two-year-olds.—The number of animals in this class was calculated by making certain deductions from the number of yearlings in the herd in 1915.

Three, four, five, and six year old males.—The number of animals in each of these four classes was also calculated from the 2, 3, 4, and 5 year old male classes, respectively, of the previous year. In determining the 4, 5, and 6 year old classes, no deductions were made for natural mortality in the preceding year. This loss is known to be small and is believed to be more than offset by ample deductions made for the first three years in the life of these seals.

Bachelor and young bull counts.—At the time of the height-of-the-season harem counting the seals on the several hauling grounds were counted, and the area occupied by them was plotted on Coast and Geodetic Survey charts. This area was found to have increased to a large extent over that of the previous year.

The enumeration of hauling-ground seals must be considered in the light of a check upon other methods of computation rather than as a method of obtaining definite figures. In the first place the counts can not be made simultaneously on all the rookeries unless more assistance be provided than is now available, and, secondly, precise information is not at hand as to the percentage of these seals which are on land at any one time. It was formerly believed that only about 20 per cent of the bachelors were on land at one time. If this be a correct assumption it would appear that the number of bachelors and young bulls deduced from the known birth rates is less than the number which actually exists and is, therefore, on the side of safety.

COMPLETE CENSUS OF FUR SEALS IN 1916.

Pups, as per count July 26 to August 15		116, 977
Breeding cows, 3 years of age and over		116, 977
Harem bulls, in active service, as per counts July 16 to 20		3, 500
Idle bulls, in position for harem service but without cows, as per counts July 16 to 20		2, 632
Yearlings, male and female:		
Pups, both sexes, born in 1915	103, 527	
Deduction for natural mortality in first year, 35 per cent	36, 234	
Yearlings, both sexes, in 1916	67, 293	
Yearling females, one-half of total yearlings	33, 646	33, 646
Yearling males, one-half of total yearlings	33, 647	
Yearling males killed in 1916	2	
Yearling males, Aug. 10, 1916		33, 645
2-year-olds, male and female:		
Pups, both sexes, born in 1914	93, 250	
Deduction for natural mortality in first year, 35 per cent	32, 637	
Yearlings, both sexes, in 1915	60, 613	
Deduction for males, 50 per cent	30, 307	
Yearling females in 1915	30, 306	
Deduction for natural mortality in second year, 20 per cent	6, 061	
2-year-old females in 1916		24, 245
Yearling males in 1915	30, 307	
Yearling males killed in 1915	2	
Yearling males at close of 1915	30, 305	
Deduction for natural mortality in second year, 20 per cent	6, 061	
2-year-old males in 1916	24, 244	
2-year-old males killed in 1916	75	
2-year-old males, Aug. 10 1916		24, 169

3-year-old males:		
Pups, both sexes, born in 1913	92,269	
Deduction for natural mortality in first year, 35 per cent	32,294	
Yearlings, both sexes, in 1914	59,975	
Deduction for females, 50 per cent	29,988	
Yearling males in 1914	29,987	
Deduction for natural mortality in second year, 20 per cent	5,997	
2-year-old males in 1915	23,990	
2-year-old males killed in 1915	353	
2-year-old males at close of 1915	23,637	
Deduction for natural mortality in third year, 4 per cent	945	
3-year-old males in 1916	22,692	
3-year-old males killed in 1916	3,290	
3-year-old males, Aug. 10, 1916		19,402
4-year-old males:		
Pups, both sexes, born in 1912	81,984	
Deduction for natural mortality in first year, 35 per cent	28,694	
Yearlings, both sexes, in 1913	53,290	
Deduction for females, 50 per cent	26,645	
Yearling males in 1913	26,645	
Yearling males killed in 1913	5	
Yearling males at close of 1913	26,640	
Deduction for natural mortality in second year, 20 per cent	5,328	
2-year-old males in 1914	21,312	
2-year-old males killed in 1914	16	
2-year-old males at close of 1914	21,296	
Deduction for natural mortality in third year, 4 per cent	852	
3-year-old males in 1915	20,444	
3-year-old males killed in 1915	3,056	
3-year-old males at close of 1915	17,388	
No deduction for mortality in fourth year.		
4-year-old males in 1916	17,388	
4-year-old males killed in 1916	1,961	
4-year-old males, Aug. 10, 1916		15 427
5-year-old males:		
Pups, both sexes, born in 1911[a]	75,000	
Deduction for natural mortality in first year, 35 per cent	26,250	
Yearlings, both sexes, in 1912	48,750	
Deduction for females, 50 per cent	24,375	
Yearling males in 1912	24,375	
Deduction for natural mortality in second year, 20 per cent	4,875	
2-year-old males in 1913	19,500	

[a] Bureau of Fisheries document No. 820, p. 35.

5-year-old males—Continued.		
Deduction for natural mortality in third year, 4 per cent	780	
3-year-old males in 1914	18,720	
3-year-old males killed in 1914	2,872	
3-year-old males at close of 1914	15,848	
No deduction for mortality in fourth year.		
4-year-old males in 1915	15,848	
4-year-old males killed in 1915	297	
4-year-old males at close of 1915	15,551	
No deduction for mortality in fifth year.		
5-year-old males in 1916	15,551	
5-year-old males killed in 1916	57	
5-year-old males, Aug. 10, 1916		15,494
6-year-old males:		
5-year-old males in 1915 [a]	11,271	
5-year-old males killed in 1915	99	
6-year-old males in 1916	11,172	
6-year-old males killed in 1916	5	
6-year-old males, Aug. 10, 1916		11,167
Recapitulation:		
Pups	116,977	
Breeding cows	116,977	
Harem bulls	3,500	
Idle bulls	2,632	
Yearling females	33,646	
Yearling males	33,645	
2-year-old females	24,245	
2-year-old males	24,169	
3-year-old males	19,402	
4-year-old males	15,427	
5-year-old males	15,494	
6-year-old males	11,167	
Total, all classes		417,281

BRANDED SEALS.

The seals branded when pups in 1912 continue to furnish valuable information along lines which require that animals whose ages are definitely known shall be available.

On St. George Island in the period from June 9 to August 10, 1916, both dates inclusive, there were observed in various drives 198 male seals bearing the 1912 brand. Of these 30 were killed. In order that no branded seal might be counted more than once each one of those not killed was when first counted marked by clipping the hair and fur from the left side of the head. When one of these clipped seals appeared in a subsequent drive, a record was made of

[a] Bureau of Fisheries document No. 834, p. 96.

the occurrence, and a total of 46 were so recorded. Branded animals were observed in nearly every drive. In the course of observations made on the rookeries on St. George Island in 1916, cows bearing the 1912 brand were seen in the harems in considerable numbers.

There were included in the 1916 shipment of sealskins from the Pribilofs 96 of these branded skins. After they had been received by Funsten Bros. & Co. at St. Louis additional records were made. The following table shows certain data secured at the Pribilof Islands and at St. Louis in regard to them and supplements similar data published in the corresponding report on the Alaska Fisheries and Fur Industries in 1915:

DATA ON CERTAIN MALE SEALS KILLED, 1913 TO 1916, BRANDED AS PUPS IN 1912.

YEARLINGS.

Serial No. of skins.	Date of killing.	Island.	Carcass weight.[a]	Carcass length.	Green-skin weight.		Salt-skin weight.[b]		Effect of salt.		Salt-skin length.[b]	Salt-skin width.[b]	Trade classification.[b]
									Gain.	Loss.			
			Pounds.	Inches.	Pounds.	Ounces.	Pounds.	Ounces.	Ounces.	Ounces.	Inches.	Inches.	
G 5157 [c]	Aug. 16, 1913	St. George	39.25	37	4	6	5	7.50	17.50		36	22	Middling pup.
G 5158 [c]	do	do	37.50	35.50	3	13	4	15	18		34	21	Small pup.
G 5155 [c, d]	Nov. 5, 1913	do	41.75	36	5	11	6	12	17		36	22.25	Middling pup.

TWO-YEAR-OLD.

Serial No. of skins.	Date of killing.	Island.	Carcass weight.	Carcass length.	Green-skin pounds	Green-skin ounces	Salt-skin pounds	Salt-skin ounces	Gain	Loss	Salt-skin length	Salt-skin width	Trade classification
G 5160 [c, d]	July 9, 1914	St. George	57.75	42	5	7	6	13	22		36	24	Middling pup.

THREE-YEAR-OLDS.

Serial No. of skins.	Date of killing.	Island.	Carcass weight.	Carcass length.	Green-skin pounds	Green-skin ounces	Salt-skin pounds	Salt-skin ounces	Gain	Loss	Salt-skin length	Salt-skin width	Trade classification
P 8477	Oct. 21, 1915	St. Paul	68.50	43	6	13	6	3.75		9.25	38	29.5	Small seal.
P 8478	do	do	67	45.50	6	5	5	15.50		5.50	37.50	29.75	Do.
P 8479	do	do	94	49	7	13	7	4.50		8.50	38.50	28	Do.
P 8480	do	do	68	45.75	6	7	6	2.25		4.75	35	27.5	Large pup.
P 8481	do	do	80.50	46	7	2	6	9		9	36	30	Do.
P 8482	do	do	66	42	7		6	4.75		11.25	34.50	27.50	Do.
P 8626	Oct. 26, 1915	do	66	45.50	7	9	6	14.50		10.50	38.50	28.25	Small seal.
P 8627	do	do	75	44.25	7	7	6	13		10	38.50	29.25	Do.
P 8628	do	do	58.50	43	6	7	6	.75		6.25	37	27.50	Large pup.
P 8629	do	do	59.50	43.75	6	6	6	.25		5.75	37	30.25	Small seal.
P 8630	do	do	65.50	42.25	6	12	6	5.50		6.50	37	28.25	Do.
P 8631	do	do	69.50	43.50	6	15	6	5.25		9.75	32.50	28.50	Middling pup.
P 8632	do	do	60	40	6	14	6	5.75		8.25	33.25	25	Do.
P 8633	do	do	74.50	47.75	8	8	8	2.75		5.25	33.75	32.5	Middling and small.
P 8753	Nov. 3, 1915	do	62	44	7	7	6	13.25		9.75	36	28.75	Large pup.
P 8754	do	do	53	43.75	7	4	6	13.75		6.25	34.50	23.50	Do.
P 9074	Nov. 11, 1915	do	95.75	46	9	11.25	10	.25	5		38.25	30.75	Small seal.
P 9630	Dec. 3, 1915	do	76	48.25	8	1.75	7	9.75		8	42	29.75	Middling and small.

FOUR-YEAR-OLDS.

P 9978	June 3, 1916	St. Paul	73	49.25	8	11	8	7.75		3.25	38.25	28.50	Small seal.
P 9979	do	do	103	50	12	8	12	9.50	1.50		45	32	Middling.
P 9980	do	do	62	45.25	7		6	13.75		2.25	40.75	27	Small seal.
P 9981	do	do	90	47.25	8	11	9		5		39.50	27.25	Do.
P 9982	do	do	85	48.50	9	4	9	3		1	45	29.50	Middling and small.
P 9983	do	do	102	51.50	11	2	10	14.50		3.50	39	31	Do.
P 9984	do	do	92	50.50	10	8	10	4.25		3.75	44.75	31.50	Middling.
P 9985	do	do	100	47	11	1	11	2.75	1.75		43.75	31.25	Middling and small.
P 9986	do	do	95	50.75	10	9	10	2.50		6.50	41	30.25	Do.
P 9987	do	do	90	47.50	11	12	11	10		2	42.50	33	Do.
P 9988	do	do	91	48.75	9	10	9	10			44.75	31	Do.
P 9989	do	do	78	51	7	11	7	6.75		4.25	40	28.25	Small seal.
P 10200	June 12, 1916	do	75.50	45.25	7	3	7	4.50	1.50		33.75	27.75	Middling pup.
P 10201	do	do	80.50	45.75	8	1	8	7	6		39.25	30.75	Small seal.
P 10202	do	do	87	48.75	9		8	10		6	39	33.50	Middling and small.
P 10203	do	do	95	51	10	9.50	10	12.50	3		41.75	34	Do.
P 10263	June 23, 1916	do	81.75	50	8		7	14.75		1.25	35.25	31.75	Large pup.
P 10264	do	do	81.50	50.50	8	8	8	4.50		3.50	35	31	Do.
P 10265	do	do	70.50	45	7	8	7	2.75		5.25	32	27.50	Small pup.
P 10627	June 30, 1916	do	76.50	42.75	7	10	7	14.50	4.50		34	27.25	Large pup.
P 10628	do	do	84	50	8	13	8	15.50	2.50		39	29	Middling and small.
P 10629	do	do	84	50.50	8	14	8	15.75	1.75		37.75	30	Small seal.
P 10630	do	do	90	48.50	8	6	8	4.25		1.75	37.75	29.25	Do.
P 10631	do	do	84	50	8	14	8	11.75		2.25	39	31.25	Middling and small.
P 10632	do	do	98	50.50	9	13	9	14.75	1.75		43.25	35	Middling.
P 11013	July 10, 1916	do	84	48	7	8	8	8.75	16.75		36.75	29	Large pup.
P 11014	do	do	74	48	8		7	14.50		1.50	38.25	28.50	Small seal.
P 11015	do	do	96	50	9		9	4	4		37.50	32.25	Do.
P 11016	do	do	55	40	6		6	4	4		33	26.25	Middling pup.
P 11017	do	do	85	51	9		9	1	1		34.50	27.25	Large pup.
P 11018	do	do	78.50	48.50	8		8	10.75	10.75		34	27.25	Middling pup.
P 11019	do	do	65.50	42	7		7	15	15		31.50	26.25	Small pup.
P 11497	July 15, 1916	do	86	48.50	10		9	14.75		1.25	37.50	28.50	Small seal.
P 11498	do	do	105	51	11		11	2.50	2.50		44	31.50	Middling.
P 11499	do	do	92	50	9		9	5.75	5.75		40.25	28.50	Small seal.
P 11500	do	do	91	46	9		8	15.75		.25	36	28.25	Large pup.
P 11595	July 22, 1916	do	80	47.50	8	8	8	4.50		3.50	39.25	29	Small seal.
P 11596	do	do	101	51	9		8	11.75		4.25	34.25	27.25	Large pup.
P 11597	do	do	106	51	10	8	10	6.75		1.25	39.75	32.25	Small seal.
P 11598	do	do	78	49	9		8	15		1	38	28.50	Do.
P 12072	July 26, 1916	do	87	47	9		8	8.50		7.50	34.50	32	Large pup.
P 12256	July 29, 1916	do	94.50	48.50	10		9	7.50		8.50	36	30	Do.
P 12498	Aug. 1, 1916	do	71.50	48.50	9		9				37	30	Do.

[a] Carcass weights of seals killed on St. George Island in 1913 and 1914 were obtained before the seals were bled; in 1915 and 1916, after the seals were bled.
[b] The salt-skin weights, salt-skin lengths, salt-skin widths, and trade classifications were obtained at St. Louis, Mo., in January, 1917.
[c] The skins bearing tag numbers G 5157, G 5158, G 5155, and G 5160 were referred to in the corresponding table in the report of the Alaska Fisheries and Fur Industries for 1915 as not having been shipped from St. George Island. These skins were forwarded in the 1916 shipment, hence complete data are now available as above indicated.
[d] Green-skin weight of skins bearing tag numbers G 5155 and G 5160 includes mask.

DATA ON CERTAIN MALE SEALS KILLED, 1913 TO 1916, BRANDED AS PUPS IN 1912—Continued.

Serial No. of skins.	Date of killing.	Island.	Carcass weight.[a]	Carcass length.	Green-skin weight.		Salt-skin weight.[b]		Effect of salt.		Salt-skin length.[b]	Salt-skin width.[b]	Trade classification.[b]
									Gain.	Loss.			
			Pounds.	Inches.	Pounds.	Ounces.	Pounds.	Ounces.	Ounces.	Ounces.	Inches.	Inches.	
P 12676	Aug. 11, 1916	St. Paul	105.50	53	10	....	9	12	....	4	37	31.25	Small seal.
G 3651	June 24, 1916	St. George	94.50	48	11	1	11	3.25	2.25	....	39	30	Do.
G 3652	do	do	80.50	47.50	13	4	12	12.25	....	7.75	38.75	27	Large pup.
G 3653	do	do	100	50	10	....	10	3.25	3.25	....	38.50	29	Small seal.
G 3851	June 27, 1916	do	90.50	44	10	12	10	14.25	2.25	....	37	30	Large pup.
G 3852	do	do	104.25	53	12	12	12	7.25	....	4.75	42	30	Middling and small.
G 3853	do	do	91.25	49	11	4	11	12.25	8.25	....	43.50	28.25	Do.
G 3854	do	do	61	42.50	8	8	8	9	1	....	38.25	27	Large pup.
G 3903	June 29, 1916	do	79	48	11	2	12	.25	14.25	....	41	28	Small seal.
G 3904	do	do	70.50	45.50	9	....	9	9.50	9.50	....	41	27	Do.
G 3905	do	do	76.25	48	9	12	9	15.25	3.25	....	41.75	26.50	Do.
G 3906	do	do	101.50	49.50	11	5	11	13	8	....	41.25	28.50	Middling and small.
G 3907	do	do	102	45	14	4	14	2.50	....	1.50	42.50	30	Do.
G 3908	do	do	79	45.50	10	15	11	1.25	2.25	....	41	27	Small seal.
G 4019	July 1, 1916	do	89	48.75	15	12	15	7.25	....	4.75	38.75	27	Do.
G 4020	do	do	102.75	48	16	10	16	2	....	8	37.75	27.25	Do.
G 4021	do	do	84	47	12	....	11	6.25	....	9.75	39.75	27.50	Do.
G 4022	do	do	99	48	19	....	17	9	....	23	41	29.50	Middling and small.
G 4023	do	do	79.50	50	11	8	11	15.25	7.25	....	36	30	Large pup.
G 4301	July 7, 1916	do	84	46.25	10	4	10	15	11	....	36.50	28	Do.
G 4302	do	do	83	46	11	6	11	6.50	.50	....	37	26	Do.
G 4370	July 11, 1916	do	85.50	50	14	2	13	6.50	....	11.50	40	27.50	Small seal.
G 4371	do	do	90	47.50	12	2	11	8	....	10	39	29	Do.
G 4372	do	do	66.50	46	9	4	10	2.25	14.25	....	38.75	25.50	Large pup.
G 4373	do	do	98.50	52	10	6	11	1.75	11.75	....	38.25	26	Do.
G 4664	July 12, 1916	do	86.50	45	11	....	12	1	17	....	40	28.50	Small seal.
G 4665	do	do	81	46	8	12	9	5.75	9.75	....	38	27	Large pup.
G 4666	do	do	102.50	48	12	2	12	1.25	....	.75	38.50	26.25	Do.
G 4667	do	do	84	46.75	8	4	9	3.75	15.75	....	37	29.25	Large pup.
G 4668	do	do	68	44.75	9	2	9	11.75	9.75	....	35	26.25	Do.
G 5023	July 15, 1916	do	79.25	45	9	8	9	7	....	1	32.50	24	Middling pup.

[a] Carcass weights of seals killed on St. George Island in 1916 were obtained after the seals were bled.
[b] The salt-skin weights, salt-skin lengths, salt-skin widths, and trade classifications were obtained at St. Louis, Mo., January, 1917.

FOXES.

The size of the blue-fox herds on St. Paul and St. George Islands remains fairly constant from year to year. The pelts generally become prime on both islands in the latter part of November and the pelage is at its best in December. The general method of taking foxes for the pelts by means of a large wire cage operated in connection with a house in which the animals are fed on St. George Island and by means of steel traps on St. Paul Island has been continued.[a]

Increased efforts to eliminate the white foxes from the herds have been made by allowing the natives, beginning with the season of 1915–16, the same credit for taking a white-fox pelt as for taking a more valuable blue-fox pelt.

The killing of foxes in the season of 1915–16 was continued into January, 1916, on St. Paul Island only, 22 blue foxes and 1 white fox having been killed in that month.

In the season of 1916–17 the killing of foxes was begun on St. George Island in November and on St. Paul Island in the latter part of December. Through December 31, 1916, 238 blue foxes and 2 white foxes had been taken on St. George and 83 blues and 21 whites on St. Paul. Telegraphic advices indicate that for the season 150 blue-fox pelts and 37 white-fox pelts were taken on St. Paul Island (including 1 blue and 1 white pelt taken from foxes found dead in February, 1917) and 417 blue-fox pelts and 2 white-fox pelts on St. George Island, or a total of 567 blues and 39 whites. These numbers make the season's take the largest of any in recent years.

Foxes supplied for breeding purposes.—In response to a request made by the Bureau of Biological Survey, Department of Agriculture, the Bureau of Fisheries agreed to furnish the Biological Survey with six pairs of blue foxes for use on an experimental fox farm located in the State of New York. The foxes were captured on St. George Island and were placed aboard the Bureau's supply vessel for transportation to Seattle. With the exception of two which died en route the animals were delivered at Seattle to an agent of the Bureau of Biological Survey. Along with these foxes there were shipped from St. George five other blue foxes, one of which died before reaching Seattle.

REINDEER.

In order that the herds may be brought into more definite relation with the general organization of the Department's activities on the islands, general plans for their future management were prepared early in 1916. The plans in part contemplate (1) the construction of suitable stone corrals, (2) the branding of animals, (3) the maintenance of a proper proportion of the two sexes, (4) the utilization of

[a] Details of the method appear in Bureau of Fisheries Document No. 820, p. 112.

animals for food, (5) the exchange of breeding animals between the two islands in order to maintain virility and prevent too close inbreeding, and (6) the utilization of skins.

St. George Island.—A census taken in August, 1916, showed that the herd on this island consisted of 31 fawns and 54 others aged 1 year and upward. In the early part of 1916 two males were killed and the meat distributed, principally among the native families. One of the reindeer dressed 204 pounds, the other 158 pounds.

It was not possible to undertake the building of a corral on St. George until in October when one was begun.

St. Paul Island.—The press of other work curtailed the amount of attention which it had been hoped could be given to the herd on this island. At the end of the year the herd numbered at least 111.

RADIO SERVICE.

Radio stations were maintained on St. Paul and St. George Islands by the Navy Department throughout the year. These stations render valuable assistance to the Bureau. For several months each year no other means of communicating with the islands are available.

In June various repairs and improvements were made by the Navy Department to the St. Paul radio station. Among these were the building of a tramway which, in connection with an extension made by the Bureau of Fisheries, will be of considerable use in the handling of sealskins and supplies. Natives were given employment by the Navy Department at the rate of 25 cents per hour, earning thereby over $750.

Employees at the radio station on St. Paul cooperated with the Bureau in many ways, including the overhauling and repairing of machinery and the pumping of water to the tanks from which the village of St. Paul is supplied. At the time the supply ship was being discharged two electricians were detailed to operate the launches used for towing the bidarras and skiffs in which supplies were transferred from the supply ship to the island and a third was detailed to operate a radio outfit which was temporarily installed on the ship. This temporary station was kept in operation throughout the period the cargo was being discharged at both islands and assisted materially in reducing the time required for the work.

At St. George Island natives were given employment by the Navy Department, for which they received about $240. During the year the employees of the Bureau and the Navy Department cooperated in various ways, to the advantage of both. Through the courtesy of the Navy Department a quantity of freight was transported from St. Paul to St. George.

PATROL OF THE NORTH PACIFIC OCEAN AND BERING SEA.

As in previous years, vessels of the Coast Guard exclusively were detailed to patrol the North Pacific Ocean and Bering Sea for the protection of the fur seals and sea otters in the season of 1916. This patrol work is required by section 9 of the act of Congress approved August 24, 1912, giving effect to the North Pacific Sealing Convention of July 7, 1911. The group of vessels detailed for the work is known as the Bering Sea fleet. In the season of 1916 the fleet consisted of the *Unalga*, the *Manning*, and the *McCulloch*. The commanding officer of the fleet was authorized to direct the cutter *Bear*, which was designated for the usual cruise in the Arctic Ocean, to perform any duty that would not interfere with her orders from headquarters for the Arctic cruise.

In addition to the patrol work for the protection of the fur seals and sea otters, the units of the fleet have many other duties to perform, including the enforcement of law generally, rendering assistance to judicial authorities, assisting vessels in distress, rendering help to natives in destitute or needy circumstances, and other duties with which the Coast Guard vessels are usually charged. The peculiar conditions which obtain in western Alaska bring about unusual need for these vessels.

The *Unalga* left Seattle for Unalaska on April 20 and returned to Seattle on August 18. The *Manning* left the Puget Sound Navy Yard May 12 for Unalaska and returned to that navy yard on September 21. The *McCulloch* left Sausalito, Cal., for Unalaska May 24 and arrived at Port Townsend, Wash., on the return trip October 18.

Close attention throughout the season was given to the possible violation of the North Pacific Sealing Convention by vessels operating within the waters covered by that convention, but no evidences of pelagic sealing nor of sea-otter hunting were observed.

Numerous courtesies were rendered to the Bureau by the various Coast Guard vessels in Alaskan waters, particularly in the way of transportation of persons, mail, and certain supplies to and from and between the Pribilof Islands. The Bureau is under obligation to the Coast Guard for such assistance and for the friendly and earnest spirit of cooperation shown at all times by the officers and men of that service.

SEALING PRIVILEGES ACCORDED ABORIGINES.

By the provisions of the North Pacific Sealing Convention of July 7, 1911, Indians, Aleuts, or other aborigines dwelling on the Pacific coast of North America north of the thirtieth parallel of north latitude are permitted to carry on pelagic sealing in canoes not transported by or used in connection with other vessels, and propelled entirely by oars, paddles, or sails, and manned by not more than five persons each, in the way hitherto practiced and without the use of firearms;

and provided that such aborigines are not in the employment of other persons, or under contract to deliver the skins to any person. By the act of Congress, approved August 24, 1912, giving effect to the convention, the privileges accorded to these aborigines were restricted by a provision which prohibited for a period of five years the killing of fur seals by any person in the waters of Alaska within the 3-mile limit.

The law provides that no skins taken from seals belonging to the American fur-seal herd of the North Pacific Ocean may be brought into the United States unless they are officially marked and certified as having been legally taken. The Department of Commerce has arranged for the marking and certifying of skins lawfully taken by Indians or other aborigines, and any skins taken by these people should be promptly reported so that the proper steps may be taken to authenticate them.

No fur-seal skins have been reported as having been taken by natives of Alaska in the year 1916.

Indians of the State of Washington took about 470 fur-seal skins in 1916. Dr. C. L. Woods, superintendent and physician, United States Indian Service, Neah Bay, Wash., at the request of the Bureau, marked and authenticated 380 of these skins as having been lawfully taken. The authenticated skins were taken from seals speared from canoes west of La Push, Wash., and a compilation of the records made in respect to these skins shows that 313 were taken from female seals and 66 from males, the sex of one not having been indicated.

SHIPMENT OF SKINS FROM PRIBILOF ISLANDS IN 1916.

Fur-seal skins.—The 1916 shipment of fur-seal skins, consisting of 4,282 skins from St. Paul Island and 2,779 from St. George Island, a total of 7,061 skins, was made from the Pribilof Islands in October. The skins were transported from the islands to Seattle by the steamer *Elihu Thomson*. From Seattle they were shipped by freight via the Northern Pacific Railroad to Funsten Bros. & Co., St. Louis. All of these skins remained on hand at the end of the year, December 31, 1916.

Fox skins.—The fox skins taken on St. Paul and St. George Islands in the season of 1915–16 (420 blues and 20 whites) were shipped from the islands on the Coast Guard cutter *Unalga* in June. They were taken by the cutter to Seward, from which point they were shipped by Wells Fargo & Co. Express to Funsten Bros. & Co., St. Louis, Mo.

SALE OF FUR-SEAL SKINS.

On September 20, 1916, there were sold at St. Louis, Mo., by Funsten Bros. & Co., 1,900 fur-seal skins taken at the Pribilof Islands. The skins sold for $74,530, an average of $39.23 each.

These skins before being sold had been dressed, dyed, and machined by the Gibbins & Lohn Fur Skin Dressing & Dyeing Co., and were the first of the Government's skins so treated to be offered for sale.

The prices obtained for the skins were considered satisfactory, especially in view of the fact that for several years the number of fur-seal skins available for the trade has been limited. Unless the supply of these skins is sufficient to justify furriers in efforts to maintain the demand for them, maximum prices can not be obtained under ordinary conditions.

The following table shows details in regard to the sale of these skins:

DETAILS OF SALE OF 1,900 DRESSED, DYED, AND MACHINED PRIBILOF ISLANDS FUR-SEAL SKINS AT ST. LOUIS, SEPTEMBER 20, 1916.

Lot No.	Number of skins.	Trade classification.	Price per skin.	Total for lot.
500	70	11 middlings and smalls; 59 smalls	$50	$3,500
501	70	11 middlings and smalls; 59 smalls	51	3,570
502	40	2 middlings; 5 middlings and smalls; 33 smalls	45	1,800
503	80	Large pups	36	2,880
504	80	do	37	2,960
505	80	do	39	3,120
506	80	do	42	3,360
507	80	do	39	3,120
508	80	do	40	3,200
509	80	do	43	3,440
510	80	do	43	3,440
511	90	Middling pups	36	3,240
512	90	do	38	3,420
513	90	do	38	3,420
514	90	do	39	3,510
515	90	do	39	3,510
516	90	do	35	3,150
517	90	do	36	3,240
518	90	do	36	3,240
519	90	do	38	3,420
520	90	do	40	3,600
521	90	Small pups	35	3,150
522	90	do	36	3,240
Total	1,900			74,530

The following table shows a summary of the trade classifications and the percentage of the total number in each class:

SUMMARY OF TRADE CLASSIFICATIONS AND PERCENTAGE IN EACH CLASS OF THE FUR-SEAL SKINS SOLD AT ST. LOUIS, SEPT. 20, 1916.

Trade classification.	Number in class.	Percentage.
Small pups	180	9.47
Middling pups	900	47.37
Large pups	640	33.68
Small seals	151	7.95
Middlings and smalls	27	1.42
Middlings	2	.11
Total	1,900	100.00

As stated in the corresponding report for 1915, there were 6,296 fur-seal skins from the Pribilof Islands on hand in the States on December 31, 1915. Nineteen hundred of these were sold September

20, 1916. The balance, 4,396, together with those shipped in 1916, 7,061, a total of 11,457, were on hand in the States December 31, 1916.

SALE OF FOX SKINS.

The fox skins shipped from St. Paul and St. George Islands in 1916 were sold at St. Louis by Funsten Bros. & Co. on September 20, 1916. The 420 blue-fox skins brought $20,242, or an average price of $48.20 each; and the 20 white-fox pelts $285, or an average price of $14.25 each.

The following table shows details in regard to the sale of these skins:

DETAILS OF SALE OF 420 BLUE-FOX SKINS AND 20 WHITE-FOX SKINS FROM PRIBILOF ISLANDS AT ST. LOUIS, SEPTEMBER 20, 1916.

Lot No.	Number of skins.	Trade classification.	Price per skin.	Total for lot.
Blue-fox skins:				
1	4	Ex. ex	$128.00	$512
2	12	I	75.00	900
3	12	II	66.00	792
4	14	II low	39.00	546
5	18	III	26.00	468
6	18	IV	15.00	270
7	17	9 V 8 skins	3.00	51
8	12	I blue	75.00	900
9	12	II blue	54.00	648
10	14	II low blue	42.00	588
11	14	III blue	23.00	322
12	18	IV blue	14.50	261
13	12	I pale	51.00	612
14	18	II pale	42.00	756
15	7	I ex. pale	40.00	280
16	4	Ex. ex	113.00	452
17	10	I	78.00	780
18	12	II	61.00	732
19	14	II low	40.00	560
20	10	I blue	66.00	660
21	12	II blue	51.00	612
22	14	II low blue	39.00	546
23	16	IV blue	13.00	208
24	4	Ex. ex	135.00	540
25	10	I	80.00	800
26	12	II	61.00	732
27	12	II	58.00	696
28	14	II low	42.00	588
29	10	I blue	74.00	740
30	12	II blue	48.00	576
31	14	II low blue	37.00	518
32	4	Ex. ex	125.00	500
33	10	I	80.00	800
34	12	II	54.00	648
35	12	II	54.00	648
White-fox skins:				
536	20	6 I 5 II 9 II stained	14.25	285
Total				20,527

SEIZURE OF FUR-SEAL SKINS.

In September, 1916, six fur-seal skins which had not been marked and authenticated as having been lawfully taken were seized at Juneau. Pursuant to an opinion by the solicitor for the Department they were delivered to the United States marshal at Juneau with the view of obtaining a decree of forfeiture from the courts.

MINOR FUR-BEARING ANIMALS.

FIELD WORK.

All the wardens in active service were detailed to field work in Alaska throughout the year. While it was expedient and desirable to utilize the services of some for brief periods in connection with patrol and other fisheries work and to detail one late in the year to the Pribilof Islands, the greater part of their time was devoted to work in connection with the minor fur-bearing animals.

The wardens concerned in enforcing the law and regulations for the protection of the fur-bearing animals of Alaska are shown in the list of employees in the introduction.

One warden, C. F. Townsend, was detailed throughout the year in the interior of Alaska, with headquarters at Fairbanks. To indicate to some degree the extent of territory under the supervision of wardens in the interior of Alaska the following trips are cited: Between January 29 and February 15 a trip was made with dog team from Fairbanks to Kaltag, following the valleys of the Tanana and Yukon Rivers, a distance of approximately 600 miles one way. Fairbanks was reached on the return trip March 12. In the latter part of the month a trip was made to the Wood River region. In the first part of April a trip was made from Fairbanks to Circle and return. It had been planned to extend this trip to Fort Yukon, but information received at Circle to the effect that the trails were breaking up and were dangerous made a curtailment seem advisable. In the summer season a trip was made from Fairbanks to St. Michael, thence to Fort Yukon, and from there to Fairbanks. This trip was made on launches and steamers and stops were made en route at trading posts and Indian villages whenever possible. The total distance traveled on this trip was approximately 3,000 miles.

Wardens Brown and Baker were stationed in the Bristol Bay region during the winter of 1915–16, with headquarters on the Nushagak River. Four months, from January 11 to May 11, 1916, were spent in travel, in the course of which it is estimated that one warden covered 1,400 miles and the other 1,170. Reindeer and dogs were used for transportation. The itinerary included Koggiung, on the Kvichak River, Naknek, Ugaguk, Ugashik, a trip up Kvichak River and Iliamna Lake to the Indian village of Iliamna at the head of that lake, including visits at Kaskanak and Nogheling and Becharof Lake. Fur was inspected, natives were given instructions in regard to regulations, and attention was given to complaints of illegal trapping and poisoning of fur-bearing animals.

Warden Larson was employed throughout the year in the eastern part of Alaska, with headquarters at Chicken. Until the latter part of the year this warden was employed in a temporary capacity and only a moderate allotment was made for field work. The territory which may be covered, however, from this point as a center by a capable warden who is experienced in field work in Alaska is considerable, and it is hoped that it will be possible to give more attention to the fur-bearing animals in this part of Alaska in the future.

REGULATIONS.

The only change made in the year in the departmental regulations for the protection of the minor fur-bearing animals in Alaska was that which gives complete protection to martens from March 15, 1916, to November 15, 1921. The affording of this protection to the martens appears to have met with entire approval. Comment has been made, however, that the prohibition upon the taking of martens will cause trouble for the alleged reason that traps set for minks and ermines will capture martens. The Bureau has been disposed to believe that trappers need not experience much difficulty in this matter. As a general proposition, minks are trapped mostly along watercourses, while martens are taken on higher grounds, and ermines are taken in the course of trapping for other animals and are not made an object of special pursuit. In any event the Bureau is firmly of the opinion that martens in Alaska must receive for a period of years greater protection than has been accorded them in recent years. It may be that experience will show that some further steps are desirable in order to secure in the best way this protection.

It developed that some persons were retaining legally-taken marten pelts in their possession in Alaska, and in order that they might not be embarrassed in case they wished to ship these from Alaska the Bureau, acting upon the suggestion of a warden, arranged for the recording of all pelts which the owners proposed to retain in Alaska after November 15, 1916. All shipments of marten pelts made after November 15, 1916, will be checked against these records. Through March 31, 1917, 58 reports were received, recording 3,031 pelts.

SHIPMENTS OF LIVE FUR-BEARING ANIMALS FROM ALASKA.

Aside from 17 blue foxes shipped from the Pribilof Islands by the Bureau, the only live fur-bearing animals shipped from Alaska in the calendar year 1916 were 12 cross and 2 silver foxes consigned by J. R. Gibson, Copper Center, to the Alaska Fur and Silver Fox Co., North Bend, Wash.

SEIZURES AND PROSECUTIONS.

Acting on cumulative evidence at hand, Wardens Baker and Brown on March 21, 1916, had a warrant sworn out for the arrest of Christ Hansen, against whom complaints had been made charging him with the use of poison for the taking of foxes in the Iliamna Lake region. Hansen was arrested four days later 110 miles from Iliamna and brought to that place. On arraignment the defendant pleaded not guilty and asked for a trial by jury. The jury and witnesses were secured and the case was tried April 1.

From the records of the Bureau it appears that the defendant had been trapping in the vicinity of Big Tulare Creek, a tributary of Iliamna Lake, in the season of 1915-16; that on December 5, 1915, he scattered along a trail leading up Big Tulare Creek two certain pieces of meat which had evidently been spread with poison; that these two pieces of meat were recovered by a witness, who testified in court, and were taken by him and fed to a worthless dog at the Government reindeer station on Big Tularo Creek; that the dog was immediately seized with convulsions and died within 20 minutes after swallowing the meat; that a dead fox and the body of a dead raven which had fed off the stomach and part of the side of the fox were found in the trap-run trail of the defendant running down the shore of the lake from the mouth of Big Tulare Creek; that the condition of the snow pointed to the fox having eaten something along the trail, and the state of the snow showed that it had died in convulsions; that the body of the raven, found a few feet away from the fox, and which had died after eating either of the fox or what the fox had eaten of, as well as the body of the fox were recovered and taken to the Government reindeer station at Big Tulare Creek. Witnesses testified to seeing the defendant on these trap-run trails, to seeing him standing in a suspicious attitude on the trail of one of his lines, and going there after he had left and finding meat that subsequently proved to be poisoned as aforesaid. The defense made no denials, and when the case went to the jury it returned in a few minutes a verdict of not guilty.

The two wardens took up the case at the instance of United States Commissioner L. H. French, who was also an assistant superintendent of education for this region. The case first came to his attention and he informed them that it was the strongest and one of the best upon which to secure a conviction that had come under his observation in the many years he had been in the Bristol Bay region. While there was a failure to secure a conviction, it is thought that the prosecution of the case has had a good moral effect.

In April, 1916, the pelts of four cross foxes were seized at Tanana Crossing, a small trading post in the eastern part of Alaska. The foxes from which the pelts were taken had been captured in the open season and subsequently killed.

On March 14, 1916, the matter of an alleged poisoning of foxes was brought to Warden Hemenway's attention at Tanana. An Indian had brought from the Tozi flats two foxes which he claimed were poisoned, and he also had a quantity of baits which he had picked up on the Tozi flats. Examination of the foxes and the baits disclosed strychnine in both. The stomachs of the foxes also contained some of the same kind of food as that of which the baits were made. There were no trap marks on the legs of the foxes. A trip was then made to the Tozi flats by Mr. Hemenway. On the way the remains of two dead foxes were found. Near a camp where two persons, H. Ross and A. Crane, had trapped, the carcass of a fox was found. The remains of the three foxes found on the trip were taken to Tanana. Poison was found in the carcass which had been obtained at the camp of Ross and Crane. Ross was arrested at Tanana and being brought into court pleaded not guilty and requested a jury trial. The case was tried on April 11 and the jury acquitted the defendant. The charge against Crane was dismissed by the court.

Fifty-seven beaver skins found among the effects of one Thomas Phillips, who was murdered on the Kuskokwim River in May, 1916, came into the possession of Dr. W. F. Green, United States commissioner, Tokotna. The killing of beavers in Alaska at any time being unlawful, instructions were issued to have the skins forwarded to agents of the Department for sale for the account of the Government.

FOX FARMING.

KODIAK-AFOGNAK REGION.

Many of the fox-farming operations which were undertaken in this region a few years ago were the result of the demand which came from the eastern part of Canada for live animals for use for breeding purposes. With the subsidence of this demand operators who had not made the production of fur the principal object of their work have lost interest to a certain extent and have either abandoned their efforts or have continued to carry them on in a more or less desultory fashion. There are, however, some fox farmers in this region whose operations were not dependent upon the demand for live foxes and these are continuing their work. In general the ones who have secured the best immediate returns are those who have had stock running wild and have trapped from it within the bounds of its natural increase. The following information in regard to fox farming in this region has been furnished the Bureau:

In 1916 operations were continued by the Kodiak Fox Farm on Long Island, Carlson & Smith at Uyak Bay, Peter J. Petrovsky on Amok Island, Alex Friedolin on Hog Island, Frank Lowell on

Ugaiushak Island, John Tashwak on an island in Marmot Bay, I. P. Chichenoff on an island near Kodiak, August Olson on Ugak Island, and Albert Johnson on Harvester Island.

Since Charles W. Pajoman became joint owner with Charles Peterson of the fox farm on Bare Island (locally known as Dry Island and so designated in the report on the Alaska Fisheries and Fur Industries for 1915), situated in Kupreanof Straits and about 1½ miles from the nearest point of Kodiak Island, a corral about 60 feet square of galvanized wire has been built. The side walls were made about 7 feet high and the top was completely covered with galvanized-wire netting.

Ingwald Loe, after having been engaged for a number of years in unsuccessful attempts to rear blue foxes in corrals on Raspberry Island, sold his stock in 1915. After having formed a partnership with Charles W. Pajoman a stock consisting of three pairs of silver foxes and two pairs of cross foxes were placed in corrals on the island. Three pairs produced young in 1916, two litters of three pups each and one of four.

M. D. Snodgrass and associates, in addition to using Kalsin Island, about 12 miles from Kodiak, have occupied Queer Island, about one-fourth mile from Kalsin Island. A few cross foxes had previously been released on this island and in 1916 nine adult silver foxes were placed there. It is not known that any young foxes were born on either Kalsin or Queer Islands in 1916. Mr. Snodgrass and his associates have also taken up Nelsons Island, near Uzinki, but down to the fall of 1916 had not placed any foxes on it.

Frank Peterson continued his fox-farming operations on an island near the mouth of Ayakulik River. The foxes run at large. In the report on the Alaska fisheries and fur industries for 1915 it was stated that the island was near the mouth of Red River. Locally the names of these two rivers are confused. Red River proper is about 7 miles north of Ayakulik River. In September, 1916, Mr. Peterson reported a litter of five young silver grays.

Otto Kraft & Co. purchased several foxes in 1916 and placed them on two small islands, Svitlak and Middle, in Kalsin Bay, about 15 miles from Kodiak. Nine silver-gray foxes were liberated on Svitlak Island. Middle Island, which is separated from Svitlak by a channel of about 500 yards in width, was stocked with 16 cross and 2 red foxes. A cabin for the use of a caretaker was built on Svitlak and arrangements were made for providing food for the foxes.

Alexander Lukin placed four silver foxes on one of the Noisy Islands, Uganik Bay, in the winter of 1914–15. The following winter one cross and one silver fox were added to the stock. The foxes were all adult animals when captured and were taken in the course of ordinary trapping in the open season.

TANANA AND YUKON RIVERS.

It appears that many of those who were engaged in fox farming along these rivers in 1915 continued their work in 1916. While in cases some degree of success was had and some improvements were made to equipment, the results as a whole have not been encouraging.

In December, 1916, George L. Morrison, Hot Springs, had 27 pairs of foxes in his pens, most of which were silver grays. In the year 13 litters of young were raised and with but slight loss. At the Tolovana Fox Farming Co. (Vachon farm), Tolovana, 40 foxes were on hand in December after the stock had been reduced by the killing of 36 foxes.

MISCELLANEOUS FOX FARMING.

Oscar Olsen, of Unga, has begun operations on Big Koniuji Island, one of the Shumagin group. In the latter part of 1916 he reported having placed on the island 13 pairs of red foxes and that he expected to continue to place foxes there until he had about 30 pairs.

Harry Olsen, of Sand Point, reported that he expected to place several pairs of blue foxes on Andronica Island for propagation purposes.

Andrew Grosvold, of Sand Point, Popof Island, in addition to his fox-farming operations on numerous other islands of the Shumagin and Sannak groups, has built corrals on Popof Island. The land selected is well drained and is broken by ledges of loose rock in which the foxes make their own burrows. The inclosures are large compared with most corrals, each covering a half acre or more. The expense connected with this method of impenning foxes is slight.

L. G. Michael, of Franklin, reported in August, 1916, that he had a stock of 1 silver, 5 cross, and 8 red foxes. One fox raised in 1915 had given birth to 6 young ones.

W. H. Newton, of Healy River (Richardson post office), has been interested in fox farming for some time.

Joseph Voelkl, Eighteen Mile Post, Haines, reported a stock of 12 foxes, 4 of which were young.

James York, of Sumdum, has operated a blue-fox farm on Sumdum Island, southeastern Alaska, for several years. The foxes live practically in a wild state and their number can not be definitely ascertained.

Information in regard to islands leased by the Department of Commerce for fur-farming purposes is furnished elsewhere in this report.

FUR-FARMING POSSIBILITIES IN SOUTHEASTERN ALASKA.

From a report submitted by Inspector Walker the following information in regard to certain observations on the possibilities in fur farming in southeastern Alaska is extracted:

Due perhaps to the smaller prices received for furs, especially for fox pelts in the past two or three years, active interest in fur farming in this region has suffered a decline, but this certainly is only a temporary lessening of interest, and it is believed that in time this line of activity will be one of the important industries of the district.

There is no satisfactory information at hand as to all the fur farms operating in the region; indeed, most of them can scarcely be termed fur farms as yet, there being in some cases but one or two animals in restricted and improper quarters. In the Chilkat Valley some attention has been given to fox farming, the attempts being made by taking the young from the dens in the spring. There have resulted several small undertakings of this sort, some of which seem to be promising. A few other animals, minks and perhaps some martens, are also kept in the valley. It is felt that the Chilkat Valley will some day become the "Prince Edward Island" of the North Pacific, as it possesses unusual natural advantages for fur farming, especially fox raising. Some of these advantages are: A climate approaching that of an interior country in that it is clear and cold in winter and warm and dry in summer; the rainfall is the smallest of any portion of southeastern Alaska; there is an easily accessible food supply as the fish are, or should be, abundant in the Chilkat River, which flows through the valley; there is perfect drainage by reason of the sandy soil; large and permanent pens may easily be constructed because the sandy soil is underlaid at an average depth of about 3 feet by a hard subsoil of clay, through which foxes could scarcely dig out under the fences; the valley is easy of access in both summer and winter; it is the natural home of the fox and in a region in which melanism is prevalent, thus producing a considerable percentage of dark individuals even from red parents.

In addition to the fox farms in the Chilkat Valley it is understood that an attempt is being made to introduce red stock on Sokoi Island, near Petersburg. This island was formerly held for use as a blue-fox ranch. In this connection it is believed that the red-fox species will not prove profitable on the islands of this region as they are not native to such climatic conditions as prevail in the way of excessive rainfall and wet underbrush and moss. Also it is believed that the effect of the salt-water atmosphere, which coarsens the fur and makes it less brilliant, will be experienced, thus reducing the value of the skins even though the animals should thrive, which is greatly doubted. A blue-fox ranch on Sumdum Island is conducted by James York with apparent success. The number of foxes on this island can scarcely be guessed at as they live in practically a wild state. This is the only island fox ranch in the district as yet upon a stable footing.

The food supply available on the islands suitable for fur farming in southeastern Alaska is almost unlimited, and the breeding of otters, minks, and martens will certainly be undertaken in the future by numerous parties. The business if properly handled will undoubtedly prove to be profitable.

It is believed that whenever a fur farm has reached an established status it should be as free from restrictions and regulations as the cattle and stock ranches in the same region would be in respect both to the killing and to the exportation of the animals, for they are certainly as much domestic stock as are the cattle and horses raised by man.

At present the difficulty of obtaining title to land within the national forest deters many from attempting elaborate undertakings. There should be some provision by which persons could secure an entire small island for fur farming so that they would not be compelled to fence to retain the animals on their own grounds.

MARTEN AND MINK FARMING.

Some attention is being given in Alaska to the problem of domesticating martens and minks. John Fanning, of McHenry Anchorage, Etolin Island (Wrangell post office), has concerned himself with both species. For a while they were kept in pens on his farm, but the martens, five males and nine females, were later turned loose on a small island of about 4 acres in area. The island is rough and timbered and affords excellent hiding places and ample freedom, and at the same time the animals are as secure as if kept in close confinement. In October he reported that he felt safe in stating that he had secured an average of three young martens for each of the females. At that time the young ones were almost as large as the old ones. Joseph Voelkl, Eighteen Mile Post, Haines, is interested in minks in connection with his fox-farming work.

BOUNTY ON WOLVES.

At the second session of the Alaska Legislature an act was passed, approved March 31, 1915, placing a bounty of $10 on each wolf killed in Alaska. Before the bounty may be paid on any animal it is required that certain portions, including the pelt properly prepared for sale, shall be forwarded to the Territorial treasurer, together with an affidavit in prescribed form, by the person who took the animal. The affidavit includes a statement to the effect that no poisons or other means that might cause the wanton destruction of any fur-bearing animals were used in taking the wolf for which the bounty is claimed. The treasurer is required to hold from time to time sales of the pelts which come into his keeping and to apply the proceeds of the sales first to the expense of caring for and disposing of such pelts and next to the payment of the bounties. He is further instructed to cause to be destroyed any skins which may prove to be worthless and unsalable. Penalties are provided for the making of any false affidavit for the purpose of fraudulently obtaining money under the provisions of the act. The biennial report of the Territorial treasurer for the two years ending December 31, 1916, showed that $1,250 had been paid in bounties on 125 wolves.

SHIPMENT OF FURS FROM ALASKA.

The Department requires that each shipment of furs from Alaska shall be reported to the Bureau of Fisheries. The reports are chiefly of value from a statistical standpoint, though at the same time they furnish useful information for other purposes. Two forms are distributed by the Bureau for the use of shippers in making their reports. One form is for use in reporting shipments made by mail; the other for shipments made otherwise than by mail—i. e., by express, freight, personal baggage, etc.

The following table shows the detailed statistics as compiled from information furnished the Bureau in regard to the furs shipped from Alaska in the years ending November 15, 1914, November 15, 1915, and November 15, 1916, respectively. The collector of customs at Juneau has rendered valuable assistance in the matter of checking statistics of his office with those of the Bureau.

FURS SHIPPED FROM ALASKA IN 1914, 1915, AND 1916.[a]

Species.	Year ended Nov. 15, 1914.			Year ended Nov. 15, 1915.			Year ended Nov. 15, 1916.		
	Number of pelts.	Average value.	Total value.	Number of pelts.	Average value.	Total value.	Number of pelts.	Average value.	Total value.
Bear:									
Black	663	$12.57	$8,333.91	739	$7.50	$5,542.50	1,129	$9.00	$10,161.00
Brown	32	9.00	288.00	20	7.50	150.00	41	7.50	307.50
Glacier	3	22.50	67.50	3	50.00	150.00	5	50.00	250.00
Grizzly				20	20.00	400.00	14	14.00	196.00
Polar	104	40.00	4,160.00						
Beaver	10	10.00	100.00	[b]70	10.00	700.00	[c]37	6.50	240.50
Ermine	6,873	.96	6,598.08	3,538	.60	2,122.80	4,345	.80	3,476.00
Fox:									
Black	13	253.00	3,289.00	8	400.00	3,200.00	26	250.00	6,500.00
Blue	239	46.59	11,135.01	382	50.00	19,100.00	659	50.00	32,950.00
Blue, Pribilof Islands	256	112.49	28,797.88	253	112.49	28,459.97	420	48.20	20,242.00
Cross	1,380	14.24	19,651.20	1,360	12.00	16,320.00	2,508	25.00	62,700.00
Red	14,967	9.80	146,676.60	11,770	8.00	94,160.00	15,711	12.00	188,532.00
Silver gray	153	147.30	22,536.90	187	150.00	28,050.00	318	150.00	47,700.00
White	6,530	12.93	84,432.90	5,967	13.00	77,571.00	6,178	20.00	123,560.00
White, Pribilof Islands	25	23.94	598.50	40	23.94	957.60	20	14.25	285.00
Hare, Arctic	1,263	.40	505.20	51	.10	5.10	1,090	.15	163.50
Lynx	6,930	12.35	85,585.50	9,374	8.00	74,922.00	21,608	12.00	259,296.00
Marten	6,497	7.56	49,117.32	3,028	6.00	18,168.00	3,100	9.00	27,900.00
Mink	35,623	4.46	158,878.58	23,073	2.00	46,146.00	22,255	4.00	89,020.00
Muskrat	101,202	.33	23,396.66	32,933	.15	4,939.95	101,827	.35	35,639.45
Otter:									
Land	1,008	10.70	10,785.60	980	8.00	7,840.00	1,330	15.00	19,950.00
Sea	[d]1	200.00	200.00				[d]1	500.00	500.00
Seal, fur, Pribilof Islands	2,893	30.00	86,880.00	3,000	30.00	90,000.00	7,061	30.00	211,830.00
Squirrel	662	.08	52.96	167	.05	8.35	214	.10	21.40
Wolf	44	7.00	308.00	51	4.00	204.00	57	7.00	399.00
Wolverine	136	11.44	1,555.84	119	7.00	833.00	297	6.00	1,782.00
Total			763,931.14			519,950.27			1,143,601.35

[a] The corresponding tables in the reports for 1914 and 1915, Bureau of Fisheries Documents Nos. 819 and 834, did not include shipments of blue-fox, white-fox, or fur-seal skins from the Pribilof Islands.
[b] Confiscated pelts.
[c] Thirty-three shipped under permit.
[d] Found dead.

LEASING OF ISLANDS FOR FUR FARMING.

The Department of Commerce is authorized to lease for fur-farming purposes certain islands off the coast of Alaska, and a few leases have been executed from time to time.

In 1916 the lease of Carlson (Crafton) Island to the Moose Bay Fur and Trading Co. was canceled. Marmot Island, located near Afognak Island, was leased to O. L. Grimes, of Afognak, for a period of five years commencing September 1, 1916, at an annual rental of $200 per year.

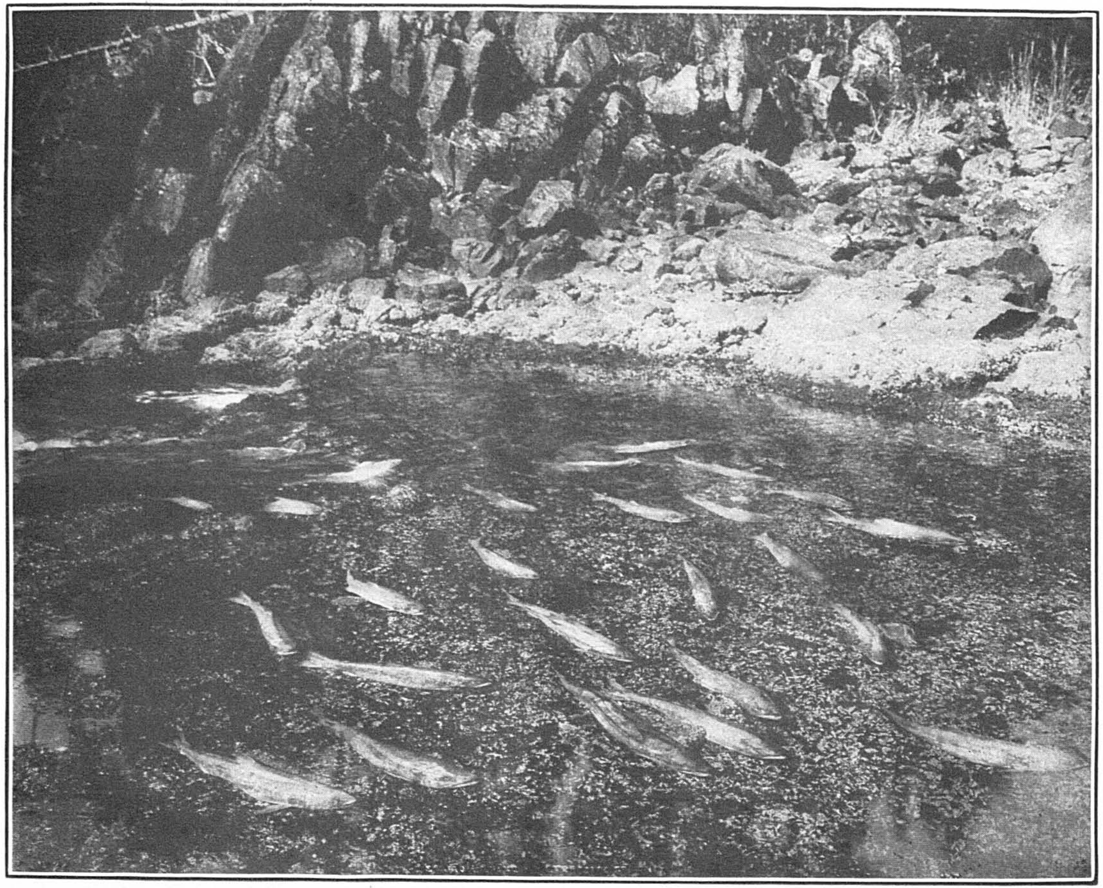
Marmot Island is located just outside the Afognak Reservation. It is approximately 6 miles long and 1½ miles wide and is rather inaccessible, there being no harbors. The Semidi Propagating Co. at one time occupied it for fox farming. Mr. Grimes expected to stock the island with foxes and had also considered the advisability of introducing minks.

The islands under lease on December 31, 1916, were as follows:

Island.	Annual rental.	Lessee.
Middleton	$200	Joseph Ibach, Valdez, Alaska.
Simeonof	250	J. C. Smith, Sand Point, Alaska.
Little Koniuji	205	Andrew Grosvold, Sand Point, Alaska.
Marmot	200	O. L. Grimes, Kodiak, Alaska.

PROPOSED LEGISLATION.

On January 29, 1916, Hon. J. W. Alexander introduced a bill (H. R. 10393, 64th Cong., 1st sess.) to redistribute jurisdiction of the Secretary of Commerce and the Secretary of Agriculture over the protection of fur-bearing animals in Alaska, and for other purposes. The bill included provisions for transferring to the Secretary of Agriculture the powers and duties now conferred upon the Secretary of Commerce in respect to protecting fur-bearing animals in Alaska, fur seals and sea otters excepted, and in respect to leasing certain islands in Alaska for use for fur-farming purposes. The bill also provided for transferring to the Secretary of Commerce the jurisdiction now exercised by the Secretary of Agriculture and the Governor of Alaska in respect to walruses and sea lions. It was expressly stipulated that nothing in the proposed act should affect existing laws vesting in the Secretary of Commerce jurisdiction over the Pribilof Islands and the fur-bearing animals thereon.



SALMON ON THE SPAWNING BEDS.

PACIFIC SALMON FISHERIES

By John N. Cobb

Appendix III to the Report of the U. S. Commissioner of Fisheries for 1916

CONTENTS.

PACIFIC SALMON FISHERIES.

By John N. Cobb.

INTRODUCTION.

The most valuable commercial fisheries in the world, excepting only the oyster and herring fisheries, are those supported by the salmons. Of these the most important by far are the salmon fisheries of the Pacific coast of North America, where California, Oregon, Washington, and Alaska, including also British Columbia, possess industries representing millions of dollars of investment and millions of output annually. In Siberia the fishery is increasing in importance annually as means of transportation become better, while Japan is also becoming a large factor in the salmon markets of the world through her investments in the salmon fisheries of Siberia and, to a lesser extent, through fisheries prosecuted in her own waters.

In this revised report[a] considerable new material has been added, while some of the chapters have been entirely remodeled and materially enlarged. The statistical data have been brought up to January 1, 1916.

[a] The salmon fisheries of the Pacific coast. By John N. Cobb. Bureau of Fisheries document no. 751, 180 p. 1911.

I. THE SPECIES OF SALMON AND THE RUNS.

The Pacific coast salmons are all included in the genus *Oncorhynchus*. With them the fishermen incorrectly class the steelhead trout, which really belongs to the closely related genus *Salmo*.

As long ago as 1731 the species of *Oncorhynchus* were first made known by Steller, who, almost simultaneously with Krascheninikov, another early investigator, distinguished them with perfect accuracy under their Russian vernacular names. In 1792 Walbaum adopted these vernacular names in a scientific nomenclature for these fishes.

Five species of salmon (*Oncorhynchus*) are found in the waters of the north Pacific, ranging northward from Monterey Bay on the American coast and Japan on the Asiatic, the extreme northern distribution of certain of the species having not yet been accurately determined. The five species are: (1) *Oncorhynchus tschawytscha*, quinnat, tyee, chinook, spring, or king salmon; (2) *Oncorhynchus nerka*, blueback, red, sukkegh, or sockeye salmon; (3) *Oncorhynchus kisutch*, silver, coho, or white salmon; (4) *Oncorhynchus keta*, dog, keta, or chum salmon; and (5) *Oncorhynchus gorbuscha*, humpback or pink salmon.

CHINOOK, QUINNAT, OR KING SALMON.

The largest, best known, and most valuable of these is the chinook or king salmon (*O. tschawytscha*). It is found throughout the region from the Ventura River, Cal., to Norton Sound, Alaska, and on the Asiatic coast as far south as northern China. As knowledge extends, it will probably be recorded in the Arctic.

In the spring the body is silvery, the back, dorsal fin, and caudal fin having more or less of round black spots, and the sides of the head having a peculiar tin-colored metallic luster. In the fall the color is, in some places, black or dirty red. The fish has an average weight of about 22 pounds, but individuals weighing 70 to over 100 pounds are occasionally taken. One was caught near Klawak, Alaska, in 1909 which weighed 101 pounds without the head. The Yukon River is supposed to produce the finest examples, although this supposition is not based on very reliable observations. The southeast Alaska fish average as high as 23 pounds in certain seasons, followed by an average of about 22 pounds in the Columbia River and about 16 pounds in the Sacramento.

In most places the flesh is of a deep salmon red, but in certain places, notably southeast Alaska, Puget Sound, and British Columbia,

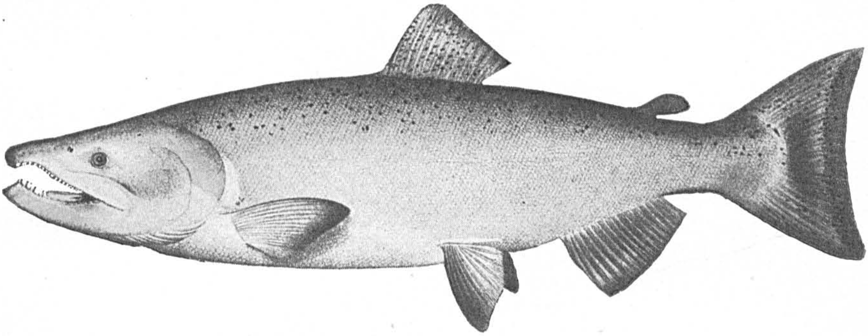


FIG. 1.—CHINOOK SALMON. BREEDING MALE.

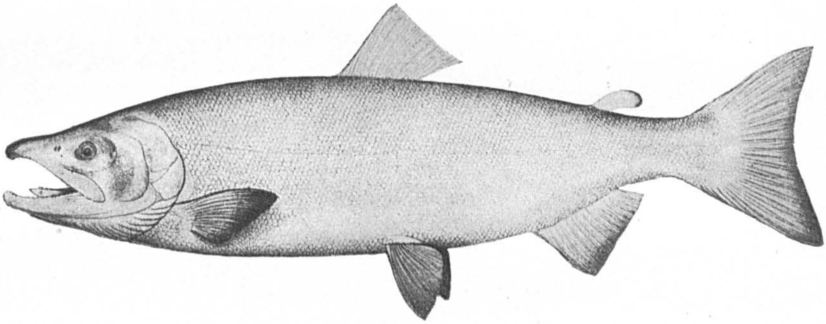


FIG. 2.—SOCKEYE SALMON. ADULT MALE.

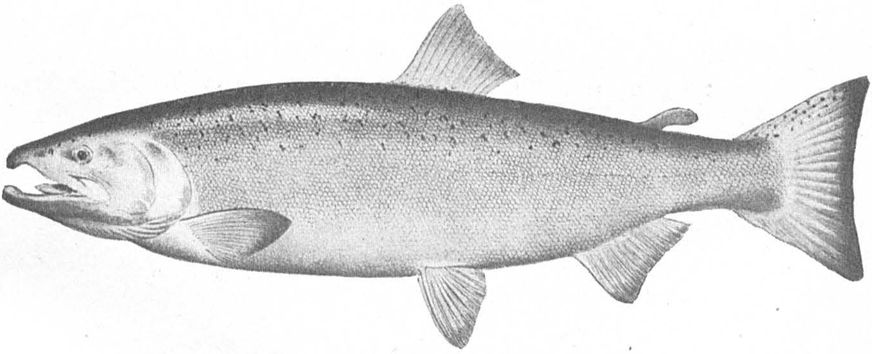


FIG. 3.—SILVER SALMON. BREEDING MALE.

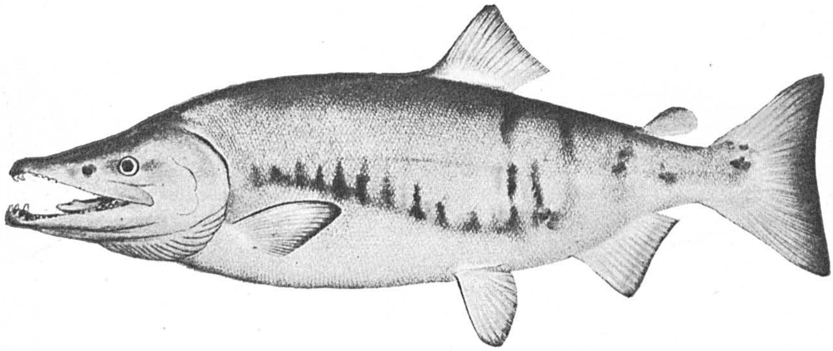


FIG. 1.—CHUM SALMON. BREEDING MALE.

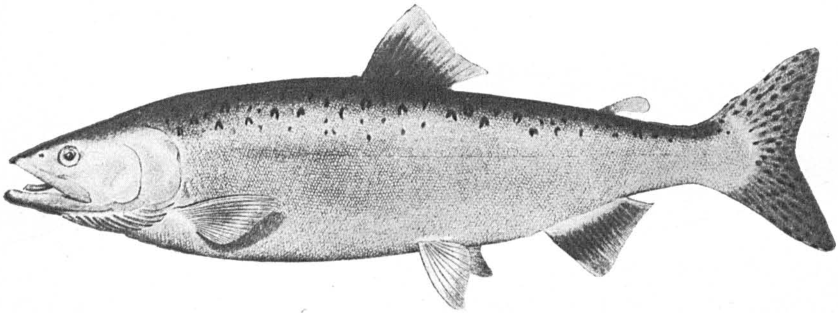


FIG. 2.—HUMPBACK SALMON. ADULT MALE.

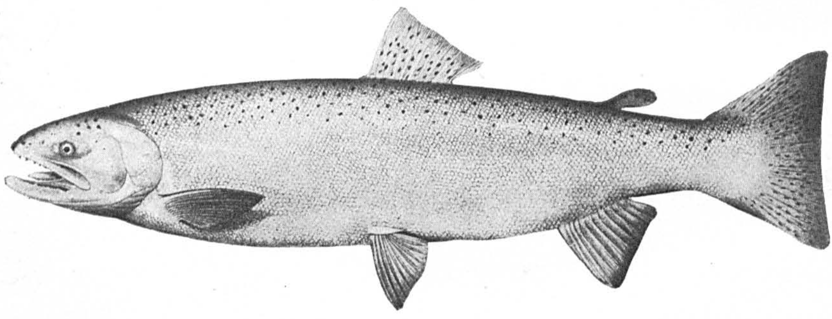


FIG. 3.—STEELHEAD TROUT.

many of the fish, the proportion being sometimes as much as one-third of the catch, have white flesh. A few examples have been taken with one side of the body red and the other white, while some are found with mottled flesh. No reasonable explanation of this phenomenon has yet been given.

In its southern range the quinnat strikes in at Monterey Bay in sufficient numbers to justify commercial fishing about the middle of April, where it is seen feeding upon the inshore moving schools of herring and sardines, continuing until in August. There are two runs of spawning fish in the Sacramento, the first or "spring run" beginning in April and continuing throughout May and June, these fish spawning mainly in the cold tributaries of the Sacramento, such as the McCloud and Fall Rivers. The second or "fall run" occurs in August, September, and October, and these fish spawn in the riffles in the main river between Tehama and Redding, also entering the tributaries in that vicinity. The two runs merge into each other. It is also claimed that there is a third run which comes in December.

In former years the San Joaquin and the American and Feather Rivers of the Sacramento system had large runs of salmon, but excessive fishing and the operation of various mining and irrigation projects have practically depleted them.

The Eel and Mad Rivers of northern California have only a late or fall run, while the Klamath River has both a spring and a fall run, and Smith River has a spring run alone. Rogue River in Oregon has both a spring and a fall run, and the Umpqua and several other coast streams of Oregon have small early runs.

The Columbia River has three runs, the first entering during January, February, and March, and spawning mainly in the Clackamas and neighboring streams. The second, which is the best run, enters during May, June, and part of July, spawning mainly in the headwaters. The third run occurs during late July, August, September, and part of October, and spawns in the tributaries of the lower Columbia.

In Puget Sound chinook salmon are found throughout the year, although it is only during the spawning season that they are very abundant. In the Fraser River, a tributary of the Sound, the run occurs from March to August.

In the Skeena River, British Columbia, the run occurs from May to July, the same being approximately true of the Nass also.

In Southeast Alaska they are found all months of the year. From March to the middle of June they are abundant and feeding in the numerous straits and sounds; in May and June the spawning fish enter the Unuk, Stikine, Taku, Chilkat, Alsek, and Copper Rivers in large numbers, and in a few smaller streams in lesser abundance. In August, September, and October they are again to be found in large numbers feeding in the bays and sounds, while during the winter months a few have been taken on trawls set for halibut, showing that they are living in the lower depths at this time.

In Cook Inlet the run occurs during May and June and is composed wholly of red-meated fish; in the rivers of Bristol Bay the run comes in May and June, and the same is true of the Togiak, Kuskokwim, and Yukon Rivers, although fish may be seen in the upper courses of the Yukon in July, the lateness here being due to the immense distance the fish have to cover.

SOCKEYE, BLUEBACK, OR RED SALMON.

The sockeye or blueback salmon (*O. nerka*), which forms the greatest part of the canned salmon of the world, when it first comes in from the sea is a clear bright blue above in color, silvery below. Soon after entering the river for the purpose of spawning the color of the head changes to a rich olive, the back and sides to crimson and finally to a dark blood red, and the belly to a dirty white. The maximum weight is about 12 pounds, and length 3 feet, with the average weight about 5 pounds, varying greatly, however, in different localities. Observations of Chamberlain[a] in Alaska show that the average weight of a number of sockeyes taken from Yes Bay was 8.294 pounds, while the average weight of a number from Tamgas was only 3.934 pounds. Evermann and Goldsborough[b] report as a result of the weighings of 1,390 red salmon, taken from as many different places in Alaska as possible, an average weight for the males of 7.43 pounds; for the females, 5.78 pounds; or an average weight for both sexes of 6.57 pounds. A run of small, or dwarf, males accompanies certain of the main runs, these being especially noticeable in the Chignik Lagoon, Alaska, run. This species usually enters streams with accessible lakes in their courses.

These fish are occasionally found landlocked in certain lakes, especially in the State of Washington, and are always much smaller in size than the sea-run fish. In Bumping Lake, near North Yakima, Wash., they are quite abundant and are mature when about a pound in weight. Despite the fact that these fish have a soft mouth, anglers consider them very gamey. They take bait, the fly, and the trolling spoon.

A few specimens of the sockeye have been taken as far south as the Sacramento River. In Humboldt County, Cal., small runs are said to occur in Mad and Eel Rivers. Only an occasional specimen appears in the coastal streams of Oregon. The Columbia is the most

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[a] Some observations on salmon and trout in Alaska. By F. M. Chamberlain, naturalist, U. S. Fisheries steamer *Albatross*. U. S. Bureau of Fisheries Document no. 627, p. 80.

[b] The fishes of Alaska. By B. W. Evermann and E. L. Goldsborough. Bulletin Bureau of Fisheries, vol. XXVI, p. 257.

southern river in which this species is known to run in any considerable numbers, entering the river with the spring run of chinooks. From here south the species is called blueback exclusively. A considerable run enters the Quinault River, Wash., and there is also a small run in Ozette Lake, just south of Cape Flattery.

In the Puget Sound region, where it is known as the sockeye, this species ascends only the Skagit River in commercial numbers, although a small run appears in the Lake Washington system of lakes and, possibly, in the Snohomish, Stillaguamish, and Nooksack Rivers.

The greatest of all the sockeye streams is the Fraser River, British Columbia, and this stream has been famous from very early days for its enormous runs of this species, a peculiar feature of which is that there is a marked quadrennial periodicity in the run. The maximum run occurs the year following leap year, the minimum on the year following that. The greater part of the catch of the Puget Sound fishermen is made from this run as it is passing through Washington waters on its way to the Fraser. The fish strike in during July and August on the southwest coast of Vancouver Island, apparently coming from the open sea to the northwest. They pass the Straits of Juan de Fuca, Rosario, and Georgia, spending considerable time in the passage and about the mouth of the river. Small numbers run as early as May and as late as October, but the main body enters about the first week in August.

The sockeye occurs in most of the coastal streams of British Columbia, and is usually the most abundant species. The principal streams frequented are the Skeena, Rivers Inlet, Nass, Lowe Inlet, Dean Channel, Namu Harbor, Bella Coola, Smith Inlet, Alert Bay, and Alberni Canal.

In Alaska, where this fish is generally known as the red salmon, it is abundant and runs in great numbers in all suitable streams, of which, in southeast Alaska, the following are the most important: Boca de Quadra, Naha, Yes Bay, Thorne Bay, Karta Bay, Nowiskay, Peter Johnson, Hessa, Hetta, Hunter Bay, Klawak, Redfish Bay, Stikine, Taku, Chilkoot, Chilkat, Alsek, Situk, Ankow, etc.; in central Alaska, Copper, Knik, Kenai, Susitna, Afognak, Karluk, Alitak, Chignik; in the Bristol Bay region, the Ugashik, Ugaguk, Naknek, Kvichak, Nushagak, and Wood. It also occurs in the Togiak, Kuskokwim, and Yukon Rivers, which debouch into Bering Sea, and probably occurs in the Arctic streams of Alaska. The run in western Alaska begins usually early in June and extends generally to the early part of August. It begins earlier in Prince William Sound, however, and sometimes extends into September in southeast Alaska. The duration of the run averages about the same in each section.

SILVER OR COHO SALMON.

The silver or coho salmon (*O. kisutch*) is silvery in spring, greenish on the upper parts, where there are a few faint black spots. In the fall the males are mostly of a dirty red. The flesh in this species is of excellent flavor, but paler in color than the red salmon, and hence less valued for canning purposes.

This species has a maximum weight of about 30 pounds, with a general average of about 6 pounds.

The silver salmon is found as far south as Monterey Bay, where it appears during the month of July and is taken by the trollers. From Eel River, in California, north, it is found in most of the coastal streams. It usually appears in July and runs as late as November, the time of appearance and disappearance varying somewhat in different sections. Owing to its late appearance comparatively few, and they usually in the early part of the season, are packed by the canneries, most of which shut down in July and August. This fish also tarries but a short time about the mouth of the stream it is to enter, and is wary of nets, which makes it rather unprofitable to fish for the latter part of the season when it is running alone.

HUMPBACK OR PINK SALMON.

The humpback or pink salmon (*O. gorbuscha*) is the smallest of the American species, weighing from 3 to 11 pounds, the average being about 4 pounds. In color it is bluish above, silvery below, the posterior and upper parts with many round black spots, the caudal fin always having a few large black spots, oblong in shape. The males in fall are dirty red and are very much distorted in shape, a decided hump appearing on the back, from which deformity the species acquires its name. The flesh is softer than in the other species; it is pale in color, hence its canned name, "pink" salmon.

The southern limit of the fish is the Sacramento River, but only occasional specimens are found here and in the rivers to the northward until Puget Sound is reached. Here a large run appears every other year, the only place on the coast where such is the case.

The humpback occurs in varying abundance in the waters of British Columbia, but it is in the waters of southeast Alaska that it appears in its greatest abundance. Many of the canneries in this region depend mainly upon the humpback for their season's pack, and the canned product now occupies an excellent position in the markets of the world. The fish spawn in nearly all of the small, short streams.

In central and western Alaska the runs are much smaller and the humpback is not much sought after by the cannery men, who are usually able to fill their cans with the more valuable species.

In southeast Alaska the run begins in June and continues until September, or even later in some places. In western Alaska the period is somewhat shorter. In Puget Sound it continues until late in the fall.

CHUM OR KETA SALMON.

The chum or keta salmon (*O. keta*) reaches a maximum weight of 16 pounds, the average being about 8 pounds. When it first appears along the coast it is dirty silvery, immaculate or sprinkled with small black specks, the fins dusky, the sides with faint traces of gridironlike bars. Later in the season the male is brick red or blackish, and its jaws are greatly distorted. Its flesh is quite pale, especially when canned. It is especially good for freezing, salting, and smoking.

This species has a wide distribution. It is found as far south as San Francisco, but is not utilized commercially in California except on Eel River. It is found in most of the coastal streams from here north, being especially abundant from Puget Sound northward to southeast Alaska, both inclusive. In this region it is being utilized in greater abundance each year, as the market for it widens.

In central, western, and arctic Alaska the species occurs in varying abundance, but is utilized sparingly, except by the natives, with whom it is the favorite species dried for winter food.

The run of chum salmon comes later than that of any other species except the coho. In Alaska it begins in June, but the height of the season does not occur until late in August or early in September, and fish are found as late as November. In Puget Sound they run from about the middle of August till late in November, and practically the same is true in the Columbia River.

STEELHEAD TROUT.

The steelhead trout (*Salmo gairdneri*) is commonly classed as one of the salmons by the fishermen of the Pacific coast, and it has been included in this report on this account. In different localities the average weight is placed at from 8 to 15 pounds, while extreme sizes reach 45 pounds. The excellent quality of its flesh causes it to be highly prized for the fresh and frozen markets, but owing to its pale color only limited quantities are canned.

The principal center of abundance of this species is the Columbia River. It is found from Carmel River, Cal., north to central Alaska, and possibly has an even wider range in Alaska. It seems to be found in the rivers during the greater part of the year. In the Columbia River the spawning season is from February to May, in Puget Sound in the spring, and in southeast Alaska in May and June. The best commercial fishing is in January, February, and March. In California the catching of this species is restricted to hook and line fishing.

AGE OF SALMON AT MATURITY.

As practically all salmon which have the opportunity spawn but once and then die, knowledge of the age at which this occurs is of great interest both from an economic and scientific standpoint. Many attempts have been made to solve the problem with the sockeye and king salmon, the most important commercially of the five species, by means of marking artificially reared fry, usually by clipping one of their fins before they are liberated, as noted elsewhere in this report, but with unsatisfactory results.

Fortunately, certain experiments carried on in Tomales Bay, Cal., and in New Zealand, where king fry were planted in streams not frequented by the species in question and the return of the adults noted, have yielded some interesting and accurate information on the subject. These indicated that the age was four or more years, as no run was reported until the fourth year.

A more certain method of determining the age of salmon has been developed in recent years through the adaptation by American scientists of the discovery by European investigators that the ridges observed on the scales of certain fishes indicated a period of growth of the animal itself.

Dr. Charles H. Gilbert, of Stanford University, as early as 1910, applied this method to the determination of the age of the various species of Pacific salmon. As to its application to the Pacific salmon and the general method followed, Dr. Gilbert has the following to say:

While the method is new as regards Pacific salmon, it has been experimentally tested and fully approved by the Fisheries Board of Scotland in the case of the Atlantic salmon, and is now universally accepted as furnishing reliable data as to the age and many other facts in the life history of that fish. It has been shown to be applicable also to various species of trout, and its value has been demonstrated in fishes as widely divergent as the carp, the eel, the bass, the flounder, and the cod. Descriptions of this scale structure and its significance have appeared in a large number of papers, both scientific and popular. It will suffice here to repeat that the scale in general persists throughout life, and grows in proportion with the rest of the fish, principally by additions around its border. At intervals there is produced at the growing edge a delicate ridge upon the surface of the scale, the successive ridges thus formed being concentric and subcircular in contour, each representing the outline of the scale at a certain period in its development. Many of these ridges are formed in the course of a year's growth, the number varying so widely in different individuals and during successive years in the history of the same individual that number alone can not be depended on to determine age. For this purpose we rely upon the fact that the fish grows at widely different rates during different seasons of the year, spring-summer being a period of rapid growth and fall-winter a season when growth is greatly retarded or almost wholly arrested. During the period of rapid growth the ridges are widely separated, while during the slow growth of fall and winter the ridges are crowded closely together, forming a dense band. Thus it comes that the surface of the scale is mapped out in a definite succession of areas, a band of widely spaced rings always followed by a band of closely crowded rings, the two together constituting a single year's growth. That irregularities occur will not be denied, and this is natural, inasmuch as growth may be checked by other causes than the purely seasonal one. Also a considerable experience is requisite for the correct interpretation in many cases, and a small residue of doubtful significance has always remained. This element is too small to affect the general results, and further investigation will almost certainly eliminate the doubtful cases altogether.[a]

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[a] Age at maturity of the Pacific coast salmon of the genus *Oncorhynchus*. By Charles H. Gilbert. Bulletin U. S. Bureau of Fisheries, vol. XXXII, p. 4, 5.

As a result of his investigations up to this point, Dr. Gilbert presented the following conclusions drawn from the data collected:

1. The sockeye spawns normally either in its fourth or fifth year, the king salmon in its fourth, fifth, sixth, or seventh year, the females of both species being preponderatingly 4-year fish.

2. The young of both sockeye and king salmon may migrate seaward shortly after hatching, or may reside in fresh water until their second spring. Those of the first type grow more rapidly than the second, but are subject to greater dangers and develop proportionately fewer adults.

3. Coho salmon spawn normally only in their third year. The young migrate either as fry or yearlings, but adults are developed almost exclusively from those which migrate as yearlings.

4. Dog salmon mature normally either in their third, fourth, or fifth years, the humpback always in their second year. The young of both species pass to sea as soon as they are free swimming.

5. The term "grilse," as used for Pacific salmon, signifies conspicuously undersized fish which sparingly accompany the spawning run. They are precociously developed in advance of the normal spawning period of the species. So far as known, the grilse of the king salmon, coho, and dog salmon are exclusively males; of the sockeye, almost exclusively males, except in the Columbia River, where both sexes are about equally represented. The larger grilse meet or overlap in size the smaller of those individuals which mature one year later at the normal period.

6. Grilse of the sockeye are in their third year, of the king salmon in their second or third year, of the coho and the dog salmon in their second year.

7. The great differences in size among individuals of a species observed in the spawning run are closely correlated with age, the younger fish averaging constantly smaller than those one year older, though the curves of the two may overlap.[a]

Since 1910 Dr. Gilbert has devoted much of his time to investigations [b] along this line, especially on the sockeye, with most interesting and valuable results.

His observations on the sockeye runs of British Columbia indicate that they consist principally of four and five year fish and that these two classes appear during successive seasons in widely differing proportions; that each stream has its distinctive race of sockeye, the progeny returning at maturity to the parent stream; that sockeye fry rarely survive when they proceed to sea within the year in which they are hatched; and that sea feeding, with the consequent rapid growth, is the most important factor in producing early maturity, an equal number of years in fresh water producing comparatively little effect.

MARKING SALMON.

A favorite recreation for quite a number of Pacific coast people has been the marking of salmon fry in order to find out the age at which they return to spawn, the rate of growth, etc. Scattered through the reports of the various State fish commissions, and occasionally

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[a] Ibid., p. 21, 22.

[b] Contributions to the life history of the sockeye salmon. (No. 1.) By C. H. Gilbert. Report of British Columbia Commissioner of Fisheries for the year ended Dec. 31, 1913, with appendixes, p. R53-78. Contributions to the life history of the sockeye salmon. (No. 2.) By C. H. Gilbert. Report British Columbia Commissioner of Fisheries for the year ended Dec. 31, 1914, with appendixes, p. N45-76.

in the reports of the United States Bureau of Fisheries, are to be found detailed reports of such markings and the sometimes remarkable results attained, apparently, at varying periods subsequent to the marking.

All sorts of marks were employed. The favorite was the removal of the adipose fin, the experimenters appearing to be of the belief that the fish would miss this the least of any. However, the entire or partial removal of nearly every fin was practiced by some one or other of the many experimenters. Sometimes a V or a U was punched out of the tail or the gill cover, and in one or two instances a tag was employed.

In time these marking experiments became so numerous, and so imperfect a record was kept of them by any central authority, that frequently it was impossible to tell, when an apparently marked specimen was obtained, where and when it was marked, and as a result but little dependence could have been placed upon them even had there been no other factors conspiring to vitiate their value.

Fishermen are continually finding in their nets salmon which they feel sure have been marked by some hatchery. Scores of times in the course of his various investigations of the fisheries of this coast the writer has been told of or shown specimens which the fishermen thought had been marked. Many of these marks were on the side of the fish and represented an M or W, depending upon the angle from which viewed, and it was impossible, generally, to convince the fishermen that this mark was caused by the twine of his gill net pressing on the side of the fish. The obvious fact that a fish could not survive when in the fry stage the infliction of such a mark did not occur to them.

Frequently the scars left by the suctorial organs of the lamprey eel have been mistakenly supposed to be hatchery marks.

One of the most interesting cases of salmon marking, and one which drives home the necessity for accepting reports of returns from such markings with extreme caution, is that of F. M. Chamberlain, then naturalist of the Bureau of Fisheries steamer *Albatross*, on the Naha Stream in Alaska.

In August, 1903, 1,600 red salmon fry, reared for the purpose from the 1902 eggs, at the Fortmann hatchery of the Alaska Packers Association, near Loring, Alaska, were marked by Mr. Chamberlain by excising both ventrals with fine curved scissors. The fry were released in the Naha River as soon as marked, at which time they were about three months old.

In 1906 between 50 and 100 adult reds with ventral fins missing were reported by the superintendent of the hatchery at Yes Lake, which is located on the northern side of Behm Canal (Naha being on the southern side) and some 15 miles farther up the canal than the mouth of Naha Stream. Some of these also had the adipose removed, this mark having also been used on some of the fry. At the Fortmann hatchery, where they were marked, only two of these fish were obtained in 1906.

From then on until 1912, a period of 9½ years, the return of a number of these supposedly marked fish is noted each year at the two hatcheries in question, the number reported in the last-named year being larger than in some of the intervening years. In the latter year Mr. Chamberlain himself pointed out the impossibility of these all being from the fry he had marked and no further attention was paid to them.

The principal thing that this and some of the other many experiments in salmon marking prove is that the percentage of salmon which accidentally lose, either through disease or the attacks of their many enemies, one or more of their fins, or portions of same, is much larger than most people suppose. Out of the many millions taken annually in commercial and fish-cultural operations it is not surprising that some should be minus such exposed portions of their anatomy and this percentage would doubtless be found to be considerable were particular attention directed toward it. As it is now, it is only occasionally that the fisherman notices such loss, or mentions the same when he does, unless his attention has been directed to it by particular inquiry. In the Chamberlain experiment, for instance, after 1907 considerable publicity was given to the search for such marked fish, and the writer, in his travels through southeast Alaska during the succeeding years until the end of 1911, frequently was told by fishermen that they had caught salmon with missing fins. Inquiry developed that while a few of the lost fins were the same as Chamberlain had excised, a number were entirely different fins, showing that when the attention of fishermen was directed especially in this line many deformed fish would be found.

The confusion resulting from the many marking experiments carried on by different people shows the absolute necessity of some central authority regulating them if any real results are to be achieved from this line of endeavor. In 1908 the Secretary of Commerce, under authority of sections 11 and 12 of the Alaska fisheries law, directed that any persons desiring to mark and release salmon in Alaska first consult with and secure the written consent of the Commissioner of Fisheries or of the agent at the salmon fisheries of Alaska. It would be an excellent thing if some such control could also be exercised over these operations in the coastal States.

During the year 1916 Dr. Charles H. Gilbert, of Stanford University, assisted by Willis H. Rich, conducted salmon-marking experiments on an extensive scale. Late in the fall of 1915 a consignment of 100,000 eggs of the red salmon was forwarded to Seattle, Wash., from the station of the Bureau of Fisheries at Yes Bay, Alaska, of which 50,000 were reshipped to the Anderson Lake hatchery of the British Columbia Fisheries Department, located on the ocean side of Vancouver Island. The remaining 50,000 were sent to the Bureau of Fisheries hatchery at Quinault Lake, on the coast of Washington. The intention was as soon as the fry, hatched from these eggs, had developed into fingerlings to mark each lot with a distinctive marking and plant them in waters near the hatcheries, with the object of proving that the adult fish would return to the stream in which they had passed their early existence, no matter where the eggs were taken.

This plan could not be carried out at Anderson Lake, as the young fish resulting from the eggs, which were sent there, were not strong enough to survive the experiment. They were therefore liberated without marking. Those hatched at Quinault Lake were marked, however, and liberated in the summer of 1916. Dr. Gilbert has strong hopes that upon the return of the marked fish important data relating to the life history of the species will be obtained.

OCEAN HOME OF THE SALMON.

All sorts of conjectures have been hazarded as to the ocean home of the salmon after the young fish have gone to sea and disappeared apparently from the ken of man. Many have conjured up visions of vast schools of adult salmon surging along the coast hundreds of miles seeking for some suitable river in which to spawn, explaining in this wise the variations in the seasonal runs in different sections. Others think the fish go out into the greater depths of the ocean and there hide from man until the spawning instinct leads them back to the coast and thence to the stream in which they were born.

Discoveries of recent years have quite altered this uncertainty, and we now are reasonably certain that the vast majority of the salmon are comparatively near our coast line, while others stay in the bays, straits, and sounds virtually all the time when not in the rivers.

Some years ago it was first noticed that king salmon would take the hook while in salt and brackish waters. At first only the anglers were interested in this fact, but as the demand for king salmon for mild curing became more insistent the commercial fishermen, attracted by the high prices paid, began to devote some attention to the fish during the early spring months, and soon trolling became a recognized branch of the industry. It was first taken up on a considerable scale in southeast Alaska in 1905.[a] As the demand for the fish increased, the fishermen extended operations until almost all of southeast Alaska waters were being fished. The length of the fishing season was also

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[a] Report on the fisheries of Alaska. By John N. Cobb. Bureau of Fisheries Document no. 618, p. 19-21.

increased until now only the severe weather of winter prevents them from fishing. However, the halibut trawls occasionally come up during the season with king salmon on them, showing that they are still on the ground.

The above is also true to a certain extent of the waters of British Columbia and Puget Sound and to a lesser extent, so far as has been disclosed, of Monterey Bay and the Oregon coast.

It has been known for some years that the silver, or coho, salmon would also take the hook under practically the same conditions as the king salmon, and the only reason this species has not been fished for to the same extent as the king has been because it was not large enough to be attractive to the mild curers, and hence there was a much lesser demand for it.

It had been supposed that the other species did not feed when in coastal waters, but Marsh and Cobb [a] state quite differently:

> Other species of salmon, in addition to the king, are found to take the trolling hook. For several weeks in July trollers in Union Bay, in southeast Alaska, caught a number of cohos and humpbacks while trolling for kings. The humpbacks were caught mainly with a spoon, no bait being used. Most of them appeared to have been feeding on needlefish and herring, according to the cutter who dressed them. A few red salmon are reported to have been caught on the trolling line by fishermen operating for king salmon in the neighborhood of Mary Island, near Dixon Entrance. Several fishermen report having in previous years frequently taken dog salmon on a hook in the bays along Chatham Strait.

In 1909, Mr. J. R. Heckman, of Ketchikan, Alaska, a well-known cannery man, told the writer that, while he was trying to install a floating trap near Cape Chacon, at the lower end of Prince of Wales Island, southeast Alaska, he on several occasions observed red salmon feeding on what he called a red shrimp.

This was also observed in 1912, when Dr. Gilbert reported, in connection with his observations of salmon fishing on Swiftsure Bank, off the Straits of San Juan de Fuca, that "during the past summer it was observed by Mr. J. P. Babcock and the writer that the sockeye on the bank were feeding extensively on a small shrimplike crustacean (*Thysanoessa spinifera*, Holmes), which floats in incredible numbers on the tides and forms a favorite food for the other species as well as for the sockeye." [b] He also found all the other species feeding voraciously in this neighborhood.

These observations would tend to confirm the belief which has been steadily growing in favor for some years that the salmon either spend the greater part of their life in the bays, straits, and sounds, or else in regions adjacent to the coast line.

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[a] The fisheries of Alaska in 1909. By Millard C. Marsh and John N. Cobb. U. S. Bureau of Fisheries. Document no. 730, p. 26.

[b] The salmon on Swiftsure Bank. By Charles H. Gilbert. Report of British Columbia Commissioner of Fisheries for year ending Dec. 31, 1912, p. 116.

The reason they had not been found in this region earlier is doubtless due to the fact that during the fall, winter, and spring months the weather on the north Pacific coast is such that fishing operations can not be carried on along the open coast, while in summer the fishermen are all busy on the spawning runs and have no time to devote to fish not yet arrived at maturity, which are probably feeding along the coast as usual.

II. FISHING GROUNDS AND HISTORY OF THE FISHERIES.[a]

WASHINGTON.

Puget Sound.—Strictly speaking, the name Puget Sound should be restricted to that long, narrow arm extending south from the Strait of Juan de Fuca, but a practice has developed, and is now common among fishermen and others, of designating all the great water area in the State of Washington comprising Puget Sound proper, Strait of Juan de Fuca, Canal de Haro, Rosario Strait, the Gulf of Georgia, and the smaller straits, bays, and sounds, as Puget Sound, and this practice, for the sake of convenience, has been followed in this report.

This great indentation in the coast, with its numerous islands and many fine harbors, has greatly aided the development of this portion of Washington and has been especially favorable to the prosecution of the salmon and other fisheries. Numerous rivers and creeks enter the Sound, the more important of these being on the eastern shore and comprising the Nooksack, Skagit, Stillaguamish, Snohomish, Duwamish, Puyallup, and Nisqually. On the southern and western shores the tributary streams are nearly all small, the more important being the Skokomish, Quilcene, Dungeness, and Elwha.

During the period when what is now the State of Washington was debatable ground between Great Britain and the United States, the Hudson Bay Co. annually salted considerable fish on Puget Sound and exported some to the Hawaiian Islands and Asia.

The first fishing operations by Americans were soon after the settlement at what is now known as Seattle, about 1852. For many years the catch was sold either fresh or salted, and the industry was small, as the population, for some years, was sparse. The extension of the railroad to Puget Sound, thus furnishing an outlet to the rapidly growing population in the Middle West, did much to aid the industry. This also gave opportunity to begin the shipping of fresh halibut and salmon to Eastern points. Ainsworth & Dunn, of Seattle, operating later under the name of the Seattle Fish Co., were the first successful pioneers in this branch of the industry, beginning about 1889, and carrying it on until they sold out in 1901, as noted later.

In 1903 the San Juan Fishing & Packing Co., which had begun the fresh-fish business in 1899, bought the business from the Pacific Packing & Navigation Co.

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[a] For some of the regions the historical data are fragmentary and can not be considered as other than historical notes. It is hoped that someone will write a history of the industry before all of the pioneers have passed away.

In 1897 the Chlopeck Fish Co. (now the Booth Fisheries Co.), which had been operating in Portland for several years, started a fresh fish and freezing business at Seattle.

The first salmon cannery on Puget Sound was erected by Jackson, Myers & Co., in 1877, at Mukilteo, in Snohomish County. The members of this firm had all been engaged previously in salmon canning on the Columbia River. The first pack was of 5,000 cases, composed wholly of silver, or coho, salmon. Later at this plant were put up the first humpbacks ever canned. In order to divert the minds of purchasers from the fact that the meat of the humpback was much lighter in color than the grades then known to the consuming public, the company printed on its label the legend, "Warranted not to turn red in the can." Even with this shrewd sizing up of the weak side of the consuming public the demand for humpback, or pink, salmon developed very slowly, and it was some years before it became a factor in the markets.

Within a year or two after the opening of the above plant another was started at Mukilteo by a man named Bigelow.

In 1880 the Myers' cannery was destroyed by a heavy fall of snow. It was rebuilt in West Seattle and was operated till 1888, when it was destroyed by fire. George T. Myers, now sole owner, built a new cannery at Milton, which was burned two years later, and he then came back to Seattle and built a cannery about where Ainsworth & Dunn's dock now stands. He remained here only one season, after which he moved to where the Pacific Coal Co.'s bunkers now are. Late in 1901 he sold out his plant to the United Fish Co., which company moved the plant to the foot of Connecticut Avenue, where they continued operations for two or three years and then quit.

In 1889 a man named Morse established a cannery at Seattle and operated it for only one year.

The first Puget Sound sockeye cannery was built at Semiahmoo, near Blaine, by J. A. Martin and John Elwood about 1887 or 1888. It was bought in 1892 for $500 by D. Drysdale, who shortly afterwards rebuilt and greatly enlarged the plant. In the same year Mr. Drysdale demonstrated the commercial success of fish traps. Traps had been in operation before this, however. In 1893 Ainsworth & Dunn had a trap at Five Mile Rock, just beyond the light house at Magnolia Bluff (now a part of Seattle), and there had been a trap or two in Elliott Bay even prior to this. Traps had not been profitable in this section, however, owing to the cheapness and abundance of salmon, haul seines being cheaper and more profitable to operate. A man named Kirby, who came originally from Nova Scotia, and another named Goodfellow (now living at Point Roberts) put in the first trap for Mr. Drysdale.

In 1893 A. E. Wadhams, who had operated on the Columbia River for some years, established a sockeye plant at Point Roberts.

In 1894 both canneries were sold to their present owner, the Alaska Packers Association, an organization formed not long before this by a combination of a number of Alaska plants.

In 1895 three new canneries were built at Anacortes—one by Philip S. Cook (later owned by the Porter Fish Co. and now by the Anacortes Fisheries Co.), one by the Anacortes Packing Co. (now owned by the Alaska Packers Association), and the other by the Fidalgo Island Canning Co.

In 1896 J. R. Young and B. L. Williams built a small cannery at Blaine. They failed in 1900 through the failure of their trap fishing and J. W. & V. Cook Packing Co., of Portland, bought their plant and put J. L. Smiley in charge of it. In 1909 Mr. Smiley purchased this plant from the company and has since operated it.

As Ainsworth & Dunn found that they were receiving more salmon than they could dispose of in a fresh condition (they were first, in 1889, to ship fresh salmon from here to eastern points), the firm built a cannery on the Seattle water front, at what is now Pier 8, about 1895 or 1896, and about 1897 built another at Blaine.

About 1898 A. E. Devlin came up from the Columbia River and established a plant at Friday Harbor, which is now operated by the Friday Harbor Packing Co.

In 1901 Ainsworth & Dunn sold all its fresh fish and canned salmon holdings to the newly organized Pacific Packing & Navigation Co. When the latter company failed and its assets were sold in 1904, the former firm bought back its Blaine plant and has operated it ever since. Mr. Ainsworth, the senior member of the firm, died in 1914, but the business is still operated under the name of Ainsworth & Dunn.

The Pacific American Fisheries Co. was incorporated in 1899. The company purchased at the time of its organization the cannery and trap properties of the Island Packing Co., San Juan Island, and the cannery of the Franco-American North Pacific Packing Co., at Fairhaven. The last-named cannery had been built the previous year.

By 1900 a number of canneries had been erected on the shores of Puget Sound, most of which were then in active operation. In 1901 the Pacific Packing & Navigation Co. was organized under the laws of the State of New Jersey, for the purpose of acquiring a number of salmon canneries on the coast. It was supposed to be backed by unlimited eastern capital, and its authorized capitalization was as follows: Common stock, $12,500,000; 7 per cent accumulative preferred stock, $12,500,000, and 6 per cent debentures, $7,000,000. It actually issued $6,037,000 common stock, $6,963,000 preferred stock, and $3,000,000 debentures. Subsequently the management effected an exchange of preferred stock for debentures, increasing the former to about $7,500,000 and decreasing the debentures to about $1,650,000.

The new company purchased a number of canneries in Alaska, also the following Puget Sound plants: Pacific American Fisheries Co.'s canneries at Fairhaven (now Bellingham) and Friday Harbor; the Ainsworth & Dunn canneries at Blaine and Seattle, and the Fairhaven Packing Co. cannery at Fairhaven.

The company had a very short career, ending up in the bankruptcy courts in 1903, and when all its affairs were wound up the stockholders received nothing, while the bondholders got but an exceedingly paltry sum out of all the money put into it.

Most of the canneries secured on Puget Sound were repurchased by their former owners or by new people.

From this time on the industry fluctuated considerably, 41 canneries, an increase of 10 over 1914, being operated in 1915.

During the early years of sockeye canning they were not sold to the trade as sockeyes, but as Alaska reds and Columbia River salmon, for which there had been an established market for some years.

H. Bell-Irving & Co., now of Vancouver, British Columbia, were the pioneers in the labeling of the fish as sockeyes, this being in 1894–95. Like all virtually new products, sockeye salmon had a hard fight for several years to secure a foothold in the salmon markets, and it was not until the Spanish-American war in 1898 caused a heavy demand for canned foods that its position became finally established.

Queets River.—This river, which is about 35 miles long, rises in the northern part of Jefferson County and empties directly into the ocean in the northwestern part of Chehalis County, within the bounds of the Quinault Indian Reservation. A small salmon cannery was built at Queets, in Jefferson County, in 1905.

Soleduck River.—This is a small stream, about 30 miles in length, which flows through the southwestern part of Clallam County and empties directly into the ocean. The Quillayute Indian Reservation is located here and the natives formerly caught salmon and marketed them on Puget Sound, but a small cannery, started at Mora, on this river, in 1912 and operated each season since, has furnished a market for the catch.

Quinault River.—This river, which enters the ocean in the northwestern part of Chehalis County, has a length from the ocean to Quinault Lake of about 40 miles, wholly within the boundaries of the Quinault Indian Reservation.

This stream is especially noted for its long-continued annual run of Quinault salmon (*O. nerka*). These fish, which are noted for their especially red-colored flesh, make their appearance early in

December, when the Indians generally catch them for their own use, as they fear that, if the whites got hold of the fish, they might throw away the hearts. Should a heart be eaten at this time by a dog or chicken, the Indians believe the run would not come. In January, when the fish begin to be abundant, all danger of this seems to have passed, for the Indians then usually have a considerable number for sale, and these are generally shipped to distant markets in a fresh condition by the buyers. As soon as the canneries open at Moclips most of the fish are disposed of at that place. The run continues up to July 1. May and June are the best fishing months.

There is a fall run of chinooks in this river, which usually arrives in August and ends about October 15.

The silver salmon appear about October 1 and the run is generally over by November 15; the dog salmon appear about November 1 and the run is usually over by the middle of the same month, while the steelhead trout run between November 20 and May 1. None of the latter are canned.

Moclips, the terminus of the railroad, is about 10 miles from the river, and the fish are all taken by team to this place. Twenty fish, weighing approximately 100 pounds, are put in each box, and these are piled onto the wagons until a load has been accumulated. The team owners get 50 cents a box for hauling the loaded ones to Moclips and 5 cents a box for bringing the empty ones back.

In 1915 the records of the Indian agent show that the Indians fishing on the north side of the river caught 219,654 Quinault salmon, valued at $49,820, while those on the south side caught 135,353 of these fish, valued at $30,528.60, or a grand total of 355,007 fish, valued at $80,348.60. This does not take into account the results of the fishing for the other species of salmon and steelhead trout, which quite materially swell the total.

Fishing is restricted to the Indians, who also make their own fishery laws, with the advice and approval of the Office of Indian Affairs, as the State laws have no force inside the bounds of the reservation. Under the regulations now in force, a clear channel of one-third the width must be left in the middle of the stream, which is from 250 to 300 yards in width. Each owner of a fishing location has to fish it in person; provided, however, that widows, orphans, minor children, old Indians, and those who are sick or have other gainful occupations are allowed to lease their locations or hire some one to fish them, and then only with the approval of the officer in charge.

During the Quinault season stake nets are used, while the rest of the time, as a result of the freshets, drift gill nets are used in the eddies. The stake nets are arranged in a rather peculiar manner. A line of stakes is run out for about one-third the width at right angles to the shore, and to these are attached a net by short ropes. From each stake a section of net is run out and downstream, curving inward like a hook at the end, the latter part being held in place by three stakes.

The stake nets are 40 to 60 meshes deep, with 5¼-inch stretch mesh, and are set 85 yards apart. A set of these as described above forms one fishing location.

The chinook gill nets are usually 8¾ to 9 inches stretch mesh and 24 meshes deep, while the gill-nets for silvers, chums, and steelheads are of 7-inch stretch mesh and 35 meshes deep.

For some years the salmon from the Quinault River were brought to Hoquiam and Aberdeen for canning. In 1911 W. W. Kurtz, of the former place, began the erection of a cannery at Moclips for the purpose of packing these fish, and the same season his example was followed by Frank Shafer. Mr. Kurtz still operates his plant, but the other is now owned by the Pacific Fisheries & Packing Co.

Grays Harbor.—This is the first important indentation on the coast of Washington south of Cape Flattery. It is about 40 miles long from east to west and about 20 miles wide in the widest part. The principal tributary is the Chehalis River, but there are a number of small streams which debouch into the harbor.

In 1883 B. A. Seaborg, who operated a cannery on the Columbia River, established a plant at what was later to be the thriving city of Aberdeen, although at that time it was practically a wilderness.

In 1902 the North American Fisheries Co. built a plant at Aberdeen. Shortly after it came into the possession of the Grays Harbor Packing Co., and on June 8, 1903, it was destroyed by fire. It was rebuilt and operated by this company until 1906, when it was sold to S. Elmore & Co., who still own it.

The Hoquiam Packing Co. built a cannery at Hoquiam in 1904 and have operated it ever since.

In 1910 two canneries were in operation at Aberdeen and Hoquiam, respectively, while in 1915 there were three at the former place and one at the latter in operation.

Willapa Harbor.—The entrance to this harbor, which also includes Shoalwater Bay, is about 27 miles south of Grays Harbor. The harbor runs east and west and is about 25 miles long. Shoalwater Bay extends south from it a distance of about 30 miles, its southern portion ending about a mile from the Columbia River and its western side being separated from the ocean by a spit varying in width from three-fourths to 1 mile. The bay is shallow, excepting in the main channel. The principal salmon streams entering the harbor are the Nasel and North Rivers, in which most of the pound or trap nets are located.

In 1884 B. A. Seaborg, a Columbia River canner, established a plant on Shoalwater Bay, as the whole of Willapa Harbor was then known.

About 1900 F. C. Barnes established a cannery at Sunshine, on the Nasel River, but the run of salmon on this river soon became so small that the plant was abandoned and the machinery moved to Mr. Barnes's cannery at South Bend.

In 1904 P. J. McGowan, the Columbia River canner, opened a cannery on the North River. Mr. McGowan, who was over 80 years of age at the time, had turned the control of his important Columbia River canning interests over to his sons, but finding idleness not to his liking, started this cannery in order to have something to occupy his time. He operated it for several years and then abandoned the project.

In 1912 the Chetlo Harbor Packing Co. established a cannery at Chetlo Harbor, but operated it only that year and in 1914.

In 1915 only two canneries, both of them at South Bend, operated on Willapa Harbor.

COLUMBIA RIVER.

The Columbia, which is the largest river of the Pacific coast, rises in British Columbia, flows through Washington, reaching the northern border of Oregon about 75 miles west of the State's eastern boundary; from this point the river forms the dividing line between Oregon and Washington, its general course being westerly. It empties into the Pacific at Cape Disappointment. Its principal tributaries are the Snake, John Day, Deschutes, and Willamette Rivers, and through these the main river drains an enormous extent of territory.

This river, which has produced more salmon than any other river in the world, has had a most interesting history. Many years before the white man saw its waters the Indians visited its banks during the annual salmon runs and caught and cured their winter's supply of food. Along the shores of the river at The Dalles for 15 miles were notable fisheries where various bands, who lived south and north, had their respective fishing locations, and to which all others were forbidden access. They used spears and dip nets in catching the salmon, the majority of which were dried and smoked for winter use.

A favorite preparation of the Indians who resorted to the river was pemmican. This was the meat of the salmon cleaned of the bones, pounded up fine, and then packed in hempen sacks of home manufacture. A sack of pemmican weighed from 80 to 90 pounds and was worth in barter as much as an ordinary horse.

It was about the year 1833 that a small trading sloop, under the command of Capt. Lamont, came into the Columbia River on one of her regular trips and dropped anchor near what is now known as St. Helens. While waiting several months for a return cargo the captain salted a number of barrels of chinook salmon, using old Jamaica rum kegs for the purpose. This is the first record of the export of this toothsome fish.

In 1861, H. N. Rice and Jotham Reed began packing salted salmon in barrels at Oak Point, 60 miles below Portland. The first season's pack amounted to 600 barrels. The venture proved fairly profitable and was soon participated in by others.

In the spring of 1866 William Hume, who had assisted in starting the first salmon cannery in the United States on the Sacramento River in 1864, finding the run of fish in the latter stream rather disappointing, started a cannery for Hapgood, Hume & Co. on the Columbia at Eagle Cliff, Wash., about 40 miles above Astoria.

The year this first cannery operated the following fishermen were operating in the river: Jotham Reed used a trap and a small gill net opposite Oak Point; Mr. Wallace fished a small seine from the shore of an island of that name a short distance below; John T. M. Harrington (who was later to establish the Pillar Rock cannery), in conjunction with a man named Fitzpatrick, operated a seine at Tenasillihe, as did also a Mr. Welch; P. J. McGowan, who, with his sons, in 1884 started a cannery at McGowan, and later, at Warrendale, Ilwaco, etc., operated two small seines at Chinook Beach; and Hapgood, Hume & Co. had two small gill nets about 125 fathoms in length and 32 meshes deep. The gill net of Mr. Reed was much smaller than these. At this period the river literally swarmed with salmon, and the cannery had no trouble in packing 4,000 cases, which it increased to 18,000 the next year and to 28,000 cases in 1868.

In 1867 a crude cannery on a scow was started by S. W. Aldrich, a ship carpenter. The scow was about 50 by 20 feet, with a cabin on it, and in one end of this he constructed a brick furnace in which he set a large cast-iron cauldron for a cooker. Along one side he rigged a bench and manufactured the cans. Aldrich was a regular jack-of-all-trades, as he did everything from catching the fish to canning and cooking them ready for the market.

In 1868 a cannery was built near Eagle Cliff by one of the Humes, while in 1873 R. D. Hume built another at Bay View, Wash. He operated it until 1876, when Mr. Leveridge, of Leveridge, Wadhams & Co., of San Francisco, bought it and operated it during 1877 and 1878. George W. Hume took it then and a few years later sold it to David Morgan, jr., who got into financial difficulties, and the plant was ordered sold by the court. C. W. Fulton, of Astoria, later a United States Senator, had the matter in charge, but was unable to find a customer, and finally in desperation, offered it to

W. H. Barker, of George & Barker, for $600. Mr. Fulton closed with him the same day. It proved a most profitable transaction for the purchasers, who acquired a million and a half labels which could be utilized, the machinery was taken out for other plants, the timber on the land belonging to the tract sold, and the floating property disposed of for a considerable sum, after which the stripped plant and land were sold back to Mr. Morgan for $600, the purchase price. He sold it to George W. Hume, who wanted it to correct a title. It was sold for taxes a couple of years later and was bought in by B. A. Seaborg, who operated it for two years, since when it has been idle.

George W. Hume was the first salmon canner to employ Chinese. This was at Eagle Cliff in 1872. At this period the white laborers in the canneries were recruited from the riff raff and criminal element of Portland. He had a Chinese working for him and through this Chinaman secured a Chinese gang from Portland. This labor proved so satisfactory that the custom soon spread to the other canneries. It was not found that the Chinese could do the work any better or quicker than the white laborers, but they proved more reliable in their work and gave less trouble.

Of the 35 canneries on the Columbia River in 1881, it is said that about one-half had been established by the Hume brothers. G. W. and William Hume were partners in the firm of Hapgood, Hume & Co., on the Sacramento River, and established the first cannery on the Columbia. In 1881 William was the proprietor of two canneries, one at Astoria, Oreg., and one at Eagle Cliff, Wash. R. D. Hume, a third brother, in the same year had a cannery in operation on the Rogue River, and established three others, one at Eagle Cliff (then owned by William Hume), one at Rainier (then belonging to Jackson & Myers), and one at Astoria. The fourth brother, Joseph, came to the coast in 1871 and some time later established a cannery on the river.

One of the pioneer canners on the river was the late F. M. Warren, operating as the Warren Packing Co., who established a cannery at Cathlamet, Wash., in 1869. The same company is still operating the plant. Later another cannery was established at Warrendale, Oreg., and both are still being operated by this company. Mr. Warren was the inventor of a retort, patented on April 10, 1877, which was in use by the principal canneries on the coast for a number of years.

John West was another pioneer. He built a cannery at Hungry Harbor, Wash., about 1869. In 1881 he moved his plant to Westport, on the Oregon side of the river. Mr. West was the inventor of a packing machine for placing the fish in the cans.

In 1871 the firm of Megler & Jewett established a cannery on the present site of Brookfield, Wash., and named it in honor of Mrs. Megler's birthplace, North Brookfield, Mass. In 1876 the plant was greatly enlarged and J. S. Megler bought out his partner and took in Mr. Macleay, of Corbett-Macleay, wholesale grocers, of Portland and San Francisco, and changed the firm name to J. S. Megler & Co., under which title it still operates. In 1879 Mr. Megler bought out this partner and owned the plant until his death in 1915, since when it has been operated by his widow.

The first soldering machine used on the Columbia River was in this plant, while the steam box and lacquering machines were first put in use on the river in this plant.

In 1874 the Adair brothers, S. D. and John, jr., erected a cannery at Astoria, the second one to be built there. Before packing began, A. Booth, the well-known Chicago fish dealer, and progenitor of the present Booth Fisheries Co., acquired a half interest in the plant, which was then named A. Booth & Co. John Adair, jr., was the manager. The brothers established canneries on the Fraser River and in some seasons exchanged places in operating on the two rivers. S. D. Adair sold out his cannery on the Fraser and bought one on the Columbia and operated it under the firm name of S. D. Adair & Co. After selling out his interest in A. Booth & Co., S. D. Adair formed a partnership with Wm. B. Adair under the style of S. D. Adair & Co. in 1881. The brothers were active in the industry for a number of years.

J. O. Hanthorn, under the firm name of J. O. Hanthorn & Co., established one of the largest canneries on the river at Astoria in 1876. Mr. Hanthorn invented a rotary can washer for washing cans after they were filled ready for soldering and before the tops were put on.

In the same year Marshall J. Kinney began his long and interesting career in the canning business by establishing a cannery at Astoria.

The first fish trap, or pound, on the river was constructed by Mr. Graham, in Baker Bay, on the Washington shore, in 1879. In 1881 P. J. McGowan built some traps just below the bay. The traps were very successful at times.

The first purse seine on the river was operated by William Graham & Co. in 1906.

Below appears a list of the canneries operated on the Columbia River in 1881, together with the pack of each during the year in question:

J. Williams (Oregon side)	9,000
Astoria Packing Co.	30,000
Elmore Packing Co.	7,890
Astoria Fishery (M. J. Kinney)	26,000
Wm. Hume	20,000
Geo. W. Hume	18,000
Devlin & Co.	20,000
Occident Packing Co.	15,000

West Coast	15,000
Badollet & Co	25,000
Booth & Co	23,000
Eagle Cannery	17,300
Timmins & Co	8,000
Fishermen's Packing Co	19,000
S. D. Adair & Co	10,000
Anglo-American Packing Co	10,300
Hanthorn & Co	19,000
Scandinavian Co	20,000
J. W. & V. Cook	30,000
F. M. Warren	12,000
J. West	12,000
Jackson & Myers (2 canneries)	13,000
Aberdeen Packing Co. (Washington Territory side)	17,000
Jos. Hume, Knappton	20,225
Pillar Rock Co	15,000
J. G. Megler & Co	25,000
Columbia Canning Co	8,000
R. D. Hume & Co	8,300
Cathlamet Cannery	8,000
Jas. Quinn	5,000
Cutting & Co	20,000
Eureka Packing Co	20,000
Hapgood & Co	13,000
Eagle Cliff Cannery	10,000
Total	549,115

The banner year in the canning industry was 1884, when 620,000 cases of chinook salmon were marketed. At this time the runs were so enormous that tons and tons of salmon were thrown overboard by the fishermen because the canneries were unable to handle them.

As in other sections there came a time when the market began to be glutted by the packs of the numerous canneries, and it was found necessary to combine some of the plants in order to operate more cheaply and also to reduce the output.

In 1885 W. H. Barker and George H. George, who had been connected with various canneries, formed a partnership as George & Barker and purchased the Astoria cannery of the Port Adams Packing Co., then 2 years old.

Shortly before this a combination which was named the Eureka & Epicure Packing Co., had been formed and comprised the following plants: Knappton Packing Co., Knappton; North Shore Packing Co., just below Knappton; and the Eureka Packing Co. This combination got into financial difficulties and the reorganizers persuaded George & Barker to join the combination and take charge, which they did.

In 1897 the Eureka & Epicure Packing Co., the plants of Samuel Elmore, M. J. Kinney and J. W. Seaborg, all at Astoria; J. O. Hanthorn & Co., Astoria; Fishermen's Packing Co., Astoria; Scandinavian

Packing Co., Astoria; Columbia Canning Co., and J. W. & V. Cook, Clifton, were combined under the name of the Columbia River Packers Association. In 1899 the association built a new cannery at Rooster Rock. Mr George was with the association until his death, but Mr. Barker left it to become general manager of the British Columbia Packers Association where he is at present, the dean of the Pacific coast cannerymen.

At the present time (1915) there are 19 canneries in operation on the river, while large quantities of salmon are also frozen, mild cured, pickled, smoked, and sold fresh in the markets of the world.

Commercial fishing is carried on mainly between the mouth of the Columbia and Celilo, a distance of about 200 miles, and in the Willamette River. The most of it is in the lower part of the river, within about 40 miles of its mouth. Bakers Bay, on the Washington or north side, and just within the river's mouth, is the favorite ground for pound-net fishing. The principal gill-net drifting ground is from the river's mouth to about 20 miles above Astoria, but drifting is done wherever convenient reaches are found much farther up the river. Most of the drag seines are hauled on the sandy bars in the river near Astoria, which are uncovered at low water. Wheels are operated in the upper river above the junction of the Willamette with the main river.

Astoria is the principal center for all branches of the industry, but more especially for canning. Other places in addition to Astoria at which canneries are located are Ilwaco, Eagle Cliff, Altoona, Brookfield, Pillar Rock, and Cathlamet, on the Washington shore, and at Warrendale, Rooster Rock, and Seuferts, on the Oregon shore.

OREGON.

Necanicum Creek.—This short stream is in Clatsop County and enters the Pacific Ocean about 10 miles south of the Columbia River. Its fisheries are of small importance.

Nehalem River.—The Nehalem is a small coastal river that rises in the mountains of Clatsop and Columbia Counties, and flows into the Pacific Ocean in the northern part of Tillamook County. As early as 1887 there was a small cannery here, and the business has been followed ever since. In 1911 an additional plant was built and both have operated each year since, except in 1913, when one was shut down.

Tillamook Bay and River.—Tillamook River is a very short stream which enters Tillamook Bay, the latter being in Tillamook County and about 45 miles south of the mouth of the Columbia River.

Fishing is carried on mainly in the bay. The earliest record we have of canneries on this bay is of 1886, when two were in operation. From 1891 to 1910 but one was operated, but in 1911 another plant was started, and both have been operated each season since, except in 1913, when one was shut down.

Nestucca River.—This stream enters the ocean in the southwestern part of Tillamook County. A cannery operated here in 1887 and the business has been carried on each season with but one intermission since 1905.

Siletz River.—This river has its source in the mountains of Polk County and enters the ocean in the northern part of Lincoln County. The commercial development of the fisheries was hampered for many years owing to the fact that the river was within the boundaries of what was then the Siletz Indian Reservation. The first cannery was established here in 1896, and it has operated nearly every season since.

Yaquina Bay and River.—The Yaquina ("crooked") River is about 60 miles long; its general course is nearly west through the county of Benton. The river is narrow throughout the greater part of its length. A few miles from its mouth it suddenly broadens out into an estuary from one-half to three-fourths of a mile wide, which is commonly called Yaquina Bay. The river enters the Pacific about 100 miles south of the Columbia.

Salmon canning was begun on this river in 1887, when two small canneries were constructed. The next year an additional plant was erected. The business has fluctuated considerably since then and there is now but one cannery, which has not been operated since 1911.

The fishing grounds are all in the bay and the lower section of the river. The fishermen of this section are fortunate in that they have railroad communication with the outside world, the only place on the ocean side of Oregon, except Tillamook, so situated. In 1915 another railroad line from Eugene to the mouth of the Siuslaw River, at which point it connected with a line to the Coquille River, was opened for traffic.

Alsea Bay and River.—Alsea River rises in the southwestern part of Benton County, and flows in nearly a northwesterly direction to the Pacific, a distance of about 60 miles. Like the Yaquina, the "bay" is merely a broadening out of the river just inside its mouth.

The first cannery was established in 1886 and by 1888 there were three in operation. For many years but one was operated. In 1911 and each season since two canneries have been operated.

The best fishing grounds are from the mouth of the river to about 5 miles inland.

Siuslaw River.—This river has its source in the mountains of Lane County, and its course lies first in a northwesterly direction and then to the westward until the Pacific is reached. Through part of its course it is the dividing line between Lane and Douglas Counties.

As early as 1878 there were two canneries operated on this river, but from 1879 till 1888 there are no data available showing the extent of the fisheries. In 1896 A. W. Hurd built a cannery which was destroyed by fire in 1908. At present there are two canneries, but of recent years only one has been operated. The opening of a railroad line from Eugene to here, thus furnishing an outlet for fresh salmon shipments, will doubtless greatly help in developing its fisheries.

The salmon fishing grounds extend from near the mouth of the river to about 20 miles upstream.

Umpqua River.—With the exception of the Columbia this is the largest and longest river in Oregon. It is formed by north and south forks, which unite about 9 miles northwest of Roseburg, and the river then flows northwestwardly and enters the Pacific. Practically all of this river is within the boundaries of Douglas County, one of the largest counties in the State. A railroad has recently been built along this river and in time there will doubtless be a large development of the fisheries of this region owing to the opportunities which will be offered for shipping fresh fish.

With the exception of Rogue River, this is the only river in Oregon south of the Columbia River in which a spring run of chinook salmon occurs.

As early as 1878 there were two canneries located on the Umpqua, one of which was built by George W. Hume. The number has never been larger than this, and usually there has been but one operating. In 1912 there was but one, at Gardiner. In 1915 two were operated.

Coos Bay and River.—Coos Bay is a navigable semicircular inlet of the ocean with numerous arms or branches. There is much marshy ground in the bay, and a number of sloughs, or small creeks, which empty into the bay from both sides. Coos River proper is an unimportant stream, but a few miles in length. North Bend, Marshfield, and Empire are the principal towns on the Bay. A branch railroad is being built to these points from the main line of the Southern Pacific Railway, and as soon as this is completed the fishing industry will receive a great impetus. Heretofore this region has depended upon steamers and sailing vessels plying to Portland and San Francisco for its communication with the outside world, and this slow and infrequent means of shipment has very seriously handicapped the fisheries.

Salmon canning began here in 1887, when two canneries opened for business. The business has fluctuated considerably since, most of the time but one cannery being operated, and such being the case in 1915.

Fishing is carried on mainly in the bay. A few set nets are operated in the river.

Coquille River.—This river is formed by three branches, called the North, Middle, and South Forks, which rise in the Umpqua Mountains and unite near Myrtle Point, the head of tidewater, about 45 miles by river from the mouth of the stream. It is a deep and sluggish river, with no natural obstructions to hinder the free passage of fish. Its fisheries have been seriously hampered by the lack of railroad communication, but this has recently been remedied, as the railroad to Coos Bay connects with a short line now in existence between the Coquille River and Coos Bay, and thence on to the Siuslaw and from there to Eugene.

The principal towns on the Coquille River are Bandon, Prosper, Coquille, and Myrtle Point. Bandon is the shipping port.

Pickled salmon were cured and shipped from this river very early, the first recorded instance of any considerable quantity being in 1877, when 3,000 barrels of salmon were sent to San Francisco. The salt shipments were important until within recent years. The first salmon cannery was erected in 1883, at Parkersburg. In 1886 another was built at the same place, and the following year still another was erected close by. This was the largest number ever in operation in any one year. Since 1909 two canneries have been operated, both at Prosper.

The fishing grounds are from the mouth to Myrtle Point, about 45 miles inland.

Sixes River.—This small river is located in the northern part of Curry County, and is about 40 miles in length, entering the Pacific a very short distance above Cape Blanco. The salmon caught here are either salted or shipped fresh to the canneries on the Coquille River.

Elk River.—This is another small stream about 40 miles in length, which enters the Pacific just south of Cape Blanco. As on the Sixes River, the salmon are either salted or sold fresh to the canneries on the Coquille River.

Rogue River.—This river has as its source Crater Lake in the Cascade Mountains, on the western border of Klamath County, flowing a distance of about 325 miles to the ocean, which it enters at Wedderburn. Its principal tributaries are the Illinois, Applegate, and Stewart Rivers. Owing to canyons and falls in the main river between the mouth of the Illinois River and Hellgate, the latter near Hogan Creek, which runs through the town of Merlin, navigation and fishing are impossible in that section. Except at the mouth of the river the population is very sparse until about the neighborhood of Hogan Creek, where the river approaches the railroad, and from here on for some miles there are numerous growing towns.

Owing to the fact of there being both a spring and a fall run of salmon in this river, the fisheries early became of importance, although sadly hampered because of being compelled to depend wholly on vessel communication with San Francisco, many miles away. In the early years the salmon were pickled and shipped to San Francisco. In 1877 R. D. Hume, who had been canning salmon on the Columbia River, removed to the Rogue River, and established near the mouth a cannery which he operated every season (except 1894, when the cannery burned down) until his death in November, 1908, after which date it was operated by his heirs. Mr. Hume also operated a large cold-storage plant at Wedderburn for several years.

The development of the fisheries of the lower Rogue River was very much hampered by the monopoly which Mr. Hume acquired and maintained until his death. He bought both shores of the river for 12 miles from its mouth, and also owned an unbroken frontage on the ocean shore extending 7 miles north from the mouth of the river. As a result of this, independent fishermen could find no convenient places for landing, which was necessary in order to cure, handle, and ship the fish caught. Since Mr. Hume's death the property has been sold to the Macleay estate, but the people of Oregon, upon an initiative and referendum petition, voted in 1910 to close Rogue River to all commercial fishing, and it was so closed in 1911 and 1912, but reopened in 1913. A second cannery was built here in 1915 by B. A. Seaborg & Co.

In the upper river ranchers living along the banks have engaged in fishing for a number of years, the catch for the most part being sold fresh. In recent years, as the country has developed, this fishery has become fairly important.

Chetco and Windchuck Rivers.—These two unimportant streams empty into the Pacific in the lower part of Curry County, not far from the California line. The former is about 20 miles and the latter about 25 miles in length. Both have runs of salmon, and small fisheries have been maintained for some years, the catch being either pickled or sold to the California canneries.

CALIFORNIA.

Smith River.—This river, which is the most northerly one in the State, rises near the Siskiyou Mountains, and runs in a westerly direction to the Pacific Ocean.

The river has only a spring run of salmon, and the early recorded history of the fisheries is fragmentary. The pickling of salmon was the main business at first and has been important ever since, as the cannery, which was first established in 1878, operated irregularly, and seems to have shut down entirely in 1895. Canning began again in 1914 by H. E. Westbrook and continued in 1915.

Klamath River.—This is the most important river in California north of the Sacramento. It issues from the Lower Klamath Lake in Klamath County, Oreg., and runs southwesterly across Siskiyou County, passes through the southeastern section of Del Norte County, keeping its southerly course into Humboldt County, where it forms a junction with the Trinity River, and thence its course is directed to the northwest until it reaches the Pacific Ocean.

The Klamath River is important as a salmon stream because it has both a spring and fall run of salmon. In 1888 a cannery was established at Requa, at the mouth, and this has been operated occasionally ever since. The pickling of salmon has been done here for a number of years. Some years part of the catch has been shipped fresh to the cannery on Smith River or to the Rogue River (Oreg.) cannery. Since 1908 the cannery has been operated continuously by the Klamath River Packers Association.

Humboldt Bay and tributaries.—The shore line of Humboldt County is bold and high, except in the vicinity of Humboldt Bay, where it is rather flat. The latter is the only harbor along the county shore, and it is quite difficult of access, owing to the bar at the entrance, upon which the sea breaks quite heavily. The bay is about 12 miles long and about 3 miles wide. Mad River, which has its rise in the lower part of Trinity County, runs in a northwesterly direction, then makes a sharp turn and enters the bay from the north side. Eel River, which has its rise in Lake County, far to the southeast, runs in a northwesterly direction and enters the bay at its southern extremity. Small railroads running south from Eureka traverse the shores of both rivers for some miles. A railroad now runs from the north side of San Francisco Bay to Eureka, and it has aided very materially in extending the market for salmon caught in these rivers.

Mattole River.—This is a small and unimportant river in the southern part of Humboldt County, and is said to have a good run of salmon each year, but no commercial fishing has as yet been carried on here.

Some salmon fishing is now (1915) carried on at Fort Bragg, in Mendocino County. The Noyo River debouches into the ocean at this place. Shipping salmon from here is now possible, owing to a branch railroad having been built to the coast at this point. It is probable that, as other points in the region between San Francisco and Humboldt Bays are made accessible by the railroad, the salmon fishery will be expanded very considerably.

Sacramento and San Joaquin Rivers.—These two rivers are the most important in California. The Sacramento is quite crooked, the distance by river from Red Bluff to San Francisco being about 375 miles, while the distance by rail between these two places is only 225 miles. The river rises in several small lakes in the mountains about 20 miles west of Sisson, in Siskiyou County, and for nearly half its length flows through a narrow canyon. The upper portion is a typical mountain stream, with innumerable pools and rapids. A little above Redding the river emerges from the canyon and widens into a broad shallow stream. Below Sacramento it runs through a level country and is affected by tides. Sloughs are numerous in this stretch, some connecting it with the San Joaquin. The Sacramento and San Joaquin Rivers join as they empty into Suisun Bay.

The principal tributaries of the Sacramento which are frequented by salmon are the Pit and McCloud Rivers and Battle Creek. At one time salmon frequented the American and Feather Rivers, but mining and irrigation operations along these streams either killed them off or drove them away.

The San Joaquin River has its source in the Sierra Nevada Mountains. Flowing westerly and forming the boundary between Fresno and Madera Counties for a considerable distance, it then turns abruptly to the north just where it is joined by Fresno Slough, which drains Lake Tulare. From here its general course is northwesterly until it joins the Sacramento River, near the latter's mouth. The Chouchilla and Fresno Rivers are the principal tributaries of the San Joaquin.

The principal fishing grounds for salmon are Suisun Bay, the lower part of San Joaquin River, and the Sacramento River as high as the vicinity of Sacramento. Drift gill nets are used almost exclusively in this section. From Sacramento to Anderson there is considerable commercial fishing, more particularly with haul seines.

Owing to the early and excellent railroad facilities which the fisheries of the Sacramento River have enjoyed, they have not been handicapped so seriously as most of the other Pacific coast rivers in finding profitable outlets for the catch. Soon after the first transcontinental line was opened the shipping of fresh salmon to eastern points began, and it has been an important feature of the industry ever since.

The chief event in the history of the salmon fisheries of this river is the fact that the canning of salmon on the Pacific coast had its inception here in 1864. The circumstances leading up to this event and its consummation are interestingly told by R. D. Hume:

The first salmon cannery of the United States was located at Washington, Yolo County, Cal. A part of the building was originally a cabin situated on the river bank outside of the levee just opposite the foot of K Street, Sacramento City. It was built in 1852 and occupied by James Booker, Percy Woodsom, and William Hume. William Hume came to California in the spring of 1852, bringing with him a salmon gill net which he had made before leaving his home at Augusta, Me. In company with James Booker and Percy Woodsom, Mr. Hume began fishing for salmon in the Sacramento River just in front of the city of Sacramento. William Hume had been salmon fishing in the Kennebec River in the State of Maine with his father, where his father and grandfather had been engaged in the same business since 1780, and their ancestors in Scotland had for pleasure pursued the sportive salmon on the Tweed and

Tay for centuries before. In 1856 William Hume went back to Maine, and on his return to California the same year was accompanied by his brothers, John and G. W. Hume, who also engaged in salmon fishing in the Sacramento River. Among the schoolmates of G. W. Hume was one Andrew S. Hapgood, who had learned the tinsmith's trade, and who a short time after G. W. Hume left for California went to Boston and entered the employ of J. B. Hamblen, a pioneer in the canning business, and was sent by him to Fox Island on the coast of Maine to engage in canning lobsters. The canning of lobster was a new and growing industry, and Mr. Hamblen, to increase his business, a short time after sent Mr. Hapgood to the Bay of Chaleur, an arm of the sea which divides the Province of Quebec from that of New Brunswick, where, in addition to the canning of lobster, they also canned a few salmon. I believe this was the first salmon canned on the American Continent, and I am informed that the business in a small way is still carried on in that section of the country. In 1863 G. W. Hume went back to Maine, and while there visited Mr. Hapgood at Fox Island, to which place he had been again sent by J. B. Hamblen to take charge of the works at that place. During the visit of G. W. Hume to his friend Hapgood a talk about salmon was had, and it was agreed that if salmon on the Pacific coast were as plentiful as represented by Mr. Hume much money could be made in a salmon-cannery business. The plan decided on was that G. W. Hume, on his return to California, should try and induce his brother William to engage in the business with them, and, if he succeeded in so doing, Mr. Hapgood should purchase the necessary machinery and come out to California in time for the spring season of 1864. William Hume being agreeable to take part in the enterprise, Mr. Hapgood set out on the journey and arrived at San Francisco on March 23, 1864, and a few days later at the location where the operations were afterwards conducted.[a]

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For a considerable time after the salmon-canning business was inaugurated the packers suspended operations in the early part of July of each year, as at that time the market would take only goods which showed a rich oil and the best food values.[b]

The business languished after the firm established its cannery on the Columbia River, but in 1874 was renewed again by others and continued with varying success until 1905, when it ceased temporarily, owing to the smaller quantity of fish available and the difficulty of competing with the mild-cure packers and the fresh-fish dealers. Several times since small packs have been made when, for some reason, mild-curing was unprofitable.

Monterey Bay.—The first harbor south of San Francisco is Monterey Bay, a large indentation cutting into Santa Cruz and Monterey Counties. Only a portion of it is well sheltered, however. For a number of years it had been known that salmon frequented the waters of this bay for the purpose of feeding on the young fishes which swarmed there. Sportsmen frequently caught them with rod and reel, but it was not until the early eighties that the industry was established on a commercial basis. It has since grown very rapidly. The catch has either been mild cured at Monterey or shipped fresh. A few were canned in 1915.

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[a] The description of the machinery used and the methods of canning have been quoted in full under "Canning" elsewhere in this report.

[b] The first salmon cannery. By R. D. Hume. Pacific Fisherman, Seattle, Wash., vol. II, no. 1, January, 1904, p. 19-21.

ALASKA.[a]

Alaska is the most favored salmon-fishing region. Many rivers, some of great length and draining enormous areas, intersect the district in every direction, while the number of small creeks is countless. Almost every one of these have runs of salmon of varying abundance. The principal streams entering Bering Sea are the Yukon, Kuskokwim, Togiak, Nushagak, Kvichak, Naknek, Ugaguk, and Ugashik; in central Alaska the Chignik, Karluk, Alitak, Susitna, and Copper Rivers are the main streams, while in southeast Alaska are found, among many others, the Anklow, Situk, Alsek, Chilkat, Chilkoot, Taku, Stikine, and Unuk Rivers. Most of the fishing in Alaska is carried on in the bays into which these rivers debouch. In southeast Alaska, which is composed largely of islands, the fishing is carried on mainly in the bays, sounds, and straits among these.

Even before the purchase of the district from Russia in 1867 our fishermen occasionally resorted to southeast Alaska and prepared salted salmon. The salmon fisheries did not become important, however, until canning was begun.

SOUTHEAST ALASKA.

One of the most favorable sections for carrying on fishing operations is southeast Alaska. Here a narrow strip of mainland, about 30 miles wide, separates British Columbia from salt water and forms the "panhandle" of Alaska. Outside this is a fringe of numerous islands, large and small, close to the coast line, conforming to its irregularities and separated from it and from each other by deep straits and channels. These islands, about 1,100 in number, extend from the coast an average distance of about 75 miles and along the general contour for about 250 miles. Some of these islands are very large, indented with deep bays and sounds, and they in turn fringed with smaller islands.

The largest streams in this region are the Unuk, Stikine, Taku, and Chilkat, all of which take their source in the interior and drain considerable areas. The other rivers are usually streams, and the greater number are simply outlets to a lake or system of lakes.

All species of salmon are to be found in this region, but the humpback is by far the most abundant.

This region has been the favorite fishing ground for the smaller operators, although a few of the largest canneries in Alaska are located here. Of recent years transportation facilities have been exceedingly good and fairly cheap, while the nearness to the States

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[a] The material for the history of the salmon fisheries of Alaska for the period from the inception of salmon canning to 1900 was obtained almost wholly from the following excellent and valuable reports by Capt. Jefferson F. Moser, U. S. N., to whom I am deeply indebted for this and other valuable data:

The salmon and salmon fisheries of Alaska. Report of the operations of the United States Fish Commission steamer *Albatross* for the year ended June 30, 1898. By Jefferson F. Moser. Bulletin U. S. Fish Commission, vol. XVIII, p. 1-178.

Alaskan salmon investigations in 1900 and 1901. By Jefferson F. Moser. Bulletin U. S. Fish Commission, vol. XXI, p. 173-398.

and the considerable resident population which could be drawn upon for labor have been big factors in its development.

The Russians did considerable salting of salmon. Petroff, in his report in the Tenth Census on the "Population, industries, and resources of Alaska," writes as follows of the Redoubt near Sitka: "The once famous Redoubt or deep-lake salmon fishery on Baranof Island, which at one time during the Russian rule supplied this whole region, and whence 2,000 barrels of salmon were shipped in 1868, now lies idle."

One of the earliest operators in southeast Alaska was a Greek, or Slav, named Baronovich, who married the daughter of Skowl, one of the old-time chiefs of the Kasaans, and received from him the fishery on Karta Bay, a part of Kasaan Bay, and one of the best red salmon streams south of Wrangell Narrows. Baronovich built a saltery here, kept a store and traded with the Indians. He died some years ago, and for some time after his death his sons operated it. It finally collapsed a couple of years ago.

For a number of years a saltery was operated at Klawak, on the west coast of Prince of Wales Island. In 1878 the North Pacific Trading & Packing Co. purchased the saltery and erected the first cannery in Alaska here. A pack was made the same year, and the plant has operated every year since. In 1899 the cannery burned down, but it was immediately rebuilt on the opposite side of the bay. For some years this plant was operated almost exclusively with native labor, and at the present time the majority so employed are natives.

The same year that the above cannery was established the Cutting Packing Co. built a cannery at old Sitka, and operated it in 1878 and 1879, after which time it was closed down. In 1882 the machinery was taken by another company to Cook Inlet.

In 1882 M. J. Kinney, of Astoria, under the name of the Chilkat Packing Co., built a cannery on the eastern shore of the inlet and made a pack the same year. The cannery changed hands several times and finally was burned in 1892, and not rebuilt. The cannery packed every year from 1883 to 1891, both inclusive, except in 1888, when it was closed.

In 1883 the Northwest Trading Co., built a cannery on Pyramid Harbor, a little bay on the western side of Chilkat Inlet. It was operated by this company in 1883 and 1884, was idle in 1885, and in 1888 was sold to D. L. Beck & Sons, of San Francisco, and operated by that firm. In the spring of 1889 it was burned, but was rebuilt at once and a pack made that year. In 1893 it joined the Alaska Packers Association, which operated it, except in 1905, until the end of the season of 1908, when it was finally abandoned.

On the north shore of Boca de Quadra, about 8 miles from the entrance, a cannery was built in 1883 by M. J. Kinney, of Astoria, and operated under the name of the Cape Fox Packing Co. from 1883 to 1886. Late in the last-named year it was sold and moved to Ketchikan and operated there under the name of the Tongass Packing Co. during 1887, 1888, and until August, 1889, when it was burned and not rebuilt.

In 1886 Rhode & Johnson erected a saltery at Yes Bay. The following year the firm became Ford, Rhode & Johnson. In 1887 work was begun on a cannery which was finished in 1888. Packing was begun in 1889 under the name of the Boston Fishing & Trading Co. In 1901 it was included in the Pacific Packing & Navigation Co. consolidation, and when that concern failed was purchased in 1905 by the Northwestern Fisheries Co. In 1906 the cannery was purchased by C. A. Burckhardt & Co., who have operated it each year to date, either under that name or subsequent incorporations known as the Yes Bay Canning Co., and the Alaska Pacific Fisheries.

In 1887 the Aberdeen Packing Co. of Astoria, Oreg., built a cannery on the Stikine River, about 8 miles above the mouth. In 1889 the cannery was moved to Point Highfield, on the northern end of Wrangell Island, and operations commenced under the name of the Glacier Packing Co. In 1893 it joined the Alaska Packers Association, who have operated it continuously, except in 1905.

The Loring cannery of the Alaska Packers Association was built in 1888 by the Alaska Salmon Packing & Fur Co. of San Francisco and operated by the Cutting Packing Co. For a number of years previous to this time a saltery had been in operation here. When the Alaska Packers Association was formed in 1893 it joined that organization. The cannery has been operated every year since it was built, and in some seasons has made the largest pack of any in theTerritory.

Shortly after William Duncan and his community of Tsimpsean Indians had settled, in 1887, on Annette Island, which island had been set aside by the Federal Government as a reserve for them, plans were under way for a salmon cannery, but funds came in so slowly that it was not until 1890 that any pack was attempted. In 1891 it was in full operation, and operated from then continuously until 1913, when the plant was shut down for that and the two succeeding years. Much dissatisfaction had been expressed by the natives over the operation of this and other industrial plants on the island, and finally the Federal authorities took possession of practically everything, as guardian of the natives, and early in 1916 leased the cannery to P. E. Harris & Co., of Seattle, the understanding being that they were to employ natives when available. Unfortunately the plant burned down just before the fishing season began.

James Miller operated a saltery on Burroughs Bay, on Behm Canal, in 1886 and 1887. In 1888 Andrew and Benjamin Young, of Astoria, Oreg., built a cannery here and operated it under the name of the Cape Lees Packing Co. in 1888, 1889, and 1890. It was closed in 1891 and 1892. In 1893 it became a part of the Alaska Packers Association, and was dismantled the following year.

About 1888 a saltery was established on Thorne Bay, Prince of Wales Island. The following year it was sold to the Loring cannery. In 1892 it was sold to Robert Bell, who moved it to the upper end of the northwest arm, on the western shore. Salting was not carried on each season, as it was sometimes found to be more profitable to sell the fish fresh to the canneries. The plant was finally abandoned.

In 1889 Messrs. Sanborn and Ellmore, of Astoria, built a cannery in Pavlof Harbor, Freshwater Bay, on the eastern side of Chichagof Island, and operated it under the name of the Astoria & Alaska Packing Co. It made a pack that year and in the spring of 1890 was moved to Point Ellis, on the eastern side of Kuiu Island, packing that year and also in 1891. It was burned in May, 1892; only one building was left standing, and it and the site were purchased by John H. Mantle, of Wrangell, who operated a saltery on each arm of the bay. Mr. Mantle began operations here in 1893.

In 1889 the Baranof Packing Co. built and first operated a cannery at the Redoubt, about 12 miles below Sitka. It was also operated in 1890 and then moved to Redfish Bay, on the western coast of Baranof Island. It made its first pack here in 1891 and was then operated every year until 1898, when it was sold to the Alaska Packers Association and dismantled.

In 1889 the Thlinket Packing Co., organized at Portland, Oreg., built a cannery at Point Gerard, on the mainland opposite Point Highfield, at the head of Wrangell Island. It was operated that and the subsequent year.

In 1901 this company built another cannery at Santa Anna, on the north side of Cleveland Peninsula, and made a pack the same year.

In 1901 both plants became part of the Pacific Packing & Navigation Co. In 1902 the Gerard Point plant was closed and was not opened again. In 1903, 1904, and 1905 the Santa Anna plant was closed also. Early in 1905 these plants were purchased by the Northwestern Fisheries Co. at the assignee's sale of the old corporation's properties. The Santa Anna plant was operated in 1906 and has been operated each year since.

The Chilkat Canning Co. put up a plant at Chilkat village, on Chilkat Inlet, in 1889. It was operated from 1889 to 1893, and then sold to the Alaska Packers Association. It was held in reserve for some years but was finally dismantled.

In 1889 D. Blauw, of Tacoma, Wash., built a saltery on Grouse Island, Boca de Quadra, and dry-salted dog salmon. He operated only one season.

In 1890 a cannery was built by the Bartlett Bay Packing Co. on Bartlett Bay, Icy Straits, and operated by Williams, Brown & Co., of San Francisco. A saltery was constructed here prior to that date, and in 1889 a pack of 4,300 cases was made in a crude way. In 1891 the ice piled up in Glacier Bay to such an extent that the cannery could do almost nothing. It was not operated after this date. In 1893 it became a part of the Alaska Packers Association and was dismantled in 1894.

About 1890 a saltery was established on the north shore of the mouth of Quadra Stream, on Boca de Quadra, by Clark & Martin. It was operated intermittently until about 1898, when it was abandoned. The same parties also established a saltery at Ketchikan shortly after the one on Quadra Stream was built, and operated this until about 1898, when the plant was turned into a steamer wharf and warehouse for the new town of Ketchikan which was building up around it.

In 1896 the Pacific Steam Whaling Co. built a cannery on the northern side of Hunter Bay, near the southern end of Prince of Wales Island, and made a pack the same year. Miller & Co. had a saltery at this place and it was purchased by the company and removed to make room for the cannery. Miller & Co. also had a saltery on Nutqua Inlet, which was built in 1896, and this also was sold to the canning company. In 1901 the cannery became a part of the Pacific Packing & Navigation Co. It was closed in 1904. Upon the dissolution of the company in 1905 this plant was purchased by the Northwestern Fisheries Co., which company, after keeping it closed in 1905 and 1906, has operated it each season since.

The Quadra Packing Co. built a cannery on Mink Arm, in Boca de Quadra, in the spring of 1896 and made its first pack that year. In 1901 the plant was purchased by the Pacific Packing & Navigation Co. It was closed in 1904, 1905, and 1906. Upon the dissolution of the company in 1905 the plant was purchased by the Northwestern Fisheries Co. It was reopened in 1907 and has been operated each season since.

In 1897 a saltery was built on Taku Point, near the head of Taku Inlet. In 1898 and 1899 it was operated by the Quadra Packing Co. In 1900 the Icy Straits Packing Co. operated it.

In 1897 a small saltery was in operation by Cyrus Orr at Point Barrie, Kupreanof Island. In the same year Walter Kosmikoff operated a small saltery at Shipley Bay, on Prince of Wales Island. In 1900 he sold it to the Icy Straits Packing Co.

Fred Brockman in 1897 built and operated a small saltery on Sarkar Stream, Prince of Wales Island. Mr. Brockman operated this saltery intermittently until his death in 1915.

In 1897 Banter & West were operating a saltery at Sukkwan, on Sukkwan Island. In the same year Miller & Co. started another saltery on Kassook Inlet, on Sukkwan Island, while Thomas McCauley was operating a saltery on Whale Passage.

In 1899 the Icy Straits Packing Co., consisting of stockholders of the Quadra Packing Co., built a cannery and sawmill at a point on the southeastern shore of Wrangell Narrows, about a mile south of the northern entrance to same, and named the town site Petersburg. The cannery was ready and operated in 1900. In 1901 it became a part of the Pacific Packing & Navigation Co. It was closed in 1903, 1904, and 1905. In 1905 it was purchased at the sale of the company's properties by the Northwestern Fisheries Co. In 1906 the Pacific Coast & Norway Packing Co., which had been operating a cannery at Tonka, on Wrangell Narrows, purchased this plant and transferred its activities to the latter. In 1915 the plant was leased to the Petersburg Packing Co., composed of stockholders of the old company.

In 1900 the Western Fisheries Co., of Portland, built a cannery at the head of Dundas Bay, and made a pack the same year. In 1901 it became a part of the Pacific Packing & Navigation Co. It was closed in 1904. At the assignee's sale of the company's properties in 1905 this plant was purchased by the Northwestern Fisheries Co. and operated in 1905 and each subsequent year.

In 1900 the Fidalgo Island Packing Co. built a cannery on the southern side of Ketchikan Creek. A pack was made the same year. The plant was closed in 1903, only a little salting being done that year, but was opened in 1904. It was closed again in 1905, but opened in 1906. Since then it has been operated each season to date, except in 1909.

In 1900 the Pacific Coast & Norway Packing Co. operated a floating saltery while prospecting for a cannery location. In 1901 the company built a cannery at Tonka, about midway of Wrangell Narrows, on the western side, and made a pack in that and subsequent years until 1906. In that year the company purchased the Petersburg cannery and thenceforth operated from there. The Tonka plant was dismantled a few years later.

In 1900 the Royer-Warnock Packing Co., of San Francisco, built a small cannery on Beecher Pass, which connects Duncan Canal with Wrangell Narrows, using the old Buck saltery for the cannery proper. It operated only the one season. It was a hand-pack plant.

The Taku Fishing Co. in 1900 built a cannery on the southern side of the entrance to Port Snettisham, and made a pack in that year. In 1901 it became a part of the Pacific Packing & Navigation Co. The plant was closed in 1902 and not opened again.

In 1900 the Taku Packing Co., organized in Astoria, Oreg., built a cannery on the western shore of Taku Inlet, and made a pack the same year. In 1901 it became a part of the Pacific Packing & Navigation Co. It was closed in 1904 and not reopened again. In 1905 it became the property of the Northwestern Fisheries Co.

In 1900 the Chilkoot Packing Co., organized at Aberdeen, Wash., built a cannery at the head of Chilkoot Inlet, and operated the same year. In 1901 it became a part of the Pacific Packing & Navigation Co. It was closed in 1904 and not reopened again.

In 1900 the Great Northern Fish Co. operated a floating saltery. Its principal business was salting dog salmon for the Japanese trade, and it operated only one season. J. E. Rice, of Whatcom, Wash., in the same year packed dog salmon on Karta Bay for the same trade.

The Pacific Packing & Navigation Co. (an account of whose inception, operation, and failure appears under Puget Sound) was organized in 1901 and acquired the following canneries in Alaska: Canneries of Pacific Steam Whaling Co. at Nushagak, Bristol Bay; Chignik, Alaska Peninsula; Uyak, Kodiak Island; Kenai, Cook Inlet; Orca, Prince William Sound; Hunter Bay, southeast Alaska. Also the Hume Bros. & Hume canneries at Chignik and Uyak; the Thlinket Packing Co. with canneries at Gerard Point and Santa Anna; the Western Fisheries Co. cannery at Dundas Bay, Icy Straits; Chilkoot Packing Co. cannery at Chilkoot Inlet; the Taku Packing Co. cannery at Taku Inlet; the Taku Fishing Co. cannery at Port Snettisham; the Boston Fishing & Trading Co. cannery at Yes Bay; the Chatham Straits Packing Co. cannery on Sitkoh Bay; the Icy Straits Packing Co. cannery at Petersburg, Wrangell Narrows; and the Quadra Packing Co. cannery at Mink Arm, Boca de Quadra.

The company met with financial disaster in 1904, and at the resulting sale most of its properties were bought by the Northwestern Fisheries Co., a corporation formed for the purpose. Of the Alaska canneries the Sitkoh Bay plant was sold to George T. Myers & Co., while the Orca plant was leased to Capt. Omar J. Humphreys, from whom the Northwestern Fisheries Co. later on secured it.

The San Juan Fishing & Packing Co., of Seattle, established a cannery and cold-storage plant in 1901 at Taku Harbor, a small bay on the mainland a short distance south of Taku Inlet, and made a pack the same year. This plant was purchased in 1903 by the Pacific Cold Storage Co. and operated by it in 1903, 1904, and 1905. In 1906 it was leased and operated by the Taku-Alaska Packing Co. From 1907 to 1911 the plant was leased and operated by John L. Carlson & Co. In 1911 the plant was purchased by Mr. Carlson and the name changed to the Taku Canning & Cold Storage Co., under which name it has been operated each year since.

In 1901 the Chatham Straits Packing Co. built a cannery on Sitkoh Bay, Chichagof Island. The same year this cannery became a part of the Pacific Packing & Navigation Co. Upon the dissolution of the latter, early in 1905, this plant was purchased by George T. Myers & Co., which company has operated it to date without a break.

In 1901 F. C. Barnes, of Portland, Oreg., built a cannery at Lake Bay, on the east side of Prince of Wales Island, and made a pack that season. This cannery was operated in 1902, but was closed in 1903. It was reopened in 1904, and operated each season after that. In 1910 it was incorporated under the name of F. C. Barnes Co.

In 1901 the Union Packing Co., organized in Tacoma, Wash., built a cannery on Kell Bay, an arm of Affleck Canal, on the southern side of Kuiu Island. In 1904 this plant was moved to the Kvichak River in Bering Sea.

Buhring & Heckman operated a small saltery in Union Bay, on the north side of Cleveland Peninsula, in 1901. Packing was carried on aboard a barge.

In 1901 the Muir Glacier Packing Co. put up a saltery on Ideal Cove, Dry Pass, near Wrangell. It has operated mainly as a mild-cure station. It was closed down in 1903, but open in 1904. It was then closed in 1905, 1906, and 1907. It was opened in 1908 by K. J. Johansen and operated in 1908 and 1909.

In 1902 the Kasaan Bay Co. built a cannery on the north side of Kasaan Bay, Prince of Wales Island, and made a pack the same year. It was shut down in 1904 and 1905, but reopened in 1906 by Gorman & Co., of Seattle, who had purchased control of the company. Shortly after the closing of the packing season the plant burned down, but it was rebuilt in time to operate the following season. In 1909 the plant was closed, but was reopened in 1910. On September 12 of that year the plant was again destroyed by fire, but was rebuilt in time to operate the following season. On October 29, 1911, the plant was once more destroyed by fire, but was rebuilt in time to operate in 1912. In 1915 the plant was purchased and operated by the Anacortes Fisheries Co., a subsidiary of the Booth Fisheries Co.

In 1902 the Alaska Fish & Lumber Co. built a cannery at Shakan, on Kosciusko Island, near the head of Prince of Wales Island, and made a pack the same year. It was shut down in 1904. In 1905 the property was taken over by the Shakan Salmon Co., a new company composed largely of members of the old corporation, who operated it that season. In 1906 Gorman & Co., of Seattle, obtained control of this cannery and operated it each season under the name of the Shakan Salmon Co. until 1915, when it was sold to the Anacortes Fisheries Co., a subsidiary of the Booth Fisheries Co.

In 1902 the Columbia Canning Co. built a cannery on the southern side of Chilkoot Inlet, and made a pack that year. In 1910 C. A. Burckhardt & Co., under the name of the Chilkoot Fisheries Co., purchased and operated this plant. In 1911 the name was changed to that of the Alaska Pacific Fisheries.

The only cannery in this section lost to Alaska by action of the Federal Government was that of the Wales Island Packing Co., which was built on Wales Island, near Dixon Entrance, in 1902. As a result of the action of the Alaska Boundary Arbitration Commission in declaring Wales Island a part of Canada in 1903, this cannery automatically ceased to be an American one. After the change of government it lay idle for some time, but is now in use once more by Canadian parties.

In 1902 the Thlinket Packing Co. built a cannery on Funter Bay, on the west side of Admiralty Island, and made a pack that year and every subsequent year to date.

The same year the Pillar Bay Packing Co. built and operated a cannery near Point Ellis, on Kuiu Island, and has operated it each season to date.

In 1902 the Alaska Fisheries Union, organized in Seattle, built a cannery on the east side of Chilkat Inlet, and made a pack that year. After operating to 1905, the plant was in that year leased to and operated by the Lynn Canal Packing Co. The plant was purchased in 1906 by the Pacific American Fisheries. In 1908 it was moved to Excursion Inlet and has been operated each season to date.

The Tacoma Fishing Co. in 1902 established a saltery and halibut station at Tee Harbor, on Lynn Canal, and made a pack that year. Later it became the property of the International Fisheries Co. In 1910 the plant was purchased by the Tee Harbor Packing Co., which established a cannery and operated first in 1911. It has been operated each season since.

The Seattle-Scandinavian Fish Co. built a saltery on Snug Harbor, Tenakee Inlet, Chicagof Island, in 1902, and made a pack. It packed in 1903 also, but shut down in 1904. The plant was leased in 1905, and then shut down for good.

The Alaska Fish & Mining Co. built and operated a saltery at Revilla, on Tongass Narrows, during the single season of 1902, while the Rice Fisheries Co., in the same year, built and operated a saltery on Boca de Quadra.

The United Fish Co., of Seattle, salted at Tolstoi Bay, east side of Prince of Wales Island, 1903 and 1904.

In 1907 the Alsek Fisheries Co. did some salting on the Alsek River. Malcolm Campbell was interested in the above company and in subsequent years operated under his own name. In 1910 the St. Elias

Packing Co. established a cannery near the saltery and made a pack the same year, and in 1911 and 1912. Since then the plant has been closed and was sold in 1916 to Libby, McNeill & Libby.

The Astoria & Puget Sound Packing Co., in 1908, built and operated a cannery on Excursion Inlet. It was closed the following year, but has been operated each year since.

The year 1911 witnessed a considerable increase in the number of canneries. Among the new plants built and operated were the following: Hidden Inlet Canning Co., Hidden Inlet, Portland Canal; Hawk Fish Co. (later changed to P. E. Harris & Co.); Hawk Inlet, Admiralty Island; Lindenberger Packing Co., Roe Point, Behm Canal; Deep Sea Salmon Co., Cape Edwards, Chichagof Island; L. Gustave & Co., Skowl Arm, Prince of Wales Island (changed in 1912 to Skowl Arm Packing Co.), and M. E. Lane (a small hand-pack plant), Myers Chuck, Cleveland Peninsula.

An innovation in Alaska salmon canning this year was when the old ship *Glory of the Seas* was fitted out as a floating cannery by the Alaska Fish Co., and operated in Hawk Inlet, Admiralty Island, and at Ketchikan. Quarters for the crew were built over the cabins on the quarter deck, the latter being reserved for officials. The remainder of the upper deck was used for receiving, dressing, and cleaning the fish, which were brought on board by means of a portable elevator attached to the side of the ship. The "iron chink" and the sliming and cleaning tanks were also on this deck. The fish were carried in chutes to the second deck, where a line of sanitary machinery had been installed. The retorts were placed on the forward part of the second deck. The third deck was used for cooling and storing the pack. No lacquering or labeling was carried on aboard the vessel.

In 1912 this plant and the ship *William H. Smith*, the latter by the Weiding & Independent Fisheries Co., of Seattle, were operated. The *William H. Smith* also did some freezing of salmon.

In 1913 the *Glory of the Seas* was sold to the Glacier Fisheries Co., which operated it as a cold-storage plant. The floating cannery and cold-storage ship *William H. Smith* was not operated in Alaska during this season.

In 1912 still more canneries were built, among these being the following: Admiralty Trading Co., Gambier Bay, Admiralty Island; Alaska Sanitary Packing Co., Wrangell; Canoe Pass Packing Co., Canoe Pass; Herbert Hume Packing Co., Nakat Inlet, Portland Canal; Hoonah Packing Co., Hoonah, Icy Straits; Irving Packing Co., Karheen; Kake Packing Co., Kake; Kuiu Island Packing Co., Point Beauclaire, Kuiu Island; Lindenberger Packing Co., Craig, Fish Egg Island; Oceanic Packing Co., Waterfall; Point Warde Packing Co., Point Warde, Bradfield Canal; Pure Food Fish Co., Ketchikan;

Revilla Fish Products Co., Ketchikan; Sanborn-Cram Co., Burnett Inlet; Starr-Collinson Packing Co., Moira Sound; Sunny Point Packing Co., Cholmondeley Sound; Swift, Arthur & Co., Heceta Island; Walsh-Moore Canning Co., Ward Cove, and Wiese Packing Co., Rose Inlet.

In 1913 the plant of Swift, Arthur & Co. was used as a mild-cure station alone, while the name was changed to the Swift-Arthur-Crosby Co. The Alaska Fish Co. absorbed the Oceanic Packing Co. and transferred its activities to the former company's cannery at Waterfall. The following other plants were shut down: Canoe Pass Packing Co., Herbert Hume Packing Co., Point Warde Packing Co., and the Revilla Fish Products Co.

In 1914 one new cannery was built. This was erected on George Inlet, Revillagigedo Island, by the George Inlet Packing Co. The canneries of the Point Warde Packing Co., located at Point Warde, and the G. W. Hume Packing Co. (formerly the Herbert Hume Packing Co.), at Nakat Inlet, which were not operated in 1913, were reopened in 1914. The cannery of the Swift-Arthur-Crosby Co. was also reopened. The Walsh-Moore Canning Co. changed its name to the Ward Cove Packing Co., while the Sanborn-Cutting Co. took over the cannery operated by the Kake Packing Co. The canneries of the Admiralty Trading Co. and the Skowl Arm Packing Co. were closed in 1914. The plant of the Kuiu Island Packing Co. burned down in the fall.

In 1915 the Admiralty Trading Co. did not operate. Late in the summer it was sold to the Hoonah Packing Co., which company expects to operate it in 1916. The new canneries this year were the Doyhof Fish Products Co., at Doyhof, on Wrangell Narrows, and Edward Verney & Son (a hand plant), at Metlakahtla. The name of the Irving Packing Co. was changed to the Karheen Packing Co. The Straits Packing Co. purchased the Skowl Arm cannery of the Skowl Arm Packing Co. and operated it.

At one time salteries were of considerable importance in this section, but the establishment of canneries, with the consequent heavy demand for fresh salmon, induced most of the salteries to sell their high-grade fish to the canneries and pack only the cheaper grades. Many of them quit the business as a result of the competition, while others were forced out by the low prices prevailing at times for salted salmon. As many of the salters moved from place to place, and frequently changed their operating name, it has been difficult to keep track of them, and in this review only those are listed who attained to some prominence either through longevity or largeness of pack.

James Millar, one of the earliest whites to take up his residence here after the purchase of Alaska, and his sons were very active in starting and operating salteries, and it was an unusual thing during the period previous to 1910 when one of the family was not operating such a plant.

Jacob Louth established a saltery on the south arm of Moira Sound about 1900 and operated it for some years.

John C. Frey established a saltery on Etoline Island in the nineties and ran it until his death in 1904, when John H. Mantle purchased and operated it until about 1910.

Anderson & King built a saltery on Cholmondeley Sound, Prince of Wales Island, in the nineties. In 1904 it was operated under the name of A. E. King. After Mr. King's death his widow operated it from 1906 to 1909. In 1910 the saltery was purchased by C. A. Burckhardt & Co., who built a cannery on the site and began operations in 1911. In 1912 the name was changed to the Alaska Pacific Fisheries.

The Alaska Fish & Development Co. built a saltery on Pleasant Bay, Admiralty Island, in 1903, and operated it from 1903 to 1905. In 1907 it was operated by the Alaska-American Fish Co., but has been closed since.

Yakutat Bay is the only harbor available for vessels from Cape Spencer to Prince William Sound. In 1902 C. A. Fredericks & Co., of Seattle, Mulvey & Wilson, of Yakutat, Jewell Fish Co., and Ankow Fish Co. all established salteries here. While their primary purpose was the salting of herring, considerable salmon was also salted. These plants operated only the one season.

In 1904 the Yakutat & Southern Railway Co. built a cannery here. This plant is noted for being the only one that hauls its fish by railway from the fishing streams to the cannery. The railroad is a little over 9 miles in length, and for some years an engine which had seen service on the elevated railroads of New York City and was discarded when the latter were electrified was used. A more modern engine is now in use. The fish are carried in open freight cars. Later this company was purchased by Gorman & Co., and now is the property of Libby, McNeill & Libby, although operated under the original name.

PRINCE WILLIAM SOUND AND COPPER RIVER.

The great indentation known as Prince William Sound, and the Copper River delta, a short distance south of the sound, have not been exploited as much as many other portions of Alaska, due largely to the limited means of transportation and the consequent heavy expense of operation.

The principal source of salmon supply is the Copper River, which has its source far back in the interior and discharges through its numerous mouths an immense quantity of water.

Owing to the constantly shifting shoals in the delta, special knowledge is needed in navigating them, while special flat-bottomed vessels are required as run boats. The gill net is the only important apparatus in use.

In 1889 a company known as the Central Alaska Co. built a cannery on Wingham, or Little Kayak Island, about 15 miles west from Cape Suckling. It made a pack that year, and the following spring was moved to Thin Point, on the southern side of the Alaska Peninsula.

The Peninsula Trading & Fishing Co. built a cannery on the same island in 1889. In 1891 it was moved to one of the sloughs of the Copper River delta, known as Coquenhena, and operated in 1891. It was closed in 1892 and 1893. The Pacific Steam Whaling Co. operated it until 1897, when it was abandoned.

In 1916 the Hoonah Packing Co. built and operated a cannery near the mouth of Bering River.

Louis Sloss & Co., of San Francisco, built a cannery under the title of Pacific Packing Co. in 1889 at the extreme eastern end of the sound, close by the present site of Cordova, and called it Odiak. The cannery was closed in 1892. In 1893 it joined the Alaska Packers Association and was operated each season until 1905. In 1906 the buildings and site were sold to the Copper River & Northwestern Railroad Co., which was preparing to build a railroad from Odiak to the headwaters of the Copper River.

In 1889 the Pacific Steam Whaling Co. built a cannery close by the Odiak plant, but in the spring of 1895 it was moved to the spot now known as Orca, about 3 miles north of Cordova. Except in 1892, it has been operated ever since. In 1901 it was taken into the Pacific Packing & Navigation Co. combination. When the latter's assets were sold in 1904, this cannery was not included in the sale, as at the time the plant was under lease to Capt. Omar J. Humphrey. In 1905 it was sold to the Northwestern Fisheries Co., which had purchased most of the Alaska plants of the defunct company, and they have operated it since.

In 1915 the Copper River Packing Co. built a cannery on the Copper River at Mile 55, and made a pack the same year. The cannery uses no run boats, but has an arrangement with the Copper River & Northwestern Railroad Co. to haul the fish from the fishing stations to the cannery, and bring the finished product to Cordova for shipment by steamer.

The Canoe Pass Packing Co., which had built a cannery at Canoe Pass, southeast Alaska, in 1912, and had not operated it subsequently, in 1915 moved the machinery to Cordova and installed it in a rented building and made a pack.

This year (1916) the Carlisle Packing Co. built a cannery at Cordova, while the Clark-Graham Co. built one at Eyak, a few miles away.

COOK INLET.

While this great inlet has an abundant supply of salmon, it is one of the most difficult sections in all Alaska in which to fish successfully. The tides and currents in the inlet are strong and treacherous, increasing in height and force as its head is approached, where the tide comes in with a bore which is extremely dangerous to small craft. Shoals make out a long distance from shore and are continually changing.

The first cannery to be built on the inlet was in 1882, when the Alaska Packing Co., of San Francisco, built one at Kasilof, on the right bank of the Kasilof River at the mouth, utilizing the available machinery from the cannery built by the Cutting Packing Co. at old Sitka in 1878. In 1885 this cannery was sold to the Arctic Fishing Co. In 1890 the loss of its cannery ship forced it to close that season. In 1893 it joined the Alaska Packers Association. At the height of the season of 1905 the plant was burned. It was rebuilt the next spring and has been operated each year since.

The cannery of the Northern Packing Co. was built in 1888 on the eastern side of Cook Inlet, at Kenai, at the mouth of the Kaknu River. It was operated up to and including 1891. In 1893 it joined the Alaska Packers Association, but has not been operated since 1891.

In 1897 the Pacific Steam Whaling Co. built a cannery at Kenai, but did not install the machinery and operate it until the next year. In 1901 this cannery was taken over by the Pacific Packing & Navigation Co. In 1903 the plant burned down. Upon the sale of its assets in 1905 the site passed to the Northwestern Fisheries Co. In 1910 the company put up a new plant here and has operated it continuously since. During the period when the site was unused a mild-curing establishment was operated here by the San Juan Fishing & Packing Co. in 1907 and 1908. This plant was burned down just before the fishing season of 1916 began.

In 1890 George W. Hume, of San Francisco, built a cannery at Kasilof, on the right bank of the river, about half a mile above its mouth. It was operated in 1890, 1891, and 1892. In 1893 it joined the Alaska Packers Association and was consolidated with the plant of the Arctic Fishing Co.

C. D. Ladd operated a saltery on the left bank and at the mouth of the Chulitna River, about 6 miles above Tyonek. This saltery was purchased by the Alaska Salmon Association in 1899. The following spring it erected a cannery here and made a small pack. It was operated also in 1901 and 1902, and then abandoned.

In 1907 J. A. Herbert & Co. established a saltery at English Bay and operated it until 1910.

In 1911 the Seldovia Salmon Co. built a cannery at Seldovia and operated it continuously to date. Late in 1915 the company went into the hands of a receiver. In 1916 it was reopened by the Columbia Salmon Co.

In 1912 the Fidalgo Island Packing Co., which already operated a cannery at Ketchikan, in southeast Alaska, built a cannery at Port Graham, at the lower end of the Kenai Peninsula. A pack was made that year and each year since.

The same year Libby, McNeill & Libby built a cannery at Kenai and operated that year and each subsequent year.

In 1915 the Deep Sea Salmon Co., which operates a cannery in southeast Alaska, built a plant near Knik, on the west side of Cook Inlet, and made a small pack.

AFOGNAK ISLAND.

Afognak Island lies to the northwest of Kodiak, and it is separated from it by a narrow strait.

In 1889 the Royal Packing Co. built a cannery at the head of Afognak Bay and operated it in 1889 and 1890. It became a member of the Alaska Packers Association in 1893. It has not been operated since 1892.

The Russian-American Packing Co. in 1889 built a cannery immediately above that of the Royal. It was operated in 1889 and 1890. In 1893 it became a member of the Alaska Packers Association. It has not been operated since 1890.

In accordance with an act of Congress approved March 3, 1891, the President, by proclamation of December 24, 1892, set aside the whole island and within 1 mile from the shores thereof as a fish-cultural reserve for the use of the United States Commission of Fish and Fisheries. As a result of this action both canneries were forced to move from the island entirely.

KODIAK ISLAND.

This island has been the scene of some of the best fishing in Alaska. The Russians early settled here, one of the most fertile spots in the usually sterile soil of Alaska, and undoubtedly they must have prosecuted the fisheries from an early date, although but little data are extant showing their operations in this line.

Karluk River and Lagoon.—One of the greatest salmon streams in the world is the Karluk River, and although extensive fishing operations have been carried on for many years, it still produces, annually, a large pack of canned salmon, and has the distinction of having produced more salmon than any other river in Alaska. An exceptionally heavy run occurred in 1916.

It will doubtless surprise most readers when it is stated that the river which has yielded so many countless thousands of salmon is only 16½ miles in length. The river has its source in two lakes; the larger of these is about 8 miles long and the smaller 3 miles long. The mouth of the river is about 2 miles above the canneries, and spreads out here into a lagoon. This lagoon has at the head a width of about 300 yards, and gradually widens until it is nearly half a mile across as it approaches the spit. The lagoon has a general east and west direction, is about 2 miles in length, and, except for the shingle spit which is thrown across its mouth by the action of the sea, its shores are bluff, rising from about 50 to 100 feet. The spit is three-fourths of a mile long with an average width of about 200 feet. The outlet of the lagoon is only 90 feet wide at its mouth. The western side of the mouth of the lagoon is Karluk Head, a precipitous mountain mass about 1,600 feet high.

The outer side of the spit is where the fishing is carried on. Haul seines are used exclusively. As bowlders used to be common here it was necessary to remove a number of them in the early days when a seine shore was to be prepared. The red salmon run here is an exceptionally long one, the season extending from about the middle of June to about the middle of September. The other species of salmon also run here; sometimes humpbacks appear in large numbers. As the beach is open to Shelikof Strait, in which storms are frequent, seining is often interrupted.

As early as 1867 the salting of salmon was carried on at Karluk. In 1870 the Alaska Fur Trading Co. and the Alaska Commercial Co. began to salt salmon and continued this on a gradually expanding scale.

In 1882 Smith & Hirsch, who had been engaged in salting on Karluk Spit, built the first cannery on Kodiak Island. After operating it until 1884 it was organized under the title of the Karluk Packing Co., and packed under that name every year until 1911, when canning operations were transferred to the new cannery in Larsen Bay. In 1893 it joined the Alaska Packers Association.

The Kodiak Packing Co. in 1888 built a cannery on the eastern side of the spit and operated it in 1888, 1889, 1890, 1891, and 1893. It joined the Alaska Packers Association in 1893, but has not been operated since that season.

The Hume Packing Co. built a cannery on the spit about 400 yards westward of Kodiak cannery in 1889. In 1892 it was consolidated with the Aleutian Islands Fishing & Mining Co., which had built a cannery about 100 yards westward of the Hume cannery in 1888. In 1893 the consolidation became a member of the Alaska Packers Association. This plant was not operated in 1900.

In 1888 the Alaska Improvement Co. built a cannery on the left bank of the outlet, opposite the point of the spit and facing the Shelikof Strait. It was ready to pack in 1888, but was not operated on account of the loss of its cannery ship, the *Julia Ford.* In the spring of 1897 it was sold to the Alaska Packers Association and has since been operated by that company.

In 1893 the Hume Canning & Trading Co. built a cannery on the beach under Karluk Head, about three-fourths of a mile northward of the Alaska Improvement Co., in what is known locally as Tanglefoot Bay. It was operated in 1893 and 1894, and in 1895 it was sold to the Alaska Packers Association and operated by that company. It has been closed since.

The great increase in the number of canneries in Alaska in 1888 and 1889 caused such an enlargement of the pack that the markets became glutted, and it was soon apparent that steps would have to be taken to reduce the output if the operators were to avoid bankruptcy.

Capt. Moser in "Salmon and salmon fisheries of Alaska"[a] thus describes the attempts of the canners to find a working solution of this important problem and the final result of their endeavors:

In 1890 the three canneries at Chignik combined under an operating agreement known as the Chignik Bay Combination, under which the plant of the Chignik Bay Co. was operated, the three canneries sharing the expense and dividing the output equally. This arrangement remained in force during the seasons of 1890 and 1891. Its evident success in 1890 probably led to the local combinations on Kodiak Island in 1891, and then to the association which now exists.

The large packs during this period and the glutted market caused the cannery interests to devise some scheme to meet the conditions. The combination at Chignik in 1890 permitted the pack to be made there at a lower rate and, as previously stated, it was continued in 1891. The same year (1891) the canneries at Karluk, Uyak, and Afognak entered a combination, under the name of the Karluk River Fisheries, under which it was agreed that each cannery should have a quota of fish from the several localities, based upon the average packs of each cannery in 1889 and 1890. The estimated pack for the canneries interested was placed at 250,000 cases, and upon this estimate the apportionment of the work at each cannery was made. Under this agreement four of the eight canneries were closed, their quota being packed in the other four canneries as follows, viz, that of the Royal at the Karluk, of the Arctic at the Kodiak, of the Aleutian Islands at the Hume, and of the Russian-American at the Alaska Improvement.

In the summer of 1891 the Kodiak Packing Co. and the Arctic Packing Co., both at Alitak Bay, also had a mutual agreement under which only one cannery, the Arctic, was operated, the quota of fish of the Kodiak being packed in the Arctic cannery. By these combinations the full pack of the Karluk district was made in half the number of canneries and the expense of packing very considerably reduced.

In September, 1891, the Alaska Packers Association was formed to dispose of the unsold salmon of that season's pack (some 363,000 cases) and five trustees were appointed to manage the business. This association was not incorporated and expired after the salmon were sold.

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[a] The salmon and salmon fisheries of Alaska. Report of the operations of the U. S. Fish Commission steamer *Albatross* for the year ended June 30, 1898. Bulletin U. S. Fish Commission, vol. XVIII, 1898, d. 18-21.

The successful operation of these arrangements led, in 1892, to an arrangement in which nearly all (31) of the canneries joined, entering under the name of the Alaska Packing (not Packers) Association, for the purpose of leasing and operating and therefore controlling the canneries and reducing the Alaska pack for that year, it being found too great for the market's demands. All the canneries in operating condition in 1892 were members of this association except the following: Metlakahtla Industrial Co., at Metlakahtla; Boston Fishing and Trading Co., at Yes Bay; Baranoff Packing Co., at Redfish Bay; Chilkat Canning Co., at Pyramid Harbor; Alaska Improvement Co., at Karluk; and the Bering Sea Packing Co., at Ugashik.

The association was regularly incorporated on January 13, 1892, and shares were distributed on the basis of 1 for each 2,000 cases packed in 1891, and the profits were divided equally on all shares regardless of the amount of profits derived at the different points. Of the 31 canneries, 9 were operated by the association, while the others were closed, the Alaska pack being reduced one-half.

The year 1893 found the Alaska Packers Association organized and incorporated February 9. This association was formed from the canneries that had joined the Alaska Packing Association of 1892, except the Pacific Steam Whaling Co., at Prince William Sound, and the Peninsula Trading and Fishing Co., the latter's cannery having been moved from Little Kayak Island to the Copper River delta in 1891.

The agreement of 1893 was similar to that of 1892, except that the amount of profit was taken into consideration in addition to the probable average quantity which could be packed at the different points. This was subject to adjustment for each district and no arbitrary rule was followed. Each cannery entering the association was obliged to purchase an additional amount of stock, equaling two-thirds of the number of shares received by it for its plant; that is, a company which received 1,500 shares for its plant was required to purchase 1,000 shares additional. The money received from this sale of extra stock was used as working capital. No shares were sold to the general public, the owners of canneries subscribing for the full amount.

This association was then and is now (1916) the largest operator in Alaska, and, with its three canneries on Puget Sound, is also a factor in that region

At a number of its canneries the association has always maintained physicians, whose services and supplies have been free to its own employees and to all natives applying for medical advice and medicines. This service has been of incalculable benefit to the latter, a large proportion of whom suffer from disease in some form or other.

Alitak Bay.—Alitak Bay, or the "South End," as it is termed locally, is a deep indentation, with several arms, on the southwestern end of Kodiak Island, about 65 miles from Karluk. The seine is the principal apparatus used here.

In 1889 the Arctic Packing Co. built a cannery in the southwest bight of Olga Bay, which is a branch of Alitak Bay and is connected with it by a long, narrow passage. In 1893 it entered the Alaska Packers Association.

In 1889 the Kodiak Packing Co. built a cannery at Snug Harbor, a cove in the passage connecting Olga Bay with Alitak Bay, and operated it in 1889 and 1890. Its quota of fish was packed by the Arctic Packing Co. in 1891. In 1893 it joined the Alaska Packers Association and the same year was dismantled.

Uyak Bay.—Uyak Bay is on the northwestern side about the middle of Kodiak Island and is a considerable body of water with ramifying arms. On the western shore, near the entrance and about 18 miles from Karluk, is Uyak Anchorage. The harbor is formed by the main shore of the island and Bear and Harvester Islands, and is frequently used as an anchorage by cannery ships and the steamers from Karluk during bad weather. As there are no red salmon streams in Uyak, fishing is carried on elsewhere. Most of it is at Karluk Spit.

In the spring of 1897 the Pacific Steam Whaling Co. and Hume Bros. & Hume built canneries on the main shores at Uyak Anchorage. In 1901 both plants became a part of the Pacific Packing & Navigation Co. and were operated by it. In 1905 the Uyak plants were purchased by the Northwestern Fisheries Co., and the same year one of the plants was destroyed by fire and was not rebuilt. The remaining plant has been operated each year since.

Five miles southeast from Uyak Anchorage is a narrow arm called Larsen Bay. It is 4 miles long. Immediately within the entrance on the northern shore is the site of the cannery of the Arctic Packing Co., which was built in 1888, and operated in that year and 1889 and 1890, since which date it has been closed. In 1893 it became a part of the Alaska Packers Association and in 1896 it was dismantled.

As the association had lost several ships while loading at Karluk, it finally decided to move its plants from that place, and in 1911 a cannery was built at the old site on Larsen Bay and from that time all cannery operations formerly carried on at Karluk have been performed at this plant.

Uganuk Bay.—This bay is next to the eastward of Uyak. For several years a saltery was operated here by Oliver Smith, who sold it to the Alaska Packers Association in 1896. The same year the latter built a cannery on the bay. It made a pack in 1896 and a partial pack in 1897. This cannery was abandoned in 1900.

Kodiak.—Salting operations have been carried on at this old Russian settlement for a number of years.

In order to furnish work for the natives, the Alaska Commercial Co. and Blodgett & Blinn salted the catches made by them in 1906 and subsequent years until 1912, when the Kodiak Fisheries built a cannery and has operated it each year since.

The Woman's American Baptist Home Missionary Society had carried on a home and school for native children on Wood Island, close to Kodiak, for some years. In 1902 the society established a salmon saltery here in order to furnish employment for the natives. No data are recorded in the official reports of further activities on the part of this plant.

CHIGNIK BAY.

Chignik Bay is on the southern side of the Alaska Peninsula and is the first important indentation after leaving Cook Inlet on the way to the westward. The bay is about 150 miles southwest of Karluk. On the westward side of the bay is a small deep bay known as Anchorage Bay. Several of the canneries are located here and the transporting vessels of all the canneries make their anchorage at this point. In the extreme southwest corner of Chignik Bay is the entrance to Chignik Lagoon. At the head of this lagoon, from which all the canneries draw their supplies of red salmon, is the mouth of the stream up which go the schools.

Chignik River is about 6 miles long, with an average width of 100 yards. The depth in the river is such that a boat can ascend only at high water. The river has its rise in two lakes, each about 10 miles long.

Red salmon predominate in the runs, although all five species are to be found. A run of very small red salmon, weighing about 2 pounds, and known as Arctic salmon, appears here every year.

Practically all of the fishing here is with traps, although gill nets and seines have also been used at times.

This bay, next to Karluk Spit, has been the scene of more bitter fights for supremacy in canning than any other place in Alaska.

In 1888 the Fishermen's Packing Co., of Astoria, Oreg., sent a party to Chignik Bay to prospect for fish, and they returned in the fall with 2,160 barrels of salt salmon.

The next year, this company, operating under the name of the Chignik Bay Co., built a cannery on the eastern shore of the Lagoon, 2½ miles from the entrance.

The same year the Shumagin Packing Co., composed of capitalists from Portland, Oreg., and the Chignik Bay Packing Co., of San Francisco, built and operated canneries close to that of the Chignik Bay Co. All three of these companies soon arrived at a working agreement and finally combined into one organization. All were operated in 1889, 1890, and 1891. In 1892 they all joined the pool of the Alaska Packing Association, and the cannery of the Chignik Bay Co. alone operated. In 1893 they all became members of the Alaska Packers Association.

Since 1891 only the cannery of the Chignik Bay Co. has been operated. The Shumagin building has been moved alongside the former and the machinery consolidated, so as to form practically one large cannery.

In the spring of 1896 Hume Bros. & Hume built a cannery on the eastern side of Anchorage Bay and made a pack that year and in 1897.

The same spring the Pacific Steam Whaling Co., built a cannery one-fourth of a mile south of the Hume cannery, and made a pack that year and in 1897. In 1901 this plant, also that of Hume Bros. & Hume, became part of the Pacific Packing & Navigation Co. The failure of this company in 1904 threw its properties onto the market and most of them, including the two Chignik canneries, were purchased by the Northwestern Fisheries Co., which in 1905 shut down the Hume Bros. & Hume plant for good and has operated the other plant ever since.

In 1910 the Columbia River Packers Association built and operated a cannery on Anchorage Bay, and has operated it every year since.

ALASKA PENINSULA.

Of recent years canneries have been located on the Bering Sea side of the Alaska Peninsula, outside of Bristol Bay proper, but it is probable that their numbers will not be large in the future as the fisheries tributary to them are not very extensive, and are also very much scattered, making transportation expensive.

Port Heiden.—This important indentation on the Bering Sea side of the Alaska Peninsula, about midway between the Ugashik River and Port Moller, has never figured to any considerable extent in fishing operations. In 1912 and 1913 Gorman & Co. had the schooner *Harriet G.* located here throughout the season, engaged in salting salmon.

Port Moller.—This great indentation in the Alaska Peninsula, between Port Heiden and Nelson Lagoon, was neglected for many years for the more profitable Bristol Bay region.

About 1902 the Bering Sea Packing & Trading Co. (there seems to be some confusion between this name and that of the Peninsular Packing Co., the latter being the name the company was known by after the first year or two in the official records), established a saltery on Bear River, a tributary of Port Moller, and operated it until 1906, after which operations were suspended and but little is now left of the plant.

In 1912 the Pacific American Fisheries erected a cannery on Port Moller, but it was not operated until 1913. This concern has been successful mainly because of its introduction of purse seines in fishing operations.

Nelson Lagoon.—Nelson Lagoon is on the Bering Sea side of the Alaska Peninsula, is about 6 miles in length and about 2 miles in width. At its western end debouches the Nelson River, which is about a mile wide at its mouth. About 18 miles from the mouth the river divides, both branches having their rise in lakes. There is an easy portage from the lakes to Pavlof Bay, on the Pacific side of the peninsula, and this route is used frequently by both white men and Indians.

The run is mainly of red salmon, and gill nets and traps are utilized. During the last few years purse seines have been used in this region with considerable success.

In 1902 Charles Johnson, who had operated on the Ugashik River, established a saltery here and operated it under the name of the Lagoon Salmon Co., and made a pack that and the succeeding year. In 1904 and 1905 it was shut down. It was reopened in 1906 and continued to operate until it was sold in 1914, and in 1915 the new owners, the Nelson Lagoon Packing Co., built and operated a cannery here.

Unalaska Island:—This year (1916) the Pacific American Fisheries, having obtained a permit from the Department of Commerce, built a cannery at Unalaska, on Unalaska Island. This cannery is located inside of the Aleutian Islands reserve, and permit was given for its building and operation so that it might be possible for the Indians of Unalaska and Dutch Harbor to obtain work at home and save them the long trip to the Bristol Bay plants.

Ozernoy.—In 1889 a cannery, under the title of the Western Alaska Packing Co., was built at Ozernoy, on the western side of Stepovak Bay, south side of the Alaska Peninsula. It packed that year and in 1890, but the fish were so scarce that the cannery was dismantled in 1891 and the site abandoned.

Nothing was done with it for some years, but about 1905 Bostrop Omundsen located there and established a saltery. In the winter of 1912–13 August Lindquist purchased a half interest in the plant and it was operated under their joint names until the death of the senior partner in the fall of 1915; since then it has been operated by the former alone.

Thin Point.—Thin Point is on the southern side of the Alaska Peninsula, near its extreme western end. A saltery was operated here for several years, until the Thin Point Packing Co. was organized by Louis Sloss & Co., of San Francisco, and the cannery was built in 1889. It was operated in 1889, 1890, and 1891, and was closed after that date. In 1890 the cannery ship *Oneida*, en route for this place, struck on the Sannaks in April and nearly all of the 77 Chinese on board were lost. In 1893 the plant became a member of the Alaska Packers Association. In 1894 the cannery was moved to the Naknek River, in Bering Sea, and became a part of the cannery of the Arctic Packing Co.

The Alaska Packers Association operated a saltery at Thin Point in 1894, 1895, and 1896, and then abandoned the place.

The cannery of the Central Alaska Co. was moved in 1890 from Little Kayak Island, near Katalla, to Thin Point. It operated during 1890 and 1891, was closed in 1892, and in 1893 joined the Alaska Packers Association, but was no longer operated. In 1895 the available machinery was moved to Koggiung on the Kvichak River, in Bering Sea.

In 1908 Osmund & Andersen established a saltery at Thin Point and operated it in 1908, 1909, and 1910.

In 1911 the Pacific American Fisheries built a cannery at King Cove, on the south side of the Alaska Peninsula, a few miles east of Thin Point, and in the fall purchased the saltery. The cannery was operated in 1911 and each year since.

SHUMAGIN AND SANNAK ISLANDS.

Small salteries have been operated at different places on the Shumagin and Sannak groups. The plants have usually been rude and primitive affairs and were operated whenever the price of salted salmon was high enough to justify same. As the ownership, and the location in many instances changed frequently, no attempt has been made even to list them.

BERING SEA.

The great redfish producing section of the world is in the Bristol Bay section of Bering Sea. This bay lies in the eastern section of Bering Sea, inside of a line drawn from Port Moller to Cape Newenham, and a number of important rivers debouch into it, in all of which the annual runs of salmon, especially reds, are important.

Bristol Bay is considerably off the line of steamship travel, and as a result the companies operating here are compelled to have ships in which to bring up their employees and supplies in the spring and to take back the men and prepared products in the late summer or early fall when the season has ended.

Cannery ships belonging to the Nushagak plants are taken into the bay and anchored as near the canneries as possible. Owing to shoals this can not be done on Kvichak Bay and the Naknek and Ugaguk Rivers. In the early days of the fisheries the ships running to the latter canneries were brought as close to the plants as possible, unloaded by means of scows, and then taken to the Nushagak for shelter. When their numbers were too great to permit of this they were moored in the open about 5 miles off the point separating Kvichak Bay and Naknek River, where the anchorage is good and the vessels have very little trouble in riding out storms. Usually the captain and a boy are left aboard the ship.

NUSHAGAK RIVER AND BAY.

The Nushagak River, sometimes called the Tahlekuk, with its tributaries, and the Wood River, which enters the head of Nushagak Bay close by the mouth of the Nushagak, form a favorite resort of the red salmon, while all other species also ascend them.

But little is known of the upper courses of the Nushagak River, except that they drain the region between Lakes Clark and Iliamna on the east and the Kuskokwim on the west.

The river is said to be 200 miles long to the first lake, a large one. Beyond this lake there are three other smaller lakes, all connected by short stretches of river. The largest tributary of the river is the Malchatna, which enters it about 100 miles from the mouth. There are also several small tributaries, two of these being Tikchik River and Portage Creek. There are three or four Indian villages on the Nushagak, Kaknak being the largest. A launch drawing 3 to 3½ feet of water can navigate about 120 miles from the mouth. It is necessary to use a "bidarka" to go into the upper reaches. There are four rapids, around which a portage must be made in each case.

The river on its lower course is large, and flows a great quantity of water into the head of Nushagak Bay.

Wood River is about 24 miles long from its mouth to the first lake. Shoals and bars are frequent in the river, the depth on these at low water being 2½ feet and at high water 4 feet.

Aleknagik Lake, the first of the chain of three, is about 24 miles long, and has an average width of about 2 miles.

Wood River is noted especially for the interesting counting experiment the Bureau of Fisheries is carrying on here. This very important work was first taken up in 1908, as an indirect result of the order closing Wood and Nushagak Rivers to the commercial fishermen, as noted below, and has been continued, with the exception of 1914, to the present time. This work is made possible by the generosity of the Alaska Packers Association of San Francisco and the Alaska-Portland Packers Association of Portland, Oreg., who furnish the material and erect the barricade, also the labor needed throughout the season, while the Bureau of Fisheries furnishes the personnel required to carry on the direct work of counting the fish and making other observations.

A rack or trap is constructed across the foot of Lake Aleknagik, at a constriction in the lake contour something more than 200 yards wide, for the purpose of intercepting all salmon entering the lake and passing them through gates or tunnels at such a rate and in such a manner that an accurate estimate of their numbers can be obtained. The pot of the trap is located near the left bank, and this has three gates by which the salmon can be passed from the pot into the lake. Each gate is 2 feet in width, and its bottom rests on a wooden platform covered with white oilcloth, so that the fish can readily be seen as they pass over it when the gate is raised. When fish are passing through a gate a small wooden frame with a glass center is arranged so it will float on the water, and in order to hold it in position it is fastened to the framework of the gate. This is for the purpose of making the water smooth so the fish can readily be seen even though the surface be disturbed by ripples, etc.

When the fish are coming rather slowly every one is counted by means of a tally register as it passes out through the gates. When the large run comes the following method is employed: An actual tally of every salmon passing through is made for one minute, and this is repeated 15 minutes later, the number passing through for one minute being regarded as the average for 15 minutes. A sheet with the whole day divided into quarter hours is kept ready at the gate and the number for one minute as taken from the tally register is immediately entered thereon by the attendant who made the tally. From these figures the total for the day is obtained. During only a small part of the season has it been found necessary to resort to this method of estimating the run.

The following table shows for each year since 1908 the commercial catch of salmon made in Nushagak Bay, the number of fish passing from Wood River into Lake Aleknagik, the total of both and the percentage of salmon that escaped the fishermen:

Years.	Nushagak Bay catch.	Wood River tally.	Total.	Per cent of escape.
1908	6,140,031	2,600,655	8,740,686	30
1909	4,687,635	893,244	5,580,879	16
1910	4,384,755	670,104	5,054,859	13.2
1911	2,813,637	354,299	3,167,936	11.1
1912	3,866,950	325,264	4,192,214	7.7
1913	5,236,008	753,109	5,989,117	12.5
1914	6,074,432	(a)	....	....
1915	5,616,457	259,341	5,875,798	.4
1916	....	551,959	....	....

a Work not carried on this year.

Snake River, a tributary of Nushagak Bay, is about 30 miles in length, very crooked, and has its rise in a single lake close by Aleknagik Lake. There is an Indian village on the river just below the lake. Red salmon are abundant in this stream.

Igushik River is about 50 miles in length and enters Nushagak Bay about 4 miles above Nichols Hills. So far as known it has its source in two lakes—Amanka and Ualik. A short distance below the first lake there are rapids and a small falls. The quite large Indian village of Yacherk is located here, and the natives do most of their fishing in the rapids. Peter M. Nelson established a saltery about 10 or 12 miles above its mouth in 1902, and operated it until he sold it to the Alaska Fishermen's Packing Co., who have operated it since. There is a small Indian village close by the saltery.

Nushagak Bay, in which practically all the fishing is carried on, is about 35 miles long and from 5 to 15 miles wide. Sand bars and mud flats, which are visible at low water, occupy the greater part of its area.

The drift gill net is the favorite apparatus in this bay, although a few traps are also used. The fish begin to run very early here. Kings usually appear about June 5, reds about June 5 to 8, cohos appear either late in June or early in July, chum salmon about the middle of June, and humpbacks about the same time.

Considerable fishing was carried on in both the Nushagak and Wood Rivers until in 1908, when, as a result of a hearing held by the Secretary of Commerce and Labor on December 16 and 17, 1907, it was decreed that beginning January 1, 1908, "it is hereby ordered that until further notice Wood River, a tributary of Nushagak Bay, in the district of Alaska, and the region within 500 yards of the mouth of said Wood River be closed to all commercial fishing, and that all commercial fishing be prohibited in Nushagak River proper."

The earliest fishing by whites in the Bristol Bay section was for salting purposes by the trading companies, more particularly the Alaska Commercial Co., which had an important station at Fort Alexander on Nushagak Bay. Petroff, in the census report of 1880, refers to exports from this section of "from 800 to 1,200 barrels of salted salmon per annum from the Nushagak River."

In 1883 the schooner *Neptune* visited the Nushagak on a salting trip. The next year the Arctic Packing Co. erected a cannery here and made a trial pack of 400 cases. This was the first cannery to operate in Bering Sea. It was located close to the Moravian mission. This cannery eventually became a member of the Alaska Packers Association, and has not been operated for several years.

The second cannery to be built was by an Astoria company, the Alaska Packing Co., and it was erected on the western side near the head of the bay and about 1½ miles below the mouth of the Wood River. It has been operated every year to date, being since 1893 a member of the Alaska Packers Association. It is popularly known as the "Scandinavian" cannery.

In 1886 the Bristol Bay Canning Co. was organized by San Francisco parties, and built a cannery on the western shore of Nushagak Bay in a bend about 2 miles below the cannery of the Alaska Packing Co., at a place called Dillingham. It became a member of the Alaska Packers Association in 1893 and was operated each year until 1907. A couple of years later it was dismantled. This plant was popularly known as the "Bradford" cannery.

The Nushagak Canning Co. built a cannery on the eastern shore of Nushagak Bay in 1888, at a place known as Clark Point, 5½ miles below Fort Alexander. This cannery also became a member of the Alaska Packers Association in 1893, but from 1891 to 1901 was not operated, but held in reserve. In the last named year a large double cannery was built here and put into operation and has been operated each year since.

This company also built and operated a saltery on the Igushik River in 1886. Three years later it was moved to the mouth of the Nushagak. In 1893 C. E. Whitney & Co. purchased an interest in it and by 1899 owned it all. In 1902 the saltery was sold to the Alaska Packers Association, which closed it down.

In 1899 the Pacific Steam Whaling Co. built a cannery and commenced canning on the eastern shore of Nushagak Bay at Fort Alexander, or Nushagak village. This cannery was purchased by the Pacific Packing & Navigation Co. in 1901 and upon the sale of its properties in 1904 became a part of the Northwestern Fisheries Co. It has been operated each year since the latter company acquired it.

The same year the Alaska Fishermen's Packing Co., of Astoria, built a cannery immediately below that of the Pacific Steam Whaling Co., and operated it every year to date, control of the company passing to Libby, McNeill & Libby in 1913.

In 1901 the Columbia River Packers' Association, the Alaska-Portland Packers Association, and the Alaska Salmon Co., all built canneries on the Nushagak and have operated them to date, except the last named in 1909, when its supply ship was wrecked. The Alaska Fishermen's Packing Co. also built a saltery here. The latter plant was abandoned in 1904.

In 1903 the North Alaska Salmon Co. operated a new cannery on the Nushagak, a few miles below Clark Point.

In 1910, on August 10, shortly after the packing season had ended, the plant of the Alaska-Portland Packers Association was completely destroyed by fire. The plant was rebuilt in time to operate the next season.

KVICHAK RIVER AND BAY.

The Kvichak River is about 80 miles in length, varies from 100 yards to a mile in width, and discharges a vast quantity of water. The influence of the tide is felt 30 miles from the mouth. The current is very swift, running in places as much as 7 miles an hour. The upper half of the river is filled with low, grassy islands, the channels in many places being quite narrow. A launch drawing 3 feet of water can reach Lake Iliamna with very little difficulty. In most sections there are over 2 fathoms of water in the channels. The river drains Iliamna Lake, the largest lake in Alaska, which is about 90 miles long and about 30 miles wide, and Lake Clark. There are a number of Indian villages along the shores of the river and lakes.

Practically all of the fishing here is carried on in Kvichak Bay, gill nets being the favorite form, with also a couple of traps set in the lower part of the river. As it is not convenient for the fishermen to bring the catch to the canneries, large house lighters and scows are moored in convenient places and the fishermen live aboard the former, while the fish are put aboard the latter and taken to the canneries by the run boats. The numerous shoals in the bay seriously impede both fishing and navigation.

The first fishing operations on the Kvichak were in 1894, when the Prosper Fishing & Trading Co. and the Alaska Packers Association each established a saltery and operated that year and in 1895; in 1896 the latter purchased the plant of the former and consolidated the two.

In 1895 the Point Roberts Packing Co., which was owned by the Alaska Packers Association, built a cannery at Koggiung, the site of the former saltery, and operated it the next year.

In 1900 there was a considerable development in this region. The Kvichak Packing Co., owned by the Alaska Packers Association, built a cannery on the northern point of entrance to Bear Slough, while the North Alaska Salmon Co. built two canneries about 1,000 feet apart on the left bank of the Kvichak, about 6 miles above Koggiung.

The latter company built a cannery at Hallerville on the Alagnak River, a tributary of the Kvichak, in 1904. In 1913 a large new cannery to take the place of the Hallerville plant was built on the lower side of Pedersen Point, lower down on Kvichak Bay.

The second plant of the Alaska Packers Association, known as the Coffee Creek plant, was burned down in 1906. It was rebuilt in 1908 and operated again in 1909, and has been operated continuously ever since.

In 1904 the Union Packing Co. established a cannery on the left bank a little distance above the canneries of the North Alaska Salmon Co., having moved this plant from its original location on Kell Bay, in southeast Alaska. It was operated until 1907, when it was abandoned.

About 1905 the Northwestern Packing Co. built a saltery on the east side of the bay. In 1908 it was sold to and operated by Nelson, Olsen & Co., who in 1910 sold it to the Alaska Fishermen's Packing Co., which the following year turned it into a cannery. In 1913 Libby, McNeill & Libby bought this and the Nushagak plant, and continued to operate them under the old name.

NAKNEK RIVER.

But little is known of the Naknek River for more than 10 or 15 miles from its mouth. It is said that the river is about 60 miles long, and has its rise in a lake which is of considerable size. With the exception of a short series of rapids, up which it is possible to haul a boat with a rope from the shore, the river is navigable for small craft. Shoals and banks, many of which uncover at low water, are abundant in the lower course of the river.

Red salmon is the principal species entering this river, although all the other species are to be found here in lesser abundance. They appear here a little later than in the Nushagak Bay. Only gill nets are used in fishing.

The first commercial fishing on the Naknek River was in 1890, when the Arctic Packing Co. built and operated a saltery on the east bank about 4 miles from the mouth. This plant was sold to the Alaska Packers Association in 1893, and the next year the latter built a cannery here, and made the first pack in 1895, and has operated it every year since. Ultimately the saltery was merged with the cannery.

In 1901 the association built another cannery about a mile nearer the mouth, and in 1911 still another was built close to the mouth.

In 1890 L. A. Pedersen built and operated a small saltery on the right bank about 3 miles from the mouth. In 1894 the Naknek Packing Co. purchased the saltery and erected a cannery a short distance above. This saltery and another built on the shore of Kvichak Bay in 1897 were operated for some years. In 1907 the latter was turned into a cannery and operated by Mr. Pedersen under the name of the Bristol Bay Packing Co. The Naknek Packing Co. cannery has been operated to date.

In 1916 the Red Salmon Canning Co. built and operated a cannery between the plants of the Naknek Packing Co. and the Bristol Bay Packing Co.

UGAGUK RIVER.

According to the natives this river, which is frequently called the Egegak, or Igagik, is about 80 miles long from the mouth to Lake Becharof, at the head. The lake itself is about 45 miles long and 15 miles wide. The river is navigable for small boats to within 10 miles of the lake, whence there is a succession of rapids, around which it is necessary to portage. The lower part of the river has numerous shoals, some of which are exposed at low water. King Salmon River, the principal tributary, enters about 7½ miles from the mouth.

The red salmon is the principal species, although all the other species are found in much lesser abundance. Gill nets alone are used here.

In 1895 the Alaska Packers Association established a fishing station on the right bank about 5 miles from the mouth and operated as a saltery until 1900, when the apparatus was moved to the cannery site.

In 1899 the Alaska Packers Association, under the name of the Egegak Packing Co., commenced building a cannery on the left bank opposite and a little above the salting station. This plant was finished in 1900 and packs were made that year and each succeeding year except 1905 and 1906.

In 1903 the North Alaska Salmon Co. built and operated a cannery on the opposite shore from the Alaska Packers Association, and has operated it each year to date.

UGASHIK RIVER.

This river has its rise in a chain of two lakes, but with the exception of that portion below the upper cannery, about 25 miles, it is very little known to the whites. The river is very tortuous in its course. It has two known tributaries—King Salmon River, which enters through the left bank about 17 miles from the bar at the mouth, and Dog Salmon River, which enters through the left bank about 37 miles from the bar. From Smoky Point to the capes at the mouth the river widens very greatly, being about 20 miles across at the mouth. Shoals are numerous, but there is a channel with about 9 feet at low water.

This river is essentially a red salmon stream, but the other species are also taken in small numbers, although the humpback is very scarce. This river is noted for the great falling off in the run of red salmon of recent years, 769,002 red salmon being taken in 1901, 1,640,973 in 1902, 1,703,536 in 1903, 564,492 in 1904, 432,779 in 1905, and 152,140 in 1906. Since 1906 the run has not improved. Gill nets are used here.

C. A. Johnson was the first man to operate commercially on this river, having erected a saltery on the left bank, about 23 miles above Smoky Point, in 1889, and operated it continuously from 1889 to 1898, both inclusive. This saltery was merged in the cannery of the Bering Sea Packing Co. In 1894 Mr. Johnson established and operated another saltery on the right bank of the river, about 12 miles from the bar, which he sold in 1899 to the Alaska Packers Association, who absorbed it in their cannery plant.

The Bering Sea Packing Co., a branch of the Alaska Improvement Association, in 1890 built the first cannery on the river, this being located on the left bank near the first Johnson saltery. A small pack was first made in 1891. The plant was closed in 1892 and 1893, and as the location had proven far from suitable, it was, in 1894, moved to a point on the left bank, about 15 miles above Smoky Point, where it was operated until 1896. The next year it was sold to the Alaska Packers Association. The machinery and equipment were utilized in the latter company's cannery, and the old location abandoned.

In 1893 Charles Nelson established a saltery on the left bank of the Ugashik, immediately above the last site of the Bering Sea Packing Co. It was operated in 1893 and 1894, and then sold to the Alaska Packers Association, who closed it down.

In 1893 the Alaska Packers Association also built a saltery on the left bank of the river about a mile below the last site of the Bering Sea Packing Co. It was operated each year until 1895, when it was merged into the association's cannery.

In 1895 the Alaska Packers Association built a cannery, known as the Ugashik Fishing Station, on the right bank of the river immediately above the pilot station, which is about 12 miles from the bar. It made the first pack in 1896 and packed every year until 1907, when it was closed. In 1906 its outfit was destroyed in the San Francisco fire, and it was decided to operate it as a saltery, but the burning down of the Coffee Creek cannery of the association on the Kvichak, caused a change in the plans, and a part of the saved outfit of the latter was sent to the Ugashik and the plant operated as a cannery.

The Bristol Packing Co. built a cannery on the left bank of the river about 25 miles from Smoky Point in 1900. A pack was made the same year and the plant operated continuously until 1906, when it was shut down, and a small salting crew operated a portion of the plant. Eventually the plant was dismantled without operating again as a cannery.

In 1901 the Alaska Packers Association built and put into operation another cannery about 15 miles up the river from the other one. In 1906 this plant was shut down and eventually it was dismantled.

In 1901 the Red Salmon Canning Co. also built and operated a cannery still farther up the river and has operated it continuously to date.

KUSKOKWIM RIVER.

This, one of the great rivers of Alaska, has been but little exploited as yet. Very little accurate data have been obtainable about the river until within the last couple of years, and this relates mainly to the bay and a few miles of the adjacent river, which the United States Coast and Geodetic Survey has charted.

We know that the river has considerable runs of salmon, but usually ice conditions have been such in the spring that a cannery crew frequently could not get in in time to prepare for the run. In 1906 a salting outfit was sent here by Seattle dealers, but arrived too late for the run of fish. The outfit was cached at Bethel.

During the last three years some mild curing of king salmon has been carried on here, but the lack of cold storage, both ashore and on the vessels operating to and from the river, has prevented any considerable development of this industry.

ARCTIC OCEAN.

Although it is known that there are good runs of salmon in some of the rivers debouching into the Arctic, the ice and other conditions have deterred people from attempting to extend their operations into this region. In 1912, however, the Midnight Sun Packing Co. built and operated a small cannery on Kotzebue Sound, in the Arctic Ocean. A small pack, mostly of Dolly Varden trout, was made in that and subsequent years.

BRITISH COLUMBIA.[a]

Fraser River.—This, the largest river in British Columbia (it is over 1,000 miles in length), has been important from a fishery standpoint ever since salmon canning was taken up as a commercial proposition.

The Hudson Bay Co. was the first to engage in the preparation of salmon for commercial purposes; the company bought the fish from the Indians and pickled them in barrels for export, mainly to the Hawaiian Islands and Asia. At times this export amounted to as much as 4,000 barrels a year. The company claimed a monopoly of the fisheries, but with the revocation of its license in 1858 this claim fell. Several salteries were subsequently established on the Fraser River by whites.

In the early sixties some canned salmon was prepared in a small way for local use, but the industry was not taken up commercially until 1867, when Ewen & Wise started at New Westminster. In 1870 Deas & Co. started at Deas Island. Of these two the only one to continue was Ewen & Co., who had succeeded Ewen & Wise, and they continued in business until they sold out to the British Columbia Packers' Association in 1902.

In 1872 Holbrook & Co. purchased a small cannery which had been started at Sapperton by Capt. Stamp sometime before, and operated it for a few years.

In 1876 there were three canneries running, consisting of Holbrook & Co., Ewen & Co., and the British Columbia Canning Co. (Deas Island).

The following year this was increased by English & Co. and Finlayson & Lane, the latter quitting after one season, being succeeded in 1878 by Lane, Pike & Nelson. King & Co., the British Columbia cannery (Annieville), and the Delta cannery also commenced operations the latter year.

In 1879 Holbrook & Co., and Lane, Pike & Nelson dropped out, and Haigh & Sons (succeeded in 1884 by the Bon Accord Packing Co.) commenced operations.

King & Co. were burned out in 1880, and Adair & Co., afterward known as the Wellington Packing Co., commenced. A year later Laidlaw & Co. commenced operations.

In 1882 the British Union Packing Co., afterwards known as the Harlock Packing Co., commenced packing salmon. The British-American cannery and J. H. Todd & Sons (Richmond cannery) also began operations.

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[a] The author is indebted to Henry Doyle, of Vancouver, British Columbia, for practically all of the historical data relating to the canning industry of British Columbia, and hereby expresses his deep appreciation for this and many other courtesies.

Joseph Spratt started a floating cannery, known as "Spratt's Ark," in 1883; he retired at the end of two years. E. A. Wadhams also began operations in 1883. In 1887 the Holly cannery was built on Lulu Island opposite Deas Island. The high water of June, 1894, partly destroyed it and the site was abandoned.

No more additional plants were built until Hobson & Co. started in 1889. The Canoe Pass Canning Co. also started the same year, as did J. H. Todd & Sons with their Beaver cannery.

The Anglo British Columbia Packing Co. was formed in 1891, taking over the canneries formerly operated by the British Columbia Packing Co. (old Annieville plant), E. A. Wadhams, British-American Packing Co., Canoe Pass Canning Co., Duncan & Batchelor (Britannia cannery), and English & Co. (Phoenix cannery).

In 1892 the Terra Nova Canning Co. began operations, and the next year the Lulu Island Canning Co., Steveston Canning Co., Pacific Coast Packing Co., Canadian Pacific Packing Co., Short & Squair, and Butimar & Dawson (at Steveston), all commenced operations.

In 1894 the Gulf of Georgia Canning Co., Dinsmore Island Canning Co., Sea Island Packing Co., and the Fishermen's Packing Co. all built and began to operate canneries.

The Alliance Canning Co., Atlas Canning Co., Boutiliar & Co., and the Star Canning Co. commenced operations in 1895.

There was considerable development in 1896, when the Anglo-American Canning Co., Fraser River Industrial Co., Hume & Co., Provincial Canning Co., Westham Island Packing Co., Westminster Packing Co., and the Vancouver Packing Co. all started canning.

In 1897 the Premier Canning Co., Sinclair Canning Co., Western Fisheries, Cleve Canning Co., Welsh Bros., Currie, McWilliams & Fowler, Butimar & Dawson (at Canoe Pass), Colonial Canning Co., and the Fraser Canning Co. all began operating.

The English Bay cannery was added to the list in 1898, but the Sinclair Canning Co. and Western Fisheries plants were both destroyed by fire at New Westminster and not rebuilt. The plant of the Steveston Canning Co. was absorbed that year by the Federation Brand Salmon Canning Co. and the cannery renamed the "Lighthouse" cannery.

In 1899 the Greenwood Canning Co., Scottish Canadian Canning Co., St. Mungo Canning Co., Wurzburg & Co., and Acme Canning Co. all began active operations, while in 1900 the Great Northern Canning Co. was the only addition to the list. In 1900 the United Canneries (Ltd.) was formed to take over the Gulf of Georgia, English Bay, and Scottish Canadian plants, and the Canadian Canning Co. this year also absorbed the Star, Fraser, and Vancouver canneries. In 1901 the National Packing Co. built at Eagle Harbour.

Like the other canning sections, British Columbia suffered in 1901 from an oversupply of canned salmon, due to the large number of plants which had been erected and which were producing more salmon than market could be found for. At this juncture the British Columbia Packers Association was formed. It embraced 29 out of the 48 plants on the Fraser River and 12 of those situated in Northern British Columbia waters, including the following plants: Ewen & Co., Delta, Harlock, Wellington, Lulu Island, Terra Nova, Pacific Coast, Canadian Pacific, Short & Squair (Imperial cannery), Brunswick canneries at Steveston and Canoe Pass, Dinsmore Island, Sea Island, Fishermen's Packing Co., Reliance Cannery, Atlas Cannery, Boutiliar & Co., Hume & Co., Anglo-American, Provincial, Westham Island, Westminster Packing Co., Premier, Cleve, Welsh Bros., Currie, McWilliams & Fowler, Colonial, Greenwood, Wurzburg & Co., and the Acme Canning Co. In 1914 the corporation style was changed to the British Columbia Fishing & Packing Co., Ltd.

In 1905 the Burrard Canning Co., Steveston Canning Co., Butimar & Dawson, Unique Cannery, and the Vancouver Fish & Canning Co. were all built and operated. The latter was burned in the middle of the season. The following year the Great West Packing Co. cannery was built at Steveston; the Nye Canning Co. operated for part of the season on False Creek in Vancouver, and the Capital City Canning Co. built a plant at Victoria.

Skeena River.—The first cannery to be built on the Skeena River was in 1877, when a man named Neill built one at Inverness. In 1878 the Windsor Canning Co., consisting of Henry Saunders, W. H. Dempster, and John Wilson, of Victoria, established a cannery at Aberdeen.

There were no additions until in 1883, when the Balmoral cannery, the British-American, and Robert Cunningham canneries were started.

In 1889 the North Pacific was started and in 1890 the Standard. In 1891 the Anglo British Columbia Packing Co. bought the British-American cannery and the North Pacific Canning Co. cannery. In 1892 the Claxton, and in 1895 the Carlisle, canneries were built. The Peter Herman (afterwards the Skeena River Commercial Co.) and Turnbull canneries were built in 1900. The last named operated only four seasons.

In 1902 the British Columbia Packers Association acquired the Balmoral, Cunningham, and Standard canneries.

In 1903 the Cassiar cannery was built. The next year the Alexandria Packing Co. was started. It was later acquired by the British Columbia Packers Association, as was also the Dominion cannery, which was built in 1906.

There have been no additions to the canneries on this river since 1906.

Rivers Inlet.—The first cannery to be built and operated on Rivers Inlet was in 1881 by Shot, Bolt & Draney, afterwards the British Columbia Canning Co. The Wannuck cannery was built in 1884, the Good Hope in 1895, the Brunswick in 1896, the Wadhams and the Vancouver in 1897.

There were no changes until 1902, when the British Columbia Packers Association acquired the Wadhams, Brunswick, Wannuck, and Vancouver, the two latter being dismantled and the two former enlarged correspondingly.

In 1906 the Beaver cannery was built by J. H. Todd & Sons, the Kildalla cannery by the Kildalla Packing Co., and the Strathcona cannery by Bain & Wilson, the latter afterwards being acquired by the Wallace Fisheries (Ltd.).

Nass River.—The first cannery to be built on the Nass River was by Henry Croasdale in 1881, and it operated for four years. The Douglas Packing Co. built a cannery here in 1882 and operated it for two years. Both were then shut down owing to the fact that the locations were too far up the river for steamers to move the packs. In 1888 the plants were dismantled and removed to Nass Harbor and Mill Bay, respectively. In 1889 the Cascade Packing Co. commenced operations, but the plant was dismantled in 1893.

In 1903 the Pacific Northern cannery was built near the mouth of Observatory Inlet, and in 1905 it was purchased by John Wallace, who moved it to Arrandale. In the latter year the Port Nelson Canning & Salting Co. started. In 1908 the Mill Bay cannery was purchased by the Kincolith Packing Co. In 1911 the Arrandale and Port Nelson canneries were bought by the Anglo British Columbia Packing Co., and in the following year the Nass Harbor cannery was bought by the British Columbia Packers Association.

Vancouver Island.—The first cannery to be built on Vancouver Island was the one on Clayoquot Sound, which was built in 1895 by the Clayoquot Sound Canning Co. The Alberni Packing Co. cannery on Alberni Canal was first operated in 1903. In 1905 J. H. Todd & Sons built a cannery at Esquimault Harbor, as did also the Capital City Canning Co. the same year.

Alert Bay.—The Alert Bay cannery of the Alert Bay Canning Co. was opened in 1881.

SALMON FISHING IN THE HEADWATERS.

Considerable salmon fishing is carried on in the headwaters of certain of the larger rivers of the coast, of which no account appears in the data of the commercial fisheries. This is due to the fact that the fishing is usually of a desultory character, the fisheries are few in number and scattered widely, and while the catch in the aggregate is considerable it does not amount to much in any one spot.

The Columbia River is a typical example of such a stream. Commercial fishing is usually considered as ending at Celilo, about 150 miles from the mouth. As a matter of fact, salmon fishing for market or for home use is carried on to a considerable extent along the main river and also on the Snake and the Yakima, tributaries of the Columbia. In nearly all cases hook and line and spears are used alone, but on the Snake River, near Lewiston, in Idaho, are several rather important haul-seine fisheries. Fishing is carried on at these places in the spring for steelhead trout and in the fall for chinook and silver salmon and steelhead trout. As many as 25 salmon have been taken at one time. While this may seem a small number to one habituated to the large catches farther down the river, in the aggregate it amounts to a considerable quantity.

Considerable local fishing is carried on along the various Oregon streams above the sections usually fished by commercial fishermen. Most of this is done by ranchers living along the streams, and while by far the greater part is for home consumption a small proportion is sold.

On the Yukon River and its tributaries considerable salmon fishing is prosecuted. Much of this is done by natives for the use of themselves and their dogs, but at places white fishermen operate for a portion of the year and sell their catches in near-by settlements or at the mining camps. No effort has ever been made to secure statistics of the extent of this fishery.

III. APPARATUS AND METHODS OF THE FISHERIES.

GILL NETS.

The gill net is the oldest and most popular form of apparatus in use in the salmon fisheries of the Pacific coast. There are two kinds, drift and set, these names clearly expressing the difference between them. Fine flax or linen twine is generally used in their manufacture, although in some places cotton twine is employed, and it has usually 12 threads and is laid slack. They are hung in the ordinary manner—to a rope with cork floats to support the upper portion of the gear, and to a line with lead sinkers attached, which keeps the net vertical in the water and all its meshes properly distended. The nets are tanned, usually several times each season.

Drift nets vary greatly in length and depth, depending upon the width of the fishing channels, the depth of water, etc. On the Sacramento River they average about 300 fathoms in length, are 45 meshes deep, and have a stretch mesh of from 7½ to 9½ inches. On the coastal rivers of Oregon these nets average about 125 fathoms in length, and are about 36 meshes in depth, the mesh varying with the species of salmon sought. On the Columbia River the nets average about 250 fathoms in length and have a stretch mesh for chinooks of 9 to 9½ inches. On the Willamette River, the principal tributary of the Columbia, they average about 75 fathoms in length, with meshes of 8 and 9½ inches. On Willapa Harbor drift gill nets run from 100 to 250 fathoms in length, are 30 meshes deep, with stretch meshes of 7 and 8½ inches. On Grays Harbor they average 100 fathoms in length, the chinook nets run from 24 to 45 meshes in depth, with a stretch mesh of 9 inches, while the silver or coho nets are 35 meshes in depth, with a stretch mesh of 7 inches. In the Puget Sound region the nets average 300 fathoms in length, with meshes suitable for the particular species sought. In Alaskan waters the nets vary greatly in length and depth, depending upon the places where fished.

Drift gill netting is prosecuted chiefly in the estuaries of the rivers in and near the channels. If the water is clear the nets are set only at night, but should the water be muddy or discolored with glacial silt, fishing can be carried on either night or day. Night fishing is most common in the States, while day fishing is most common in Alaska. When fishing in rivers it is necessary to work in a straight stretch of water of fairly uniform depth and free from snags or sharp ledges, these being called "reaches."

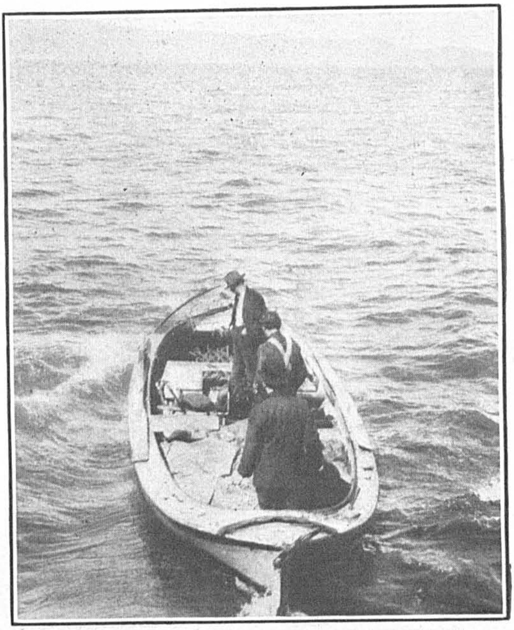


FIG. 1.—COLUMBIA RIVER POWER GILL NET BOAT.

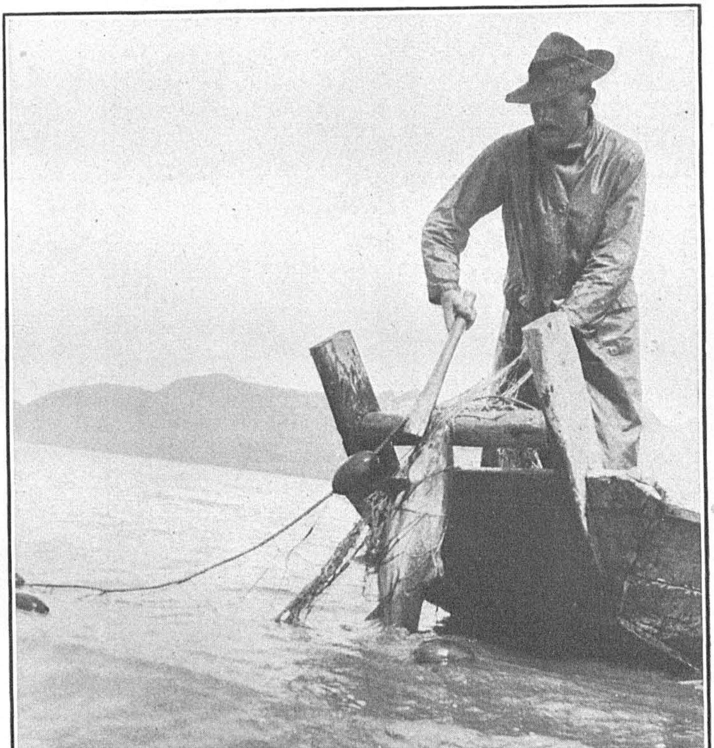
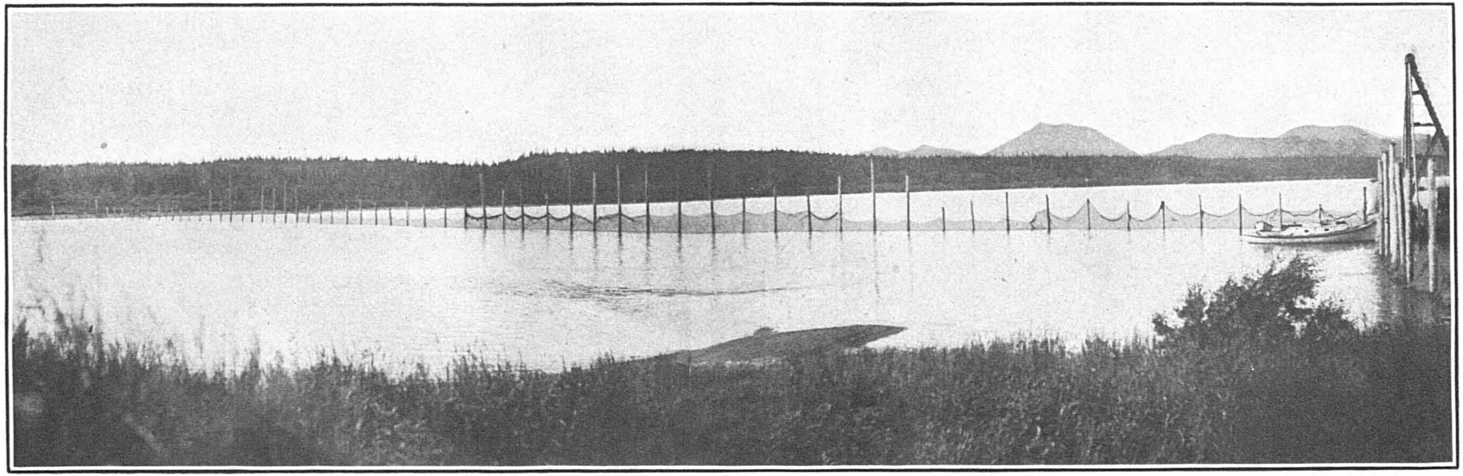


FIG. 2—REMOVING THE SALMON FROM A GILL NET.



SALMON RACK ACROSS WOOD RIVER, ALASKA.

In setting the net the boat puller rows slowly across the stream while the other man pays out the apparatus, to the first end of which a buoy has been attached. When about two-thirds of the gear is out, the boat is turned downstream at nearly right angles to her former course, so that the net, when set, approximates the shape of the letter L. The net is laid out at nearly right angles or diagonally to the river's course, so that it will intercept the salmon that are running in, and is usually put out about an hour before high-water slack and taken in about an hour after the turn of the tide. In Alaska the fishermen usually fish on both the high and low slack. The nets are allowed to drift for the time specified, the fishermen drifting along at one end, then the net is hauled into the boat over a wooden roller fixed in the stern, and the fish, which have become gilled in the meshes, are removed, stunned or killed by a blow on the head, and thrown into the bottom of the boat.

Set gill nets are made in the same way as drift nets, in many instances being fragments of the latter, and are usually operated in the upper reaches of the rivers. They vary in length from 10 to 100 fathoms, from 35 to 65 meshes in depth, and have the same sizes of meshes as the drift nets, the size varying, of course, with the species sought for. Sometimes these nets are staked, sometimes anchored, while occasionally only one end is tied to the shore or a stake set in the water.

On the flats off the mouth of the Stikine River, in southeast Alaska, a combination of the drift and set method is followed. A double set of stakes, about 6 feet apart, are set out from the shore for a distance of several hundred yards. An hour or two before slack water the fishermen pay out the net parallel to the line of stakes and about 50 feet from them. The tide drifts the net down until it is caught against the stakes, which retain it until slack water, when the fisherman takes it up and repeats from the opposite direction on the next turn of the tide.

HAUL SEINES.

On the Columbia River, where this form of apparatus plays a prominent part in the fisheries, the nets vary in length from 100 to 400 fathoms; the shallowest end is from 35 to 40 meshes deep, but it rapidly increases in width and is from 120 to 140 meshes deep at the other wing. The "bunt," or bag, in the central part of the net is about 50 fathoms long. These nets are usually hauled on the numerous sand bars which are a very noticeable feature of the river at low tide. Buildings are erected on piles on these sand flats, in which the men and horses take refuge at high tide, when the bars are covered with water. Operations begin as soon as the beach or bar uncovers, so that the men can wade about. The net is placed in a large seine boat, with the shore end attached to a dory. At the signal the seine boat is headed offshore, while the dory heads toward the bar. As the seine boat circles around against the current the net is paid out in the shape of a semicircle. The dory men hurry to the bar with the shore end of the net, the idea being to get that in as soon as possible in order to prevent the escape of the salmon in that direction. As soon as this has been accomplished, the outer shore line is brought to the bar, when several horses are hitched to the line and begin to haul in the net, care being taken by the men to work it against the current as much as practicable, and to get it in as speedily as they can in order to prevent the escape of salmon either by jumping over the cork line or finding some outlet below the footrope or lead line.

The only other place on the coast where haul seines are important is at Karluk, on Kodiak Island, in Alaska. Here the seines are hauled upon the narrow gravel spit dividing the lagoon from the strait, and practically the same method is followed as in the Columbia River.

DIVER NETS.

These are in use in the Columbia River, mainly throughout the middle and upper portions of the river. They vary from 100 to 200 fathoms in length and are used almost exclusively for chinook salmon. In construction they somewhat resemble a trammel net. Two nets are attached together side by side. The outer one, or the one toward the oncoming fish, has a larger mesh than the other, so that if the fish manages to pass through the first, it will be caught in the smaller meshes of the second.

DIP NETS.

These consist of an iron hoop secured to the end of a stout pole with a bag-shaped net fastened to the hoop. They are generally used at the cascades on the rivers, small platforms being erected upon which the operator stands while fishing. Indians formerly used them to a large extent, but, owing to the steady decline in the number of Indians, and the appropriation of favorable spots by the whites for other forms of apparatus, they are but little used now.

SQUAW NETS.

This type is virtually a set net. It consists of an oblong sheet of gill netting, about 12 feet long and 8 feet deep, its lower edge weighted to keep it down, and its upper edge attached to a pole that floats at the surface, and is held by a line or lines to another projecting pole which is securely fastened to the shore, so that it will not swing around with the strain of the swift current on the net. A single block is attached to the pole, and through this passes a rope,

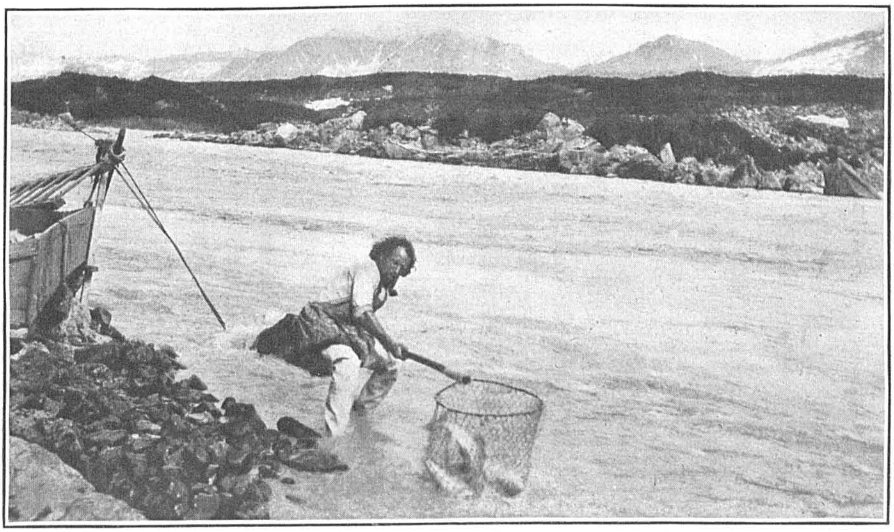


FIG. 1.—DIPPING SALMON FROM THE COPPER RIVER, ALASKA.

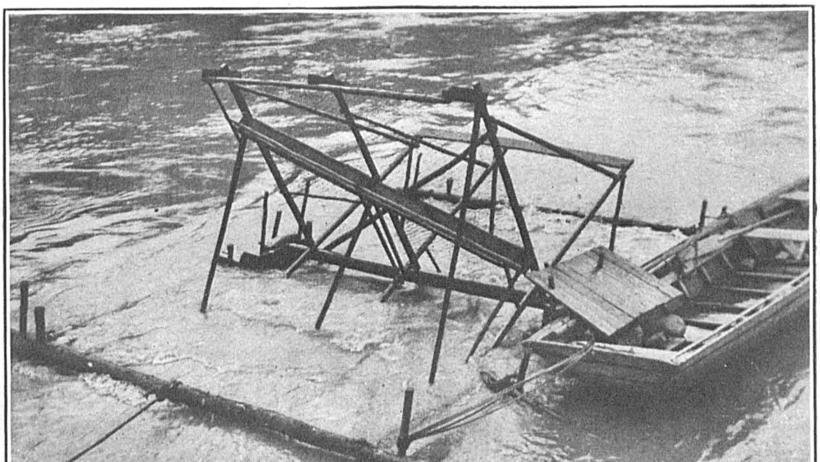


FIG. 2.—FISH WHEEL, YUKON RIVER, ALASKA.

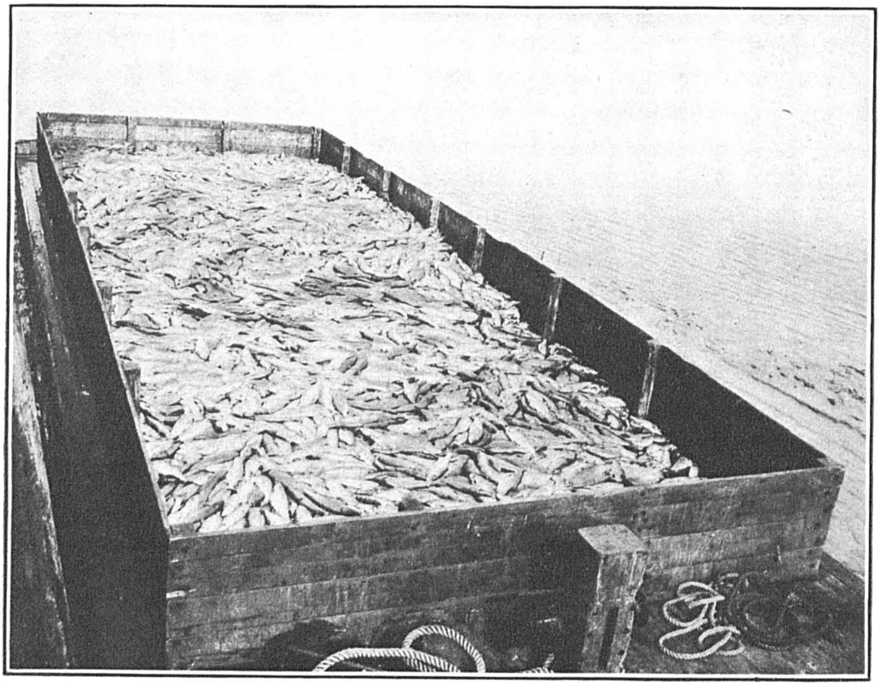


FIG. 1.—A SCOW LOAD OF SALMON.

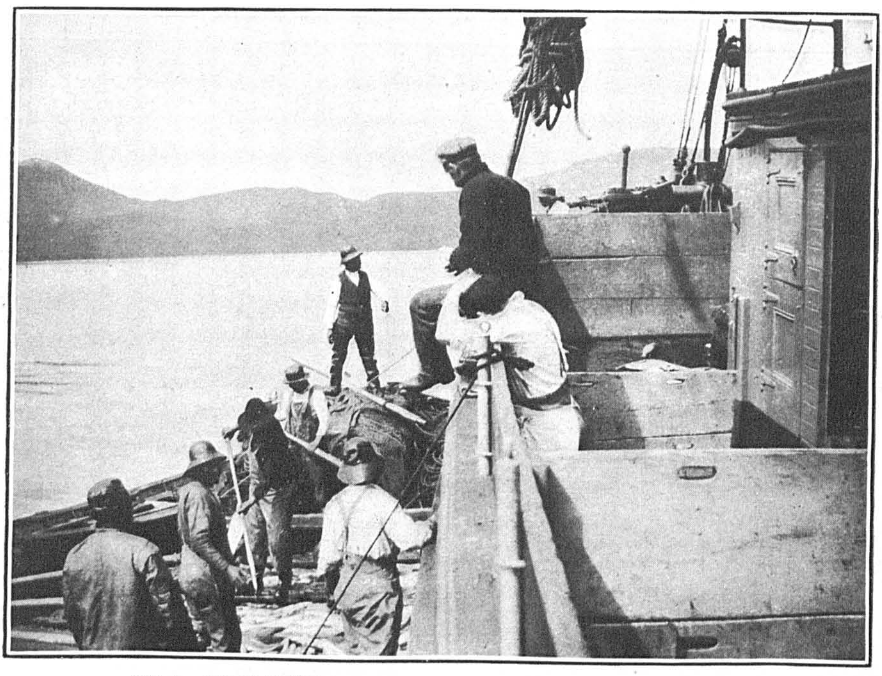


FIG. 2.—PURSE SEINE CREW DELIVERING FISH TO CANNERY TENDER.

thus making a tackle for the more convenient manipulation of the net. The dip-net fishermen of the Columbia River use this net, which derives its name from the fact that it used to be commonly operated by Indian squaws for taking salmon. But few are now in use, for the same reasons as given for the decline in the use of dip nets.

PURSE SEINES.

This form of apparatus is in quite general use in Puget Sound and southeast Alaska, and has proved highly effective in these deep, swift waters. These seines are about 200 fathoms long, 25 fathoms in the bunt, and 20 fathoms in the wings, all with a $3\frac{3}{4}$-inch stretch mesh. The foot line is heavily leaded and the bridles are about 10 feet long. The purse line is made of $1\frac{1}{2}$-inch hemp. The rings through which the purse line is rove measure about 5 inches in diameter and are made of galvanized iron.

Purse seining for salmon in Puget Sound and waters north of same is one of the most important methods in use in the fisheries. In the type of vessel used in this fishery there has probably been greater improvement than in any other branch of the fisheries of the coast. In the early days row scows were in use, but now vessels with power are used.

In 1903 the first gasoline-powered purse seine boat appeared on the Pacific coast salmon fishing grounds in Puget Sound. The vessel was named the *Pioneer* and she was equipped with a 5-horsepower engine. The first season she easily demonstrated her vast superiority over the other purse seiners in the quickness with which she could reach a school of fish after it was sighted and in surrounding it with her seine. The next year there were a few more built or equipped, and the number has steadily increased until at the present time practically all except a few in southeast Alaska are equipped with motor engines.

The first power seine boats were only about 30 feet in length and had small power. As they were few in numbers, there was virtually no competition, and high power and speed were not a necessity. As the boats increased in numbers, however, competition became keener, and the first types of boats with their small power were quickly thrown into the shade by the newer types, which averaged between 45 and 55 feet in length, with 45 to 75 horsepower engines.

When motive power was introduced in the vessels, it was natural that the fishermen should soon introduce winches for the purpose of hauling in the nets, as the whole work could then be done by the one engine.

The purse seine vessels are built with rounded sterns. On an elevated section of the stern is set a movable platform on a pivot.

The after end of this platform has a long roller. The purse seine is stowed on this platform, the head rope with corks on one side and the foot line on the other, so that there will be no tangling when the seine is paid out.

When the lookout sights a school of fish, the seiner is run down close to it and a rowboat launched. One man takes his place in this with the rope from one end of the seine and acts as a pivot, while the seiner circles around the school, the crew paying out the seine as she moves along. When it is all out, the vessel runs alongside the rowboat and takes aboard the other rope. Attaching this and the rope from the other end to the power winch, the circle around the fish is rapidly narrowed, and the slack of the seine as it comes in is stowed back on the platform. Around the bottom of the seine and through galvanized iron rings about 5 inches in diameter, runs the purse line. As this is hauled into the boat, the open space at the bottom is rapidly closed up just as a handbag would be through the drawing together of the pursing string at the top. During this operation the nonpower purse seiners have a man standing alongside the rail who throws a pole into the center in order to drive the fish away from the open section. He is so skillful in this work that almost invariably the pole comes back to his hand as the pressure of the waters forces it up again. When the bottom has been pursed up the fishermen hauling by hand can move more leisurely, but with the power winches in use the hauling in of the net is a comparatively easy matter, and the pole thrower is dispensed with.

When all the fish are in the bunt and the latter alongside, the fish are generally dipped out by means of a dip net balanced on the end of a tackle. A fisherman lowers it into the seine, scoops up a load of salmon, and as the net is hauled up, guides it over the vessel, and then trips it and dumps the fish into the hold.

The Puget Sound purse seiners meet the salmon off the entrance to the Strait of San Juan de Fuca and follow the sockeyes till they have passed out of American waters, what are known as the Salmon Banks, off the lower end of San Juan Island, being the principal rendezvous during the run of sockeyes. After this run is over they go up the Sound and fish for dogs and cohos, and later go to the head of the Sound and fish for dogs, cohos, chinooks, and steelhead trout. In southeast Alaska they follow the fish all over the bays, straits, and sounds of that section. Purse seines are used in a few other places, but the fishery is secondary to those with other forms of apparatus.

This style of fishing is said to have been introduced on Puget Sound by the Chinese in 1886.

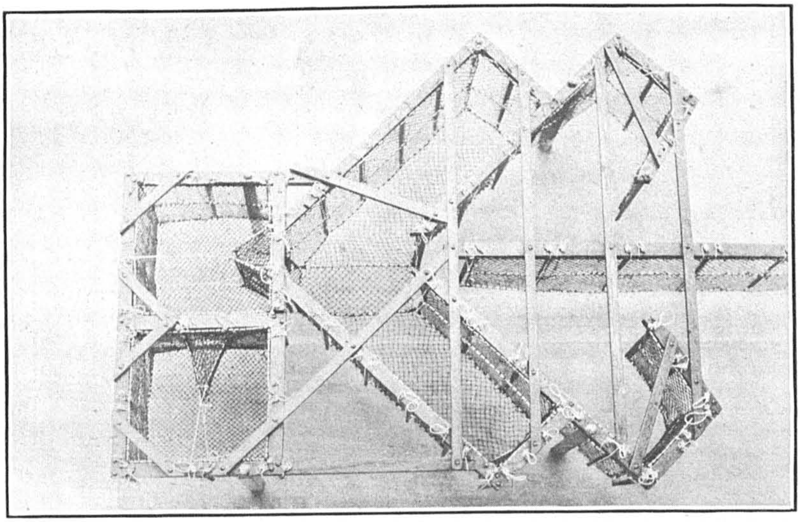


FIG. 1.—FLOATING TRAP NET.

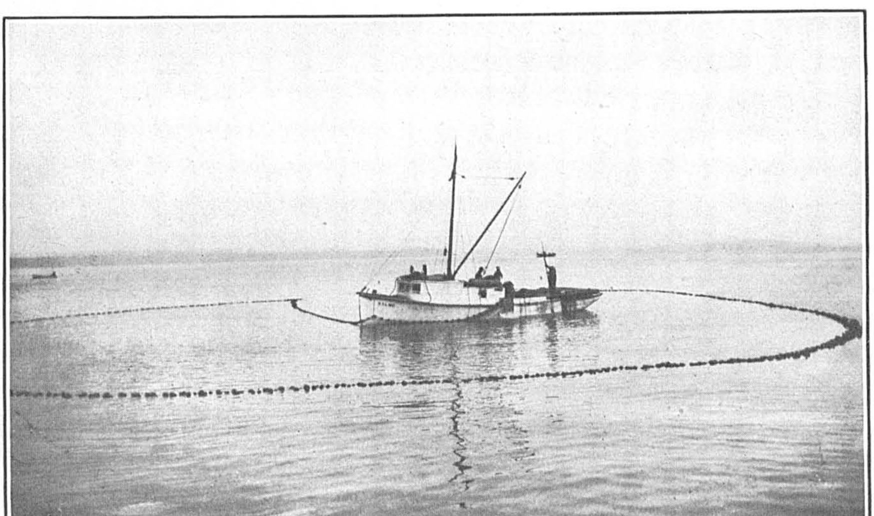


FIG. 2.—PURSE SEINER HAULING IN NET.

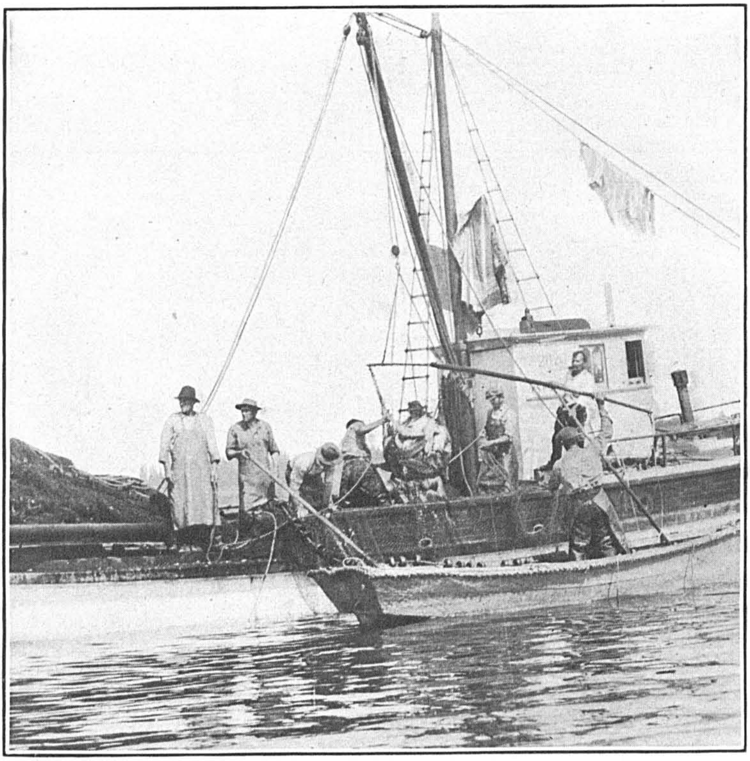


FIG. 1.—DIPPING THE SALMON FROM THE PURSE SEINE.

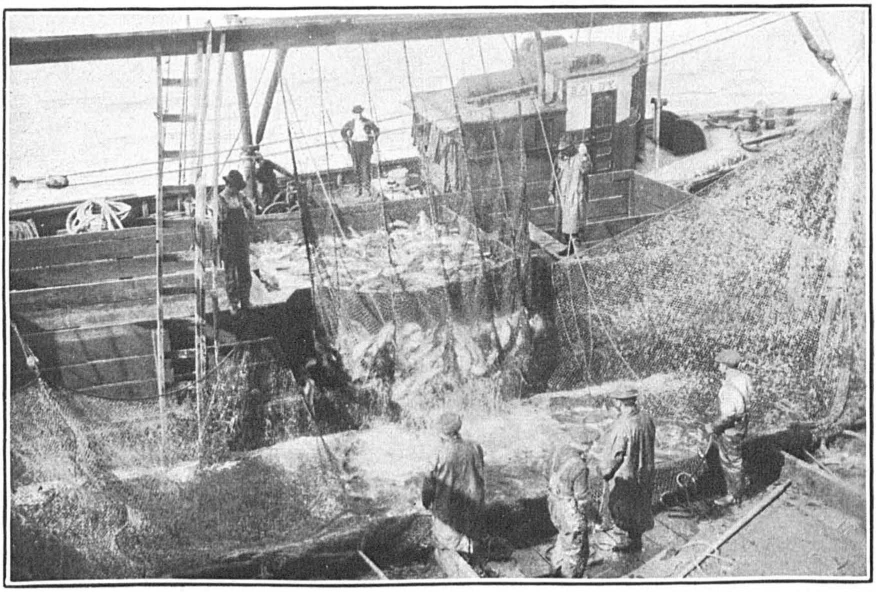


FIG. 2.—BRAILING THE SALMON FROM THE TRAP NET.

TRAPS OR POUND NETS.

A trap is stationary and consists of webbing, or part webbing and part wire netting, held in place and position by driven piles. This piling usually is held together above water by a continuous line of wood stringers, also used to fasten webbing to or to walk on if necessary.

In building, the "lead" is first constructed. This runs at right angles, or very nearly so, to the shore, and consists of a straight line of stakes, to which wire or net webbing is hung from top of high water, or a little higher, to the bottom, making a straight, solid wall.

At a little distance inshore of the outer end of the lead begin what are called the "hearts." These are V-shaped and turned toward the lead, beginning at a distance of 30 to 40 feet on either side of same and running in the same general direction, the "big heart" or outer heart first, the inner heart, supplementing the first, being smaller, and the end of the outer heart leading into it. Some traps have only one heart. The narrow end of the inner heart leads into the "pot" and forms what is known as the "tunnel." The tunnel ends in a long and narrow opening, running up and down the long way, and is held in position by ropes and rods. Below this is what is known as the "apron," a sheet of web stretched from the bottom of the heart upward to the pot, in order to lead the fish into the tunnel when swimming low in the water, and to obviate the necessity of building the pot clear to the bottom, which would be expensive, as the pots of the traps are usually in quite deep water. If the trap is intended to catch the fish coming from only one direction, the lead generally runs to and is attached to one side of the entrance to the outer heart on the side opposite to that from which the fish are expected.

Some traps have "jiggers" (a hook-shaped extension of the outer heart) on each side, and sometimes on only one side, which help to turn the fish in the required direction.

The "pot" is built out beyond the inner heart and immediately adjoining same. It is a square compartment, with web walls and bottom connected in the shape of a large square sack, fastened to piling on all sides. This pot is hauled up and down by means of ropes and tackles, either by hand or, as is most popular, by steam.

The "spiller" is another square compartment adjoining either end of the pot (sometimes there are two spillers, one at each end), and is simply a container for fish. A small tunnel leads the fish from the pot into the spiller, whence the fishermen lift them out. This is accomplished by closing the tunnel from the pot, after which the ropes holding the front of the spiller are loosened and the net wall allowed to drop almost to the level of the water. A steam or gasoline tug then pushes a scow alongside the spiller and takes position on the outside of this scow. From the deck of the tug a derrick is rigged with a running line from the steam capstan through the block at the top of the derrick. This line is attached to the far end of a net apron, called a "brailer," which is heavily weighted by having chains along each side and leaded crossways at several places. A small boat is run inside the spiller, and the men in this draw the brailer across the barge and let it sink in the spiller. The fish soon gather over it, when the steam capstan quickly reels it in, the net folding over as drawn in from its far side and spilling the fish out on the scow. Men on the scow pick out and throw overboard the unsalable and nonedible fish. The apron is then drawn back across the pot and the operation repeated so long as any fish remain. In this manner a trap with many tons of salmon in it is quickly emptied.

Traps, like nearly all other fixed fishing appliances, are built on the knowledge that salmon, like most other fishes, have a tendency to follow a given course in the water, whether a natural shore line or an artificial obstruction resembling one; also that the fish very seldom turns in its own wake. The trap has taken advantage of these natural tendencies of the fish, and is arranged so that, although the salmon may turn, he will continually be led by the wall of net toward and into the trap.

If a trap is located in a place where fish play and where an eddy exists, and the fish run one way with the incoming tide and the opposite with the outgoing, it will fish from both directions; if located where the fish simply pass by, as, for instance, on a point or reef, it will fish from one side only.

A variation of the trap, to be used in places where piles can not be driven, is the floating trap. An experimental trap of this variety was used at Uganuk, on Kodiak Island, Alaska, as early as 1896. Its use was abandoned in 1897, not to be resumed until some years later. A number of floating traps (of the type invented by J. R. Heckman, of Ketchikan, Alaska) have been and are being used in southeast Alaska, the first having been installed in 1907. The design of this trap follows the shape of an ordinary Puget Sound driven trap. It is constructed of logs, 20 to 26 inches at the butt, bolted and braced together in one solid frame. Suspended from this frame through the logs are 2½-inch pipes extending down in the water 30 feet. Halfway down these pipes and also on the extreme lower ends are eyebolts, to which the web is drawn down and fastened. Thus the web is kept in place as well as if the pipes were driven piles. The lead is also a continuation of large piles or logs bolted firmly together with similarly suspended pipes and webbing.

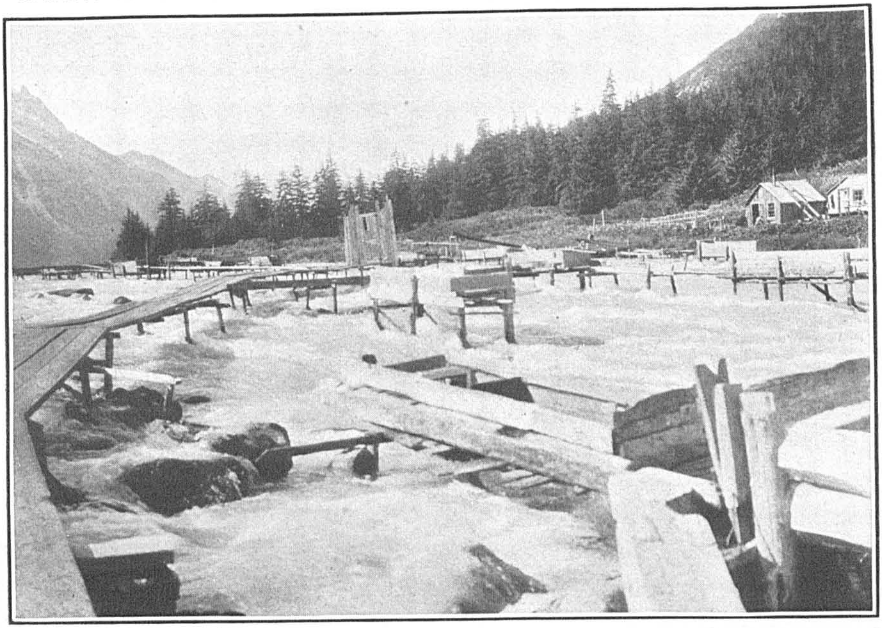


FIG. 1.—RACKS AND RUNWAYS FROM WHICH INDIANS GAFF SALMON, CHILKOOT RIVER, ALASKA.

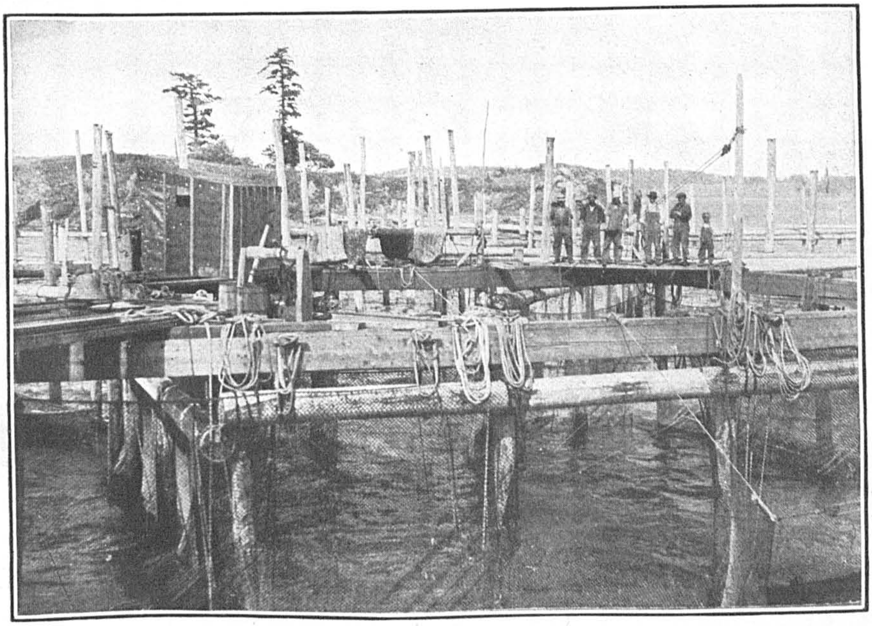


FIG. 2.—THE POT AND SPILLER OF A TRAP NET.

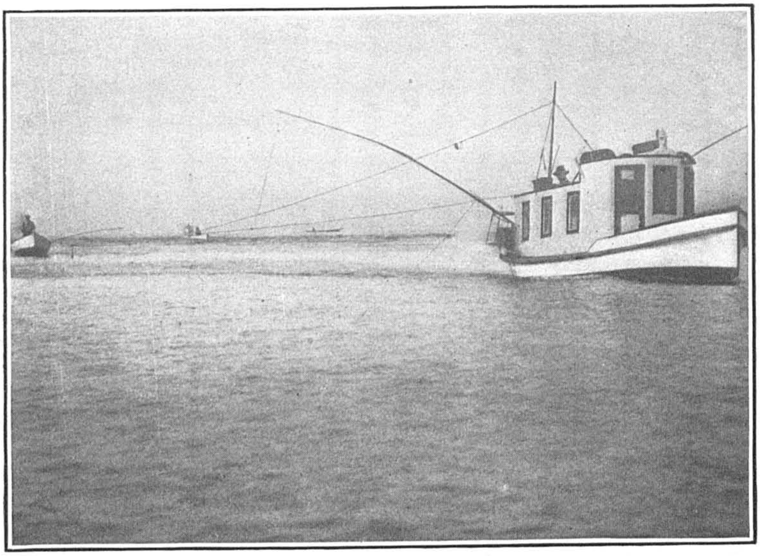


FIG. 1.—TROLLING FOR SALMON ON PUGET SOUND WITH POWER BOAT.

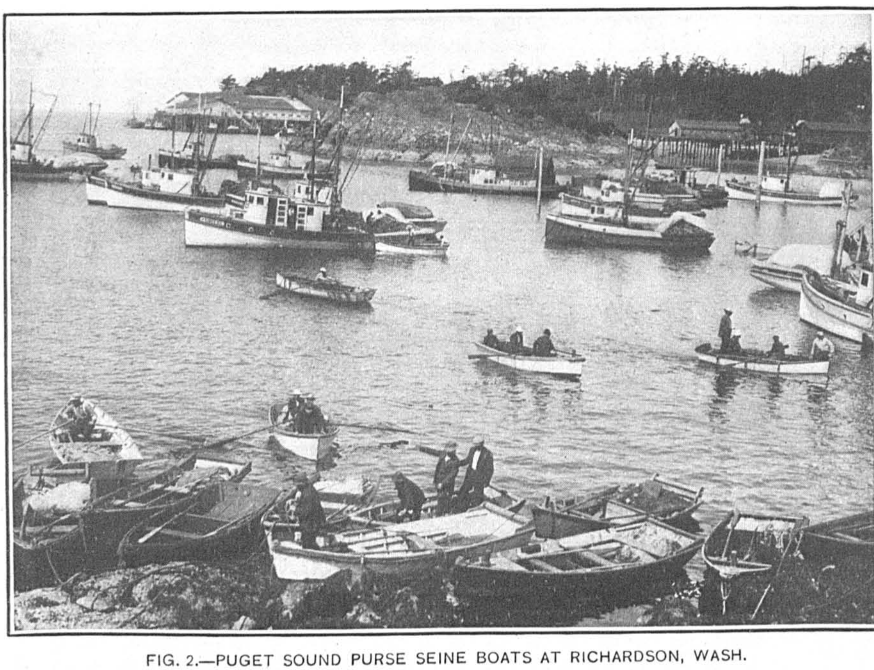


FIG. 2.—PUGET SOUND PURSE SEINE BOATS AT RICHARDSON, WASH.

The so-called wooden traps on the Columbia River are essentially weirs, being a modification of the brush weirs or traps used by the Indians for the capture of salmon long before the advent of the white men. They are built on shore, of piling and planks, the latter arranged like slats with spaces between. The bowl, or pot, is provided with a movable trapdoor that can be opened during the closed season and on Sundays, so that the fish can pass through and run upstream. These weirs, after being built, are launched into the river, placed in proper position near the shore, and then ballasted so that they sink to the bottom.

According to Collins,[a] "pound nets were introduced on the Columbia River in 1879. In May of that year O. P. Graham, formerly of Green Bay, Wis., built a pound net on the river similar to those used on the Great Lakes. The success of this venture led to the employment of more apparatus of this kind, and many fishermen went West to participate in the fishery."

According to the same authority [b] H. B. Kirby, who had previously fished on the Great Lakes, set a pound net in Puget Sound about 1883, but it was a complete failure. On March 15, 1888, he again set a pound net, which he had designed to meet the new conditions, at Birch Bay Head, in the Gulf of Georgia. It proved a complete success, and was the forerunner of the present large number which are set annually in these waters.

In Alaska the first trap was set in Cook Inlet about 1885. British Columbia refused to permit the use of pound nets in its waters until 1904, when their use was allowed within certain limited regions.

Some of these trap nets, especially on Puget Sound, have proved extremely valuable. The years 1898 and 1899 covered practically the high-water mark, as several desirable locations changed hands in those years at prices ranging from $20,000 to $90,000 for single traps, the original expense of which did not exceed $5,000. But few have brought such high prices since, however, owing to the popularity of a cheaper apparatus, the purse seine.

The location of sites for these nets is regulated by law in Oregon, Washington, and British Columbia, but in Alaska the procedure is not well defined and has proved rather confusing to strangers. Some acquire the shore line by mineral location or by the use of scrip, while still others have merely a squatter's right.

Under the existing fish-trap laws applicable to Alaska, a fish trap may be operated anywhere along the coast of Alaska, 300 or more yards from the mouth of any salmon stream, and along the shores of all rivers—excepting those emptying into Cook Inlet, the streams on Afognak Island, and in Wood River—where the same are at least 500 feet wide.

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[a] Report on the fisheries of the Pacific Coast of the United States. By J. W. Collins. Report of Commissioner of Fish and Fisheries for 1888, p. 210. 1892.

[b] Ibid., p. 267.

A clear water distance of 600 yards laterally and 100 yards endwise must be maintained between all traps. At the present time there is no law regulating the length of leads, the maximum depth of water in which the pot may be driven, or the use or occupancy of the trap sites.

It has been decided by the highest courts within the past year (1915) that title to the upland conveys no title to the trap owner who may be in front. The tide lands of Alaska are not of sufficient commercial importance as yet to enter into this controversy. At the present time there is no tide-land law applicable to Alaska affecting the upland owners or the trap-site locators.

At the present time it is probable the canner who is on the ground first and installs a working trap can assert his right to any unoccupied trap site regardless of who fished it the previous season. As a general rule, however, the canners respect the rights of rivals in the same fishing region, and a trap location once recognized as that of a certain individual or company is rarely jumped so long as the original locator cares to maintain a trap on it.

Within the bounds of the forest reserve no land can be acquired except by lease, which may be secured from the United States forestry agent, Ketchikan, Alaska.

INDIAN TRAPS.

The natives, especially in Alaska, have various ingenious methods of catching salmon. In the Bering Sea rivers they catch them by means of wickerwork traps, made somewhat after the general style of a fyke net. These are composed of a series of cylindrical and conical baskets, fitting into each other, with a small opening in the end connecting one with the other and the series terminating in a tube with a removable bottom, through which the captive fish are extracted. Some of the baskets are from 15 to 25 feet in length and are secured with stakes driven into the river bottom, while the leader, composed of square sections of wickerwork, is held in place by stakes.

During the summer of 1910 the author found and destroyed an ingenious native trap set in Tamgas stream, Annette Island, southeast Alaska. This stream is a short and narrow one, draining a lake, about midway of which are a succession of cascades. In the narrowest part of the latter, and in the part up which the fish swim, a rack had been constructed of poles driven into the bottom and covered with wire netting, so as almost wholly to prevent salmon from passing up. Just below, and running parallel to the rack and at right angles to the shore, was placed a box flume with a flaring mouth at the outer end. At the shore end the flume turned sharply at right angles and discharged into a square box with slat bottom

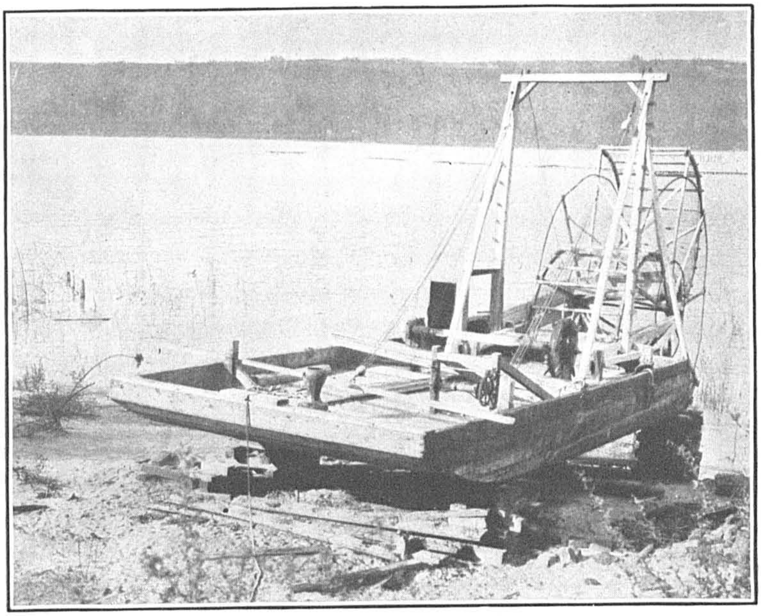


FIG. 1.—A SCOW FISH WHEEL.

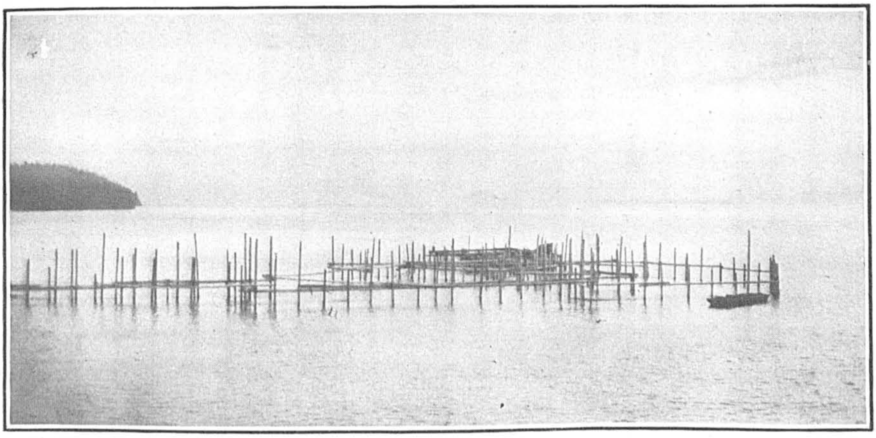
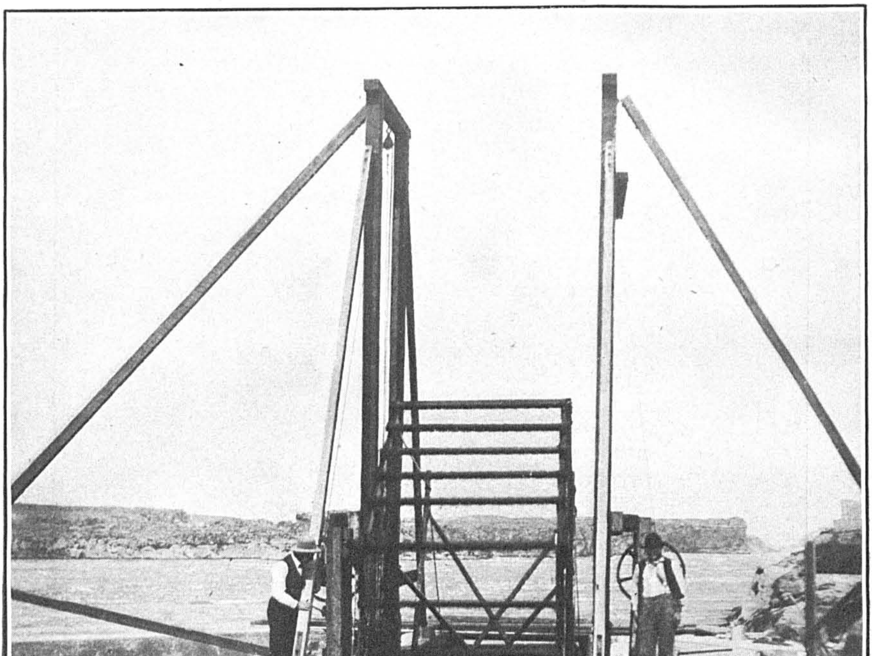


FIG. 2.—PUGET SOUND SALMON TRAP.



A STATIONARY FISH WHEEL.

and covered over with boughs. The fish in ascending the stream would be stopped by the rack and in swimming around many of them would be carried by the current into and down the flume, eventually landing in the receiving box alongside the shore.

WHEELS.

Fish wheels are of two kinds, the floating or scow wheel, which can be moved from point to point if need be, and the shore wheel, which is a fixed apparatus. They operate in exactly the same manner, however. The stationary wheel is located along the shore in a place where experience has shown that the salmon pass. Here an abutment is built of wood and stone, high enough to protect it from an ordinary rise in the river. To this is attached the necessary framework for holding the wheel. The latter is composed of three large scoop-shaped dip nets made of galvanized-iron wire netting with a mesh of 3½ to 4 inches. These nets are the buckets of the wheel and they are so arranged on a horizontal axis that the wheel is kept in constant motion by the current, and thus picks up any fish which come within its sweep. The nets are fixed at such an angle that as they revolve their contents fall into a box chute through which the fish slide into a large bin on the shore. The wheels range in size from 9 to 32 feet in diameter and from 5 to 15 feet in width, and cost from $1,500 to $8,000, the average being about $4,000. A number of them have long leaders of piling running out into the river, which aid in leading the salmon into the range of the wheel.

The scow wheel consists of a large square-ended scow that is usually decked at one end and open at the other. Several stanchions, some 8 to 10 feet high, support a framework upon which an awning is spread to protect the fish from the sun's rays and the crew from the elements. To one end of the scow are fastened two upright posts, which are guyed by wooden supports, while projecting from the same end is the framework which supports the wheel, the latter being constructed in the same way as the stationary wheel, but on a smaller scale. In operation the scow is anchored with the wheel end pointing downstream, and as the wheel is revolved by the current, the fish caught fall from the net into a box chute, through which they slide into the scow. As stationary wheels can be used only at certain stages of water, the scow wheel is a necessary substitute to be used at such times as the former can not be operated, or in places where it is not feasible to build a stationary wheel.

The above forms of wheels are used exclusively on the Columbia River.

An ingenious device is used by some of the wheelmen on the Columbia River in getting their catch to the canneries, a few miles farther down the river. The salmon are tied together in bunches and these attached to air-tight casks and sent down the stream. At the canneries small balconies have been constructed at the water end of the building. A man armed with a pair of field glasses is stationed here, and as soon as he sights one of these casks he notifies a boatman, who goes out and tows in the cask and salmon. About 800 pounds of salmon are attached to a keg, and a tag showing the wheel from which shipped is tied to the fish.

In 1908 the first fish wheel to be located in the coastal waters of Alaska was operated in the Taku River, in southeast Alaska. The wheel was set between two 4-foot scows, stationed parallel to each other, and each 40 feet in length. The wheel had two dips, each 22 feet in width and hung with netting. It could be moved from place to place, the same as the scow wheels on the Columbia River. It was operated throughout the king and red salmon runs, but caught almost no salmon, and was not set in the succeeding years.

For many years the natives of the interior of Alaska have been resorting to the banks of the Yukon River and its tributaries in order to secure a sufficient supply of salmon to sustain them through the succeeding winter. The favorite apparatus of these natives is a type of fish wheel of local invention, which has been in use by them for many years, probably long before the white man first saw the Yukon. A square framework of timbers is constructed in the water and moored to the bank by ropes. A wheel, composed of three dips, is placed in this, the axle resting upon the framework. The shape of the dip is such that the salmon caught roll off it into a trough, down which they slide into a boat moored between the wheel and the shore. Although crude in construction, it is very effective and a large number of them are set each season.

The Columbia River fish wheel is a patented device. It was first used by the patentees, S. W. Williams & Bro., in 1879, and for several years they retained a monopoly in its use. A number are now operating on the river. The device was not new even when patented, as the natives of the Yukon River Basin had been using a precisely similar principle for an unknown number of years previously, while a similar "fishing machine," as it is called, had been in use prior to this time and is still used by white fishermen on the Roanoke River in North Carolina.

REEF NETS.

As the name indicates; this device is used around the reefs. Under natural conditions the reef is covered with kelp throughout its length, the kelp floating at the top of the water. A channel is cut through this, and in it is placed a tunnel of rope and netting, which flares at the outer end, in deep water, and into which is thatched grass, kelp leaves, or any other article resembling submarine growth, to hide the construction sufficiently to avoid frightening the fish. Short leads of kelp are also arranged on the sides so as to draw the fish to the tunnel, which is held in place by anchors. On the reef itself two boats are anchored parallel to each other and some feet apart. An apron of netting is fastened to the rear of the two boats, while the other end extends under the small end of the tunnel and is kept in place by men in the forward ends of the boats, who have lines fastened so the apron can be raised by them. The device can only be used with the tide entering the tunnel at the large end. When the fish have entered and passed through the tunnel upon the apron, the men raise the floating end of the latter and dump them into the boats.

At one time this was a favorite device of the Puget Sound natives for catching sockeye salmon. They attribute its origin to one of the Hudson Bay Co.'s employees, who, they say, taught them a long time ago how to catch salmon in this way. Owing to the large number of men required to work them, and the fact that they can be worked only at certain stages of tide and in favorable weather, these nets gradually have been supplanted by other devices. In 1909 but five were used, and these were operated off the shores of San Juan, Henry, Steuart, and Lummi Islands, and in the vicinity of Point Roberts. Even less are used at present.

TROLLING.

Each year the catching of salmon by trolling becomes of increasing importance commercially. For some years sportsmen had this exciting and delightful occupation to themselves, but eventually the mild curers created such a persistent and profitable demand for king, or chinook, salmon that the fishermen, who had previously restricted their operations to the use of nets during the annual spawning runs, which last but a small portion of the year, began to follow up the fish both before and after the spawning run and soon discovered that they were to be found in certain regions throughout nearly every month in the year.

Trolling has several advantages from the fisherman's point of view over seine, gill net, and trap fishing. To engage in it, one does not require any very expensive gear, a boat, hooks, and lines being all that is required. Then, there are no licenses to pay and no seasons to observe in many sections, as the fishing is done in many instances beyond the jurisdiction of State waters.

The fishermen comprise all nationalities. While the majority of them are professionals, men of all walks of life are to be found engaging in the business, some on account of their health, others because of reverses in business or lack of work, while still others engage in it from pure love of the outdoor life.

The Monterey Bay (Cal.) trollers use 48 cotton line generally. A few inches below the main lead an additional line is added, with a small sinker on it. This gives two lines and hooks, and as the main line has but the one lead, and that above the junction with the branch line, it floats somewhat above the latter, which is weighted down with a sinker. The main stem is about 20 fathoms in length, while the branch lines are about 5 fathoms each. These lines cost about $3.50 each. No spoon is used, but bait almost invariably. A few fishermen use a spread of stout steel wire, 4 feet long, with 5 or 6 feet of line on each end of the spread, two lines and hooks.

On the upper Sacramento River (mainly at Redding and Keswick) some fishing is done with hand lines. A small catch was made here in 1908, but none were so caught in 1909.

Even as early as 1895 trolling was carried on in the Siuslaw River, Oreg., for chinook and silver salmon.

About 1912 the fishermen living along the lower Columbia River discovered that salmon could be taken by trolling off the bar. A number of them went into the business regularly, while their numbers were greatly swelled by the addition of many of the net fishermen during the regular closed seasons on the river, these not applying to trollers. Some idea of the growth of this fishery off the Columbia River Bar may be gained when it is stated that in September, 1915, about 500 boats were engaged in it.

At Oregon City and other places on the Willamette River a number of chinook salmon are caught by means of trolling each year, mainly by sportsmen. A spoon is quite generally employed in place of bait. The fishermen claim that the salmon are not feeding at this time, as their stomachs are shriveled up.

For a number of years the Indians living at the reservation on Neah Bay, Wash., have annually caught large numbers of silver and chinook salmon in the Strait of Juan de Fuca. A large number of white fishermen also engage in this fishery at the present time in the same waters, while others troll for the same species, but more particularly silvers, in parts of Puget Sound proper. The ordinary trolling line, with a spoon instead of bait, is used.

Many of the trollers use power boats, and in this event four and sometimes six lines are used. One and sometimes two short poles are run out from each side of the boat (when two are used on a side, one is shorter than the other), the butt being dropped into a chock. Two lines are generally trailed from the stern. At the end of each pole is a very short line with a small tin can attached. A few pebbles are in the can, and as the launch moves slowly through the water with all her lines set, the troller knows when he has a bite by the rattling of the pebbles in the can. Each of the lines attached to a pole is also connected with the boat by a short line from the side of the latter to a point on the line about 20 feet from where it is attached to the pole. When a fish is hooked, the fisherman merely pulls in the line by means of the short piece and then can haul the fish in hand over hand.

The most remarkable trolling region is in southeast Alaska. For some years the Indians here had been catching king salmon for their own use during the spring months, and about the middle of January, 1905, king salmon were noticed in large numbers in the vicinity of Ketchikan. Observing the Indians catching these, several white fishermen decided to engage in the pursuit, shipping the product fresh to Puget Sound ports. They met with such success that 271,644 pounds, valued at $15,600, were shipped. The next year several of the mild-cure dealers established plants in this region, thus furnishing a convenient and profitable market for the catch, and as a result the fishery has grown until in 1915 2,170,400 pounds of king salmon and 54,400 pounds of coho salmon were caught and marketed. The length of the fishing season has also lengthened until now the business is prosecuted vigorously during about seven months in the year, and in a desultory manner for two or three months more, only the severe winter weather preventing operations the rest of the year.

In southeast Alaska the fishermen generally use either the Hendryx Seattle trout-bait spoon no. 5 or the Hendryx Puget Sound no. 8. The former comes in nickel or brass or nickel and brass, the full nickel preferred. The Siwash hook no. 9/0, known as the Victoria hook in British Columbia, is in quite general use. As a rule, but one hook is used, and this hangs from a ring attached to a swivel just above the spoon, while the point of the hook comes a little below the bottom of the spoon. Occasionally double or treble hooks are used. Some fishermen use bait, and when this is done the herring, the bait almost universally employed, is so hooked through the body as, when placed in the water, to stretch out almost straight and face forward as in life.

There are a large number of power-boat trollers in this region. These trollers generally use one pole on a side and one at the stern. The rowboat trollers use but one line, which is attached to a thwart in the boat, handy to their reach when rowing, and trailing out from the stern of the boat.

The trollers usually have temporary camps where they congregate while the fish are to be found in that section, moving on to some more favorable spot when the fish begin to get scarce.

Reports from the trollers of southeast Alaska prove that all species of salmon will take the hook at some time or other in the salt waters of this region, an examination of their stomachs generally showing that they are either feeding or in a condition to feed.

A small commercial fishery is carried on in this region for coho salmon, mainly in August and September, in the neighborhood of Turnabout Island, in Frederick Sound. A Stewart spoon with two hooks on one ring is used, baited with herring in such a way that the fish is straightened out and faced toward the spoon. The sportsmen of Ketchikan also fish with rod and reel for this species in the neighborhood of Gravina Island, using a Hendryx spoon (kidney bait no. 6), which is silvery in color on one side and red on the other. Although much smaller than the king, the coho salmon is more gamey.

During the latter part of March the Gulf of Georgia, in British Columbia, is invaded by large schools of young coho salmon, locally called "bluebacks." They evidently come in from the sea by way of the Straits of Fuca, as their presence is at first apparent in the lower gulf, especially among the reefs and islands off Gabriola Pass. On their arrival these fish are only about a couple of pounds weight, but increase in size very rapidly, with correspondingly voracious appetites. They are to be found in the gulf throughout the spring and summer. By May the fish generally average close to three pounds each when dressed, while in July they are between four and six pounds in weight.

A number of fishermen with power and row boats engage in this fishery, the fish being either sold to the fresh markets or to the canneries.

Trolling lines and spoon baits of one form or another are used. In fishing from power boats the outer lines are attached to fish poles 15 to 18 feet long, rigged out on either side. Those poles are usually hinged at the foot of a short mast and lowered outboard by a halyard running through a block at the masthead, with the additional brace of a forward guy, which, with the drag of the lines aft, holds them in position. It has been customary to use from five to seven lines from each launch, the two outer lines leading from the ends of the poles; the next pair are attached to intermediate tips fastened halfway out on the main pole; while inboard lines are attached to smaller upright rods on either quarter.

The outer trolls are brought within reach (the poles being practically fixtures) by means of a short piece attached to each fishing line 15 or 20 feet from the point where it is fastened to the pole and leading inboard.

Recently, however, the Dominion authorities have decreed that a troller shall not use more than three lines from a boat when trolling for salmon. Should a man be alone in the boat three lines will keep him very busy if the fish are biting at all well.

Spoons are generally used. All shapes are employed, from the ordinary Siwash patterns to wobblers; brass or silver wobblers, of no. 4 and 5 sizes, are largely used by the fishermen. Spinners of 2 to

3 inches long are also popular. Copper, copper and silver, and brass spinners of the Siwash and Victoria patterns are very effective; while red beads, feathered hooks, or a piece of silvery salmon skin placed on the hook as an additional bait often add to the attraction of a spoon.

Quite generally the fishermen use single hooks on their spoons. Various lengths of line are used, but on the average about 60 feet for outside lines and 40 for inside are used. As fish can be landed much quicker with a short line, the fishermen generally shorten their lines to 20 or 30 feet when the fish are biting rapidly. Quite heavy lines are used from the pole to the sinker; from there extends a length of light line, and then a piece of wire, to which the spoon is attached. The sinker, which is usually between 2 and 3 pounds in weight when fishing from a power boat and about 1 pound when a rowboat is employed, is attached to the line about 18 feet from the spoon.

The best fishing times are in the early morning and evening, without regard to tidal conditions. The low slack water is always favorable to good fishing.

These fish are delicate flavored, but do not keep well, it being necessary to rush them to market if they are to be sold in a first-class condition.

Considerable numbers of these fish are taken by both American and Canadian fishermen on Swiftsure Banks, off Cape Flattery. As complaint had been made in 1914 that these fish were immature and were unfit for canning because of their appearance after being out of the water some hours, H. T. Graves, acting commissioner of agriculture for the State of Washington, which department is concerned with the wholesomeness of food products, made a thorough investigation of their fitness for food. In a letter to the Pacific Fisherman, Seattle, Wash., and published in that journal under date of August, 1914, he states, among other things, the following:

> The question, therefore, for us to determine was to ascertain their value as a food product. The condition of these fish arriving at the various canneries was carefully noted; samples were selected for bacteriological analysis.
>
> The fish when first taken from the water are very soft when compared with the other salmon. After they have been out of the water 12 hours the fish easily separates from the bony structures, and in the course of ordinary handling in the time which elapses between the hour of taking from the water until they are offered for packing at Sound canneries, which is anywhere from 12 to 48 hours, they become badly broken up and present a rather ugly and distasteful appearance, to say the least.
>
> We found that many different methods of handling were being experimented with by the fishermen and by Puget Sound canneries, but without any noticeable effect. While from a physical observation one would imagine these fish as received at the Sound canneries to be unwholesome, a bacteriological examination by Dr. E. P. Fick, State bacteriologist, indicated that putrefaction was not present, although some of the specimens did contain a rather high bacteria count.

BOW AND ARROW.

On the Tanana River, a tributary of the Yukon River, in Alaska, the Indians hunt salmon in birch-bark canoes with bow and arrow. As the canoe is paddled along and the Indian sees the dorsal fin of the salmon cutting the surface of the muddy water he shoots it. The tip of the arrow fits into a socket, and when struck the tip, which when loose is attached to the stock by a long string, comes out of the socket and the arrow floats, easily locating the fish for the fisherman.

SPEAR AND GAFF.

Spears of varying shapes and styles have been in use by the Indians from time immemorial and are still employed on many rivers in which salmon run. With the exception of the Chilkoot and Chilkat Rivers of Alaska, practically all of the catch secured in this manner is consumed by the fishermen and their families. In the Chilkoot River the Indians have built numerous racks in the stream and on the banks, upon which they stand and hook the fish out with a gaff attached to a pole. The catch is sold to the cannery located on Chilkoot Inlet.

SPORT FISHING FOR SALMON.

The number of sportsmen who improve the opportunity presented by the appearance of feeding springs and cohos is increasing yearly, and in time this promises to far excel the sport salmon fishing of the Atlantic coast.

On Puget Sound and lower British Columbia waters the anglers generally use ordinary trout fishing rods and tackle, with preferably a short trolling tip on the rod when out for coho. Small spinners of silver or copper, of about an inch in length, or else the small double Tacoma spoons, are very good. A strong gut leader or trace of fine piano wire is frequently used, as the fish's teeth would cut through an ordinary line. Where iron wire is used the salt water rusts it rapidly, and unless the precaution is taken to dry off the wire and oil it after using it can not be used for more than a couple of days. Sinkers of an ounce or two in weight are generally employed with fine line.

Many of the small spoons on the market have very cheap hooks, and these are apt to straighten out or break with the strain of a large fish. Hooks of the best steel will, however, stand up to this strain.

One of the favorite spots for anglers is at the falls on the Willamette River at Oregon City, Oreg. When the spring run of salmon appears in April, hundreds of anglers, many of them from far distant points, appear to participate in the sport during this month and in May. Many noted sportsmen have fished for salmon at this spot. Among them was Rudyard Kipling, and his experiences were woven into a short story.

The fishing ground is spread over a mile's length of the river, from Clackamas rapids to the deadline at the falls. It is not an uncommon sight to see 500 boats with from one to six fishermen and fisher-women dotting the river on favorable days during the season.

Two methods of fishing are followed. The most popular is to anchor at the head of the Clackamas rapids or in swift water near the falls and allow the rush of water to spin the trolling hook. In the longer lengths of quieter water the sportsmen troll in slow motor boats or rowboats.

An inexperienced boatman is apt to find fishing in the rapids or near the falls somewhat dangerous, as the swift water may overturn his craft and carry him to his death before help can reach him.

There is a fishway in the dam, so that the fish can pass up this and into the river above the dam. No fishing is allowed closer than 100 feet of the mouth of this ladder. Up to 1915 there was a second deadline, 600 feet from the falls, beyond which no commercial fisherman could operate nets, but the Oregon Legislature in that year closed the Willamette to all net fishermen from the Clackamas rapids to the falls.

The salmon in the spring run on the Willamette will average about 25 pounds each, but examples weighing 50 pounds and over are not uncommon.

In 1914 the Salmon Club of Oregon was formed of anglers who desired to encourage the use of light tackle in the taking of large game fish, in place of the extremely heavy tackle heretofore used The following rules were adopted:

The rods used may be made of any material except solid bamboo cane. They must not be less than 5 feet in length and weigh not over 6 ounces.

The line must not be heavier than the standard nine-thread linen line.

Any style of reel or spoon may be used and the wire leader must not exceed 3 feet in length.

The angler must reel in his fish, bring it to gaff unaided, and must do the gaffing himself. If a rod is broken at any time during the struggle with the fish it will disqualify the catch.

As a reward of merit the club awards bronze buttons to all anglers taking, on light tackle, salmon weighing 20 pounds or over; for a fish weighing over 30 pounds a silver button is given, and for any salmon over 40 pounds the lucky angler receives a gold button. Numerous additional prizes are also given by public-spirited citizens.

The season for light tackle on the Willamette River and all other inland streams of Oregon has been fixed by the club from January 1 to July 1.

In 1915 the first angler to win a gold button on the Willamette River did so on April 18, when he took a 42½-pound salmon. On the same day this same angler also won a silver button for a 32½-pound fish and a bronze button for a 26-pound fish.

DANGERS TO THE INDUSTRY.

Man is undoubtedly the greatest present menace to the perpetuation of the great salmon fisheries of the Pacific coast. When the enormous number of fishermen engaged and the immense quantity of gear employed are considered, one sometimes wonders how any of the fish, in certain streams at least, escape. High water or low water, either of which will prevent certain forms of apparatus from fishing to any extent while such conditions prevail, storms which impede fishing, and the hundred and one small things which in the aggregate are of considerable importance, however, all aid in assisting the salmon in dodging the apparatus and reaching the spawning beds in safety, while, unless the stream is completely blocked by a tight barricade, an indeterminate number of salmon will escape all the pitfalls man and animals may set for them.

One very essential fact in connection with the annual runs of spawning salmon should not be lost sight of, and that is all salmon die after spawning once, and if more are allowed to reach the spawning beds than are necessary for the perpetuation of the race the excess are an economic waste. An excessive number of spawners on the beds is also harmful, in that the late comers stir up the gravel in which many of the eggs deposited by the early spawners have been sheltered, causing them to float up and become easy prey for the predaceous fishes and birds.

In some sections an almost idolatrous faith in the efficacy of artificial culture of fish for replenishing the ravages of man and animals is manifested, and nothing has done more harm than the prevalence of such an idea.

While it is an exceedingly difficult thing to prove, the consensus of opinion is that artificial culture does considerable good, yet the very fact that this can not be conclusively proven ought to be a warning to all concerned not to put blind faith in it alone.

When salmon are stripped by man, the eggs fertilized and retained in hatcheries until the young are born, and then planted as soon as the yolk sac has been absorbed, it is manifest that the only saving over the natural method is in reducing the loss in the egg stage. We know that many eggs, after being deposited naturally on the spawning beds, are devoured by other fishes, while sudden freshets and occasional droughts also claim their toll of eggs. It is highly probable, although we have no positive data on this point, that these losses far exceed those experienced in artificial salmon culture, and whatever this difference is it represents the extent to which salmon hatcheries should be credited as preservers of the industry, when the fry are planted immediately after the yolk sac has been absorbed. Many hatcheries, however, now hold the young fish until they reach the fingerling or yearling stage before planting them, thus greatly reducing the dangers to which the fish are subject during this stage of their career, and thus adding materially to the value of the method.

In the opinion of the author, the best way in which to conserve the fisheries of the coast is by enacting and enforcing laws under which a certain proportion of the runs will be enabled to reach the spawning beds and perform the final and most important function of their lives unmolested. If this is done, there can be no question of the perpetuation of the industry, and if it is then supplemented by the work of hatcheries, which would reduce the loss in the egg and early fry stages, assurance on this point would be made doubly sure.

If unrestricted fishing is to prevail, however, with a dependence upon hatcheries alone to repair the ravages of man, the industry will suffer seriously, for, from the very nature of things, less and less fish will annually escape through the fishing zone, resulting in a continually lessening quantity of eggs being obtained at the hatcheries, and finally the latter will have to close down from sheer lack of material upon which to work.

Should eggs be brought to the hatchery from other streams, it would merely be "robbing Peter to pay Paul," and in the end the same result would follow in those streams.

Fortunately these matters are becoming increasingly plain to the people of the various States, Provinces, and Territories concerned, and, while a few selfish persons in each are seeking solely their own enrichment by any means possible, the greater number of those interested in fishing operations want to see the industry perpetuated and are willing to do almost anything that will work to this end.

Next to the fishing operations of man, the gravest danger to the salmon fisheries of the Pacific coast lies in the pollution of the rivers which the salmon ascend for spawning purposes. The salmon, both old and young, require pure cold water, and the immense runs which have annually ascended the streams for many years are doubtless due to the fact that such conditions have prevailed in them. The large increase in the population of the coast States within recent years, with the resulting increase of mills and factories, has greatly increased the amount of sewage from cities and towns and the waste from the manufacturing plants. Many of the latter have also constructed dams without adequate fishways, and these also wreak great havoc to the industry by cutting the fish off from the upper reaches of the rivers upon which constructed.

The emptying of sewage into streams ought to be made a crime. It is an exceedingly crude method of dealing with it, and, instead of disposing of the filth, merely transfers it from one place to another, making the water unfit for use at points farther downstream and spreading diseases and death amongst, not only the finny, but also human, users of it.

In the present condition of sanitary science it is a comparatively easy matter to dispose of this filth by modern septic devices, and a number of cities are now disposing of their sewage in this manner.

The irrigation ditch, a comparatively new product on this coast, while of great benefit in developing the arid lands in certain sections, as at present operated is a considerable menace to the salmon fisheries. But few ditches have screens at their head, and as a result many thousands of young salmon slowly making their way to their ocean home pass into and down these to an early doom. Every owner of such a ditch should be compelled to place at its head a screen with fine enough mesh to prevent absolutely the passage through the same of even the tiniest baby salmon.

Next to man and his methods the trout is undoubtedly one of the greatest enemies of the salmon. The Dolly Varden follow the salmon from the sea to the spawning beds, and when the eggs are extruded devour countless thousands of them. Many and many a time the writer has seen on the spawning beds female red salmon swimming around with a cloud of trout spread out behind like a fan, following her every movement, eagerly waiting for the moment when the eggs shall appear.

In the summer, when the young are heading for the sea, the trout are lying in wait for them and again take their toll of countless thousands.

Much is said by certain people of the ravages amongst the salmon of certain animals, as the seal, sea lion, bear, eagle, kingfisher, crane, duck, loon, and hawk. While in the aggregate the ravages of these animals are considerable, they are barely a drop in the bucket as compared with the direct or indirect ravages of man and his agencies.

IV. FISHERMEN, OTHER EMPLOYEES, ETC.

In the early days canning was a haphazard business, and workmen came and went as common laborers do in the wheat fields of the West. As the business increased in importance and the need of skilled labor became imperative, men were put to certain work and kept at it from season to season, with the result that in a few years a corps of highly skilled laborers had been evolved, and this had much to do with the rapid extension of the industry.

For many years Chinese formed the greater part of the cannery employees, the superintendent, foreman, clerks, machinists, and watchmen alone being white. No other laborers have ever been found to do the work as well or with as little trouble as the Chinese. In times of heavy runs, when the cannery would have to operate almost night and day in order to take advantage of what might be the last run for the season of the sometimes erratic salmon, the Chinese were always willing, even eager, to do their utmost to fill the cans, and, if fed with the especial food they insisted upon having and due regard was had to certain racial susceptibilities, the cannery man could almost invariably depend upon the Chinese doing their full duty.

The Chinese-exclusion law cut off the supply of Chinese, and as the years went by and their ranks became decimated by death, disease, and the return of many to China, the contractors were compelled to fill up the rapidly depleting crews with Japanese, Filipinos, Mexicans, Porto Ricans, etc., with the result that to-day in many canneries special quarters have to be provided for certain of the races—more particularly the Chinese and Japanese—in order to prevent racial hatred from engendering brawls and disturbances.

In Alaska the Japanese now compose about one-half of the cannery employees. While a few cannery men express themselves as well pleased with this class of labor, the majority find it troublesome.

In Alaska and at a few places in the States Indians are employed in the canneries. In Alaska more would be employed if they could be secured. They make fair workpeople but are rather unreliable about remaining through the season.

The supplying of this kind of labor is done largely through the contract system. In the large cities along the coast are labor agencies, mainly owned by Chinese, which make a specialty of furnishing labor for this work. In the agreement between the canning company and the contractor the company guarantees to pack a certain number of cases during the coming season and the latter agrees to do all the work from the time the fish are delivered on the wharf until they are ready to ship at the end of the season for a certain fixed sum per case. Should the cannery pack more than the guaranteed number, which it usually does if possible, the excess has to be paid for at the rate per case already agreed upon, while if the pack for any reason should fall below the contract amount, the company must pay for the shortage the same as though they had been packed. The company transports the Chinese to the field of work and carries them to the home port at the end of the season. It provides them with a bunk house and furnishes fuel, water, and salt. The contractor sends along with each crew a "boss," who has charge of the crew, and furnishes their food, the company transporting this free.

White men do the greater part of the fishing for salmon, many nationalities being represented, but Scandinavians and Italians predominate almost everywhere. A number of Greeks are to be found fishing on the Sacramento, while Slavonians do most of the purse seining on Puget Sound. The native-born American is not often found actually engaged in fishing, but frequently is the owner of the gear or has a responsible position in the packing plants.

A number of Indians participate in the fisheries of Alaska, and a few fish in Washington. The only Chinese engaged in fishing are in Monterey Bay. A number of Japanese also fish in this bay, which is the only place in American territory where they fish for salmon. A considerable number of Japanese engage in fishing in Canadian waters.

At many places on the coast, particularly in Alaska, fishing is a hazardous occupation. In Alaska most of it is done in the bays, sounds, and straits, where storms are frequent, and the annual loss of life is heavy. The records of the Alaska Fishermen's Union show for its members the following losses of life by drowning: 1905, 10 men; 1906, 5 men; 1907, 10 men; 1908, 17 men; and 1909, 17 men.

The fishermen early saw the advantages of organization, and nearly every river now has a union, which is subordinate to the general organization. One of the most typical of these is the Alaska Fishermen's Union, which has active jurisdiction over all sections of Alaska, except a portion of southeast Alaska. This organization enters into contracts with the salmon canneries and salteries, by which the rates of wages, duties, etc., of the fishermen are fixed in advance for a period of three years. As a result of this mutual agreement upon terms but little trouble is experienced with the fishermen, who generally conform scrupulously to the terms of the contract, and strikes and bickerings, which were very common a few years ago, are now almost entirely absent.

FISHERIES OF BOUNDARY WATERS.

Waters which form the boundaries between States or between nations, and in which fishing is carried on by the citizens of both, have almost always proved bones of contention, and the Pacific coast has been no exception to the rule.

The Columbia River, which forms the boundary between Oregon and Washington, affords a typical example of the evils which can result from a division of responsibility between two States. For many years each State enacted laws regulating the fisheries of the river with very slight regard usually to laws already in force in the other State. As a result of this the fishermen transferred their residence for license purposes from State to State as the laws of one or the other best suited their particular purposes.

The fishermen and packers also were in apparently irreconcilable conflict as to the proper means to be taken to conserve the fisheries, and each session of the legislatures saw strong lobbies present to work for certain selfish ends, while the few earnest men who had the real welfare of the fisheries of the river at heart had difficulty in making the slightest headway against the influence of these lobbies.

To further complicate the matter, in 1894 Oregon claimed that, under the provisions of the enabling act admitting it as a State, it had jurisdiction to the Washington shore, and proceeded to arrest Washington men who were fishing in what was the open season according to Washington law but the closed season under Oregon law.

In June, 1908, the voters of the State of Oregon had presented for their consideration two bills radically affecting the waters of Columbia River. One closed the river east of the mouth of the Sandy River against all fishing of any kind except with hook and line, and was originated by gill-net fishermen of the lower river for the purpose of eliminating fish wheels in the upper waters. This bill was the first presented to the people, and when it appeared the upriver men retaliated by presenting a bill affecting the lower river to such an extent that it practically prohibited the net fishermen from operating.

Very much to the surprise of all concerned both bills were passed and became laws on July 1, to take effect, as provided, on August 25 and September 10, respectively. The Oregon master fish warden proceeded to enforce both laws, arresting all violators on both sides of the river, irrespective of whether or not they were operating under a Washington or Oregon license, and incidentally did the fisheries a great service by bringing prominently before the public the anomalous condition of affairs which was occasioned by the archaic system under which the fisheries of the Columbia were governed. The State of Washington appealed to the United States courts, which, after argument, issued an injunction preventing the warden from enforcing the laws so far as the Washington fishermen were concerned.

In the meantime the attention of the General Government had been drawn to the apparently irreconcilable conflict between the two States, and fearing that in the mêlée the interests of the fisheries would be lost sight of, President Roosevelt, in a message to Congress, after reciting briefly the lack of harmony in jurisdiction by the States, recommended that the General Government take over the control of the fisheries of the Columbia, as well as other interstate rivers.

This had the effect of bringing matters to a head, and negotiations were soon in progress looking to the preparation of a treaty between the two States by which uniform laws would be adopted, and thus each State have concurrent jurisdiction to the opposite shore of the river. The legislatures each appointed a committee of eight members to confer and frame joint legislation. The two committees met in Seattle, Wash., early in 1909, and agreed upon the following recommendations:

First. A spring closed season from March 1 to May 1.

Second. A fall closed season from August 25 to September 10.

Third. A Sunday closed season from 8 p. m. Saturday of each week to 6 p. m. the Sunday following between the 1st day of May and the 25th day of August.

Fourth. We suggest the mutual recognition by each State of the licenses issued to floating gear by the other State.

Fifth. That the State of Oregon repeal chapter 89 of the session laws of Oregon for the year 1907, relative to the operation of purse seines and other like gear on the Columbia River.

Sixth. We recommend the enactment of similar laws in both States carrying an appropriation of at least $2,500 in each State and providing for the destruction of seals and sea lions and the granting of a bounty on the same, to be $2.50 for seals and $5 for sea lions.

Seventh. We recommend the repeal of both the fish bills passed under the provisions of the initiative and referendum in June, 1907, by the people of the State of Oregon, said bills being designated on the ballot as 318, 319 and 332, 333.

The recommendations were enacted into law by both States, and at the same time the State of Washington in its bill also prohibited fishing for salmon within 3 miles of the mouth of the Columbia between March 1 and May 1 and between August 25 and September 10, or salmon fishing on tributaries of the Columbia, except the Snake, between June 1 and September 15; and also prohibited fishing for salmon by any means save by hook and line in the Kalama, Lewis, Wind, Little White Salmon, Wenatchee, Methow, and Spokane Rivers and in the Columbia River 1 mile below the mouth of any of the rivers named. The agreement was subjected to a rather severe strain, however, when it was discovered that the Oregon Legislature had failed to provide the same closed periods for the tributaries that were enacted for the Columbia, thus leaving the Willamette, Clackamas, Lewis and Clark, and Youngs Rivers and Spikanon Creek open to fishing for 15 days in March and 15 days in April, while the

Columbia was closed. The cry of bad faith was at once raised by the Washington fishermen, and for a short time it appeared that the agreement would be broken at the very beginning. The Oregon Board of Fish Commissioners took the matter up, however, and by order closed these streams to all fishing during the times of closed season on the Columbia, and thus restored peace once more.

This agreement continued in force until 1915, when the legislature of each State prepared for a thorough revision of its fishery code. In order to make this revision more effective, committees from both legislatures were appointed and held joint meetings in Portland, where they mutually agreed upon laws covering the fisheries of the Columbia River, and in order to make this agreement more binding the following chapter was inserted in the codes finally adopted:

> All laws and regulations now existing, or which may be necessary for regulating, protecting, or preserving fish in the waters of the Columbia River, over which the States of Oregon and Washington have concurrent jurisdiction, or any other waters within either of said States, which would affect said concurrent jurisdiction, shall be made, changed, altered, and amended in whole or in part only with the mutual consent and approbation of both States.

As such an agreement between two States requires the approval of Congress, a bill ratifying same was introduced in Congress on December 16, 1915. This compact was not acted on by the 64th Congress.

The conditions which prevail in Puget Sound adjacent to the boundary between Washington and British Columbia have also been the cause of serious anxiety to those interested in the perpetuation of the salmon fisheries. The great schools of sockeye salmon which are on their way from the ocean to the spawning beds in the Fraser River pass through this section, and it is here that the greater part of the fishing is done. The Province of British Columbia and the State of Washington are vitally interested in the preservation of these fish, but, unfortunately, they seem to be unable to agree upon any definite policy with regard to their conservation, although it would appear to the unprejudiced observer that it ought to be possible to find some common ground upon which they could agree.

This condition of affairs on Puget Sound and similar conditions in other boundary waters led the General Government to take up the matter, and on April 11, 1908, a convention was concluded between this country and Great Britain for the protection and preservation of the food fishes in international boundary waters of the United States and Canada. Both Governments appointed international commissioners—Dr. David Starr Jordan for the United States and S. T. Bastedo (who was succeeded later by Prof. Edward Ernest Prince) for Canada—whose duty it was to investigate conditions prevailing in these waters and to recommend a system of uniform and common international regulations. After an exhaustive investigation the commissioners submitted recommendations, which included the following affecting the boundary waters dividing the State of Washington and the Province of British Columbia, these waters being defined as the Strait of Juan de Fuca, and those parts of Washington Sound, the Gulf of Georgia, and Puget Sound lying between the parallels of 48° 10′ and 49° 20′:

GENERAL REGULATIONS.

3. *Disposition of prohibited catch.*—In case any fish is unintentionally captured contrary to the prohibitions or restrictions contained in any of the following regulations, such fish shall, if possible, be immediately returned alive and uninjured to the water.

4. *Dynamite, poisonous substances, etc.*—No person shall place or use quicklime, dynamite, explosive, or poisonous substances, or electric device in treaty waters for the purpose of capturing or killing fish.

5. *Pollution of waters.*—No person shall place or pass, or allow to pass, into treaty waters any substance offensive to fishes, injurious to fish life, or destructive to fish fry or to the food of fish fry, unless permitted so to do under any law passed by the legislative authority having jurisdiction.

No person shall deposit dead fish, fish offal, or gurry in treaty waters, or on ice formed thereon, except in gurry grounds established by the duly constituted authorities.

6. *Capture of fishes for propagation or for scientific purposes.*—Nothing contained in these regulations shall prohibit or interfere with the taking of any fishes at any time for propagation or hatchery purposes, and obtaining at any time or by any method specimens of fishes for scientific purposes under authority granted for Canadian treaty waters by the duly constituted authorities in Canada and for United States treaty waters by the duly constituted authorities in the United States.

12. *Capture of immature salmon prohibited.*—No salmon or steelhead of less than 3 pounds in weight shall be fished for, killed, or captured in treaty waters.

13. *Salmon weirs, etc., above tidal limits prohibited.*—No salmon and no steelhead shall be fished for, killed, or captured by means of a net of any sort, any weir or any fish wheel, above tidal limits in any river in treaty waters.

14. *Close season for sturgeon.*—During the term of four years next following the date of the promulgation of these regulations no sturgeon shall be fished for, killed, or captured in treaty waters.

15. *Capture of fish for fertilizer or oil prohibited.*—Fishes useful for human food shall not be fished for, killed, or captured in treaty waters for use in the manufacture of fertilizer, or of oil other than oil for food or medicinal purposes.

16. *Naked hooks and spears prohibited.*—No spear, grappling hook, or naked hook, and no artificial bait with more than three hooks, or more than one burr of three hooks attached thereto, shall be used for the capture of fish in treaty waters. This regulation shall not prohibit the use of a gaff in hook-and-line fishing.

17. *Torching prohibited.*—No torch, flambeau, or other artificial light shall be used as a lure for fish in treaty waters.

The following regulations relate specifically to the waters named:

STRAIT OF JUAN DE FUCA AND ADJACENT WATERS.

The following regulations (62 to 66, inclusive) shall apply to the Strait of Juan de Fuca, those parts of Washington Sound, the Gulf of Georgia, and Puget Sound lying between the parallels of 48° 10′ and 49° 20′ north latitude:

62. *Close season for salmon.*—From August 25 to September 15 in each year, both days inclusive, no salmon or steelhead shall be fished for, killed, or captured for commercial purposes in these treaty waters; provided, however, that in the waters to the westward of a line drawn southward from Gonzales Point to the shore of the State of Washington silver salmon, or coho salmon, may be fished for, killed, or captured from September 1 to September 15 in each year, both days inclusive.

63. *Weekly close season for salmon and steelhead.*—From 6 o'clock Saturday morning to 6 o'clock on the Monday morning next succeeding, no salmon or steelhead shall be fished for, killed, or captured in these treaty waters.

It is, however, provided that in the waters to the westward of a line drawn southward from Gonzales Point to the shore of the State of Washington the weekly close season shall begin 12 hours earlier, and shall end 12 hours earlier.

64. *Construction of pound nets.*—All pound nets or other stationary appliances for the capture of salmon or steelhead shall be so constructed that no fish whatever shall be taken during the weekly close season. The erection or addition to the pound net of a jigger is prohibited.

65. *Location of pound nets.*—All pound nets shall be limited to a length of 2,500 feet, with an end passageway of at least 600 feet between one pound net and the next in a linear series, such distance being measured in continuation of the line of direction of the leader of such net, and a lateral passageway of at least 2,400 feet between one pound net and the next.

On and after January 1, 1911, the mesh in pound nets shall be 4 inches in extension in the leader and not less than 3 inches in other parts of the net.

66. *Nets other than pound nets.*—No purse net shall be used within 3 miles of the mouth of any river and no seine within 1 mile of the mouth of any river in these treaty waters.

No gill net of more than 900 feet in length or of a greater depth than 60 meshes shall be used in these treaty waters.

The effort to enact these regulations into law by our Congress met with decided objections not only on the part of the Puget Sound operators, but also from operators in other waters affected, with the result that the bill is now virtually dead.

V. THE SALMON FISHERIES OF SIBERIA.

As on the Alaska coast, the aborigines of Siberia must have learned early of the excellent food qualities of the salmon which each year frequented the rivers of that country for spawning purposes, and not only ate them fresh but also dried large quantities for winter use of themselves and their dogs.

Owing to the inaccessibility of the Siberian coast, due mainly to the lack of transportation facilities for many years, and the decided objection of the Russian Government to travelers roaming over the country, partly because of the presence of political and criminal convicts, and partly because of a fear that they might learn too much of its resources, there has been but little written, especially with regard to its fishery resources, about this remote section of the Russian Empire, and what little has been published is usually filled with inaccuracies, due, doubtless, in many instances, to the fact that the writer generally had to get most of his information at second and third hand and was also unfamiliar with fishery subjects.

Most of the data given below were obtained directly from persons living in Siberia or Japan, most of whom are engaged in the fishing industry of Siberia, or from Americans who have on various occasions visited the country in order to view its fishing possibilities at first hand.

SPECIES OF SALMON.

All five species of salmon are to be found along the Siberian coast. Although we have very little authentic data relating to their movements, these are doubtless similar to the runs on the Alaska coast, where climatic and other conditions are very similar. Nearly all streams from the Arctic Ocean to north China seem to have runs of one or more species. The steelhead does not appear to be an inhabitant of the Asian coast.

The fishing carried on by the Russians has usually been along the rivers of the mainland, principally in the Amur and on Sakhalin Island.

From very early times Japanese fishermen have frequented the Siberian coast and Sakhalin Island, the southern portion of the latter being owned by Japan, being drawn here mainly by the rich stores of salmon which could be secured easily and quickly and were so necessary to eke out the vast quantity needed to supply such a fish-eating nation as Japan.

The exhaustion of the fishery resources of many of the European waters belonging to Russia has forced some of her more enterprising fishermen to seek for new supplies in her Siberian waters, and as these resources become better known, and means of transportation are increased and improved, there will doubtless be a tremendous impetus given to their development.

FISHING DISTRICTS OF SIBERIA.

The Amur fishing district is subdivided into four districts, as follows: Nikolaievsk, Chnirahsky, Pronga, and Sakhalin. The first named consists of 22 fishing stations belonging to the municipality of Nikolaievsk and 35 to the Department of Domains. The shore line is about 230 miles. Next in importance is the Chnirahsky district, and this includes some very important and valuable fishing plants. In the Pronga district are also several good fishing plants. The Sakhalin Island district includes all the fisheries of Russian Sakhalin Island north of 50° north latitude.

The fisheries of the Usuri River, a tributary of the Amur, are controlled almost entirely by the local peasants, cossacks, and natives, who, owing to the inadequate means of transportation, are able to market but a small part of their catch otherwise than amongst themselves. The same is true also of Lake Hinka.

The Kamchatka region has had the most important development of recent years, and now comprises within its boundaries most of the salmon canneries of Siberia. There are about 187 fishing stations in this district, the vast majority of which are held by Japanese.

The Anadir district is said to be richer in fish than the southern districts of eastern Siberia. The chief commercial fisheries are concentrated near the Anadir River. A considerable quantity of salmon is frozen in this district for export.

FISHERY RIGHTS AND REGULATIONS.

Along the entire seacoast of Siberia, by virtue of the Russo-Japanese convention of 1907, concluded for 12 years, the Japanese are permitted to engage in fishing on equal terms with Russians. In such sections there is no restriction with regard to the nationality of the laborers employed or the method of preparing the fish, except that the manufacture of fish manure from fish of the salmon variety is prohibited. On the face of it this convention looks like an equitable agreement, but in putting the Japanese on the same footing as the Russians it subjected them to a lot of unstated and arbitrary laws, by-laws, and local regulations, besides making the tenure exceedingly short, virtually only one year, as a result of which Japanese capital refuses to erect more than the crudest of plants.

Fishing rights in the gulfs and bays not included in the Russo-Japanese convention, such as Peter the Great Bay, Imperial Harbor, Vanina Bay, Avatchinsk Bay, and others, as well as the rivers of Okhotsk and Kamchatka, are granted by the Governor General, without public tenders, to persons of good repute, but for one year only, and if they show their ability to establish a successful fishing station a lease for 12 years can be secured on the basis of paying a royalty of 2½ cents per pood (36.112 pounds) of prepared fish. Under the terms of the lease only Russian subjects can be employed at the stations, while all sailing vessels serving the stations must be under the Russian flag.

The regulations governing the river districts vary from those relating to coast concessions, and also vary from each other, as the local authorities in the river districts are authorized to issue temporary rules and regulations to cover local conditions.

On the Amur River, within the boundaries of the Nikolaievsk, Mariinsk, and Khabarovsk districts, the fishing stations are leased by public auction to the highest bidder, some on a long-term basis and others for only one year. At stations above the city of Nikolaievsk, within 30 miles of the Amur estuary and farther, no foreign labor is allowed. Below the city of Nikolaievsk foreign labor can be employed to handle the fish on shore, but the actual fishing can be done only by Russian subjects.

At the present time the chief aim of the Russian authorities is to break the monopoly the Japanese have of the fisheries along the greater part of the coast. This will be an exceedingly difficult thing to do, owing to the proximity of the Japanese to the Siberian coast, the ease with which they can transport by water the necessary supplies, etc., for carrying on the fisheries, the vastly greater skill in carrying on this work displayed by them over their Russian competitors, and their unlimited supply of cheap labor, while the Russian fisheries are badly hampered as a result of the few Russian subjects available for such work and the consequent high wage cost of same. Japan also has another big advantage in that she is at present almost the sole market for the greater part of the salmon and other fishes taken in Siberia. The very fact of this fish being necessary for feeding her people will cause Japan to battle hard to hold her present advantage.

The development of the salmon and other fisheries of Siberia has been much hampered by the disinclination of the Russian Government to permit foreigners to acquire fishing concessions except on very short tenure. As the Russians themselves are generally unskilled in fishing operations, and are compelled to do the work with Russian labor, which is quite scarce, they do but little with their concessions. American capital would doubtless be available for developing Siberia's fisheries were it assured of a sufficiently long tenure of lease with some other minor concessions.

APPARATUS EMPLOYED.

In the river districts somewhat primitive fishing apparatus is employed. Spears, dip nets, and the other simple forms which seem to be common to all savage tribes depending upon the water for the greater part of their subsistence, are all in use by the natives living along the upper reaches.

Weirs of a primitive type are also used. These have a lead consisting of willow poles and branches built from the river bank or a sand bank out into the stream. At the outer end is attached a net compartment with a lead, into which the fish, which have been following the lead in the search for an opening, pass. Two men in a boat are anchored close by, and as soon as 30 or 40 salmon have passed into the compartment, it is hauled up and the fish emptied into the boat, after which the net is reset.

Haul seines of varying lengths and depths are used in connection with the more important river fishing stations.

Along the coast the Japanese use a floating trap net somewhat similar to the type used in Alaska, also haul seines and a few gill nets.

ABUNDANCE OF SALMON.

It is exceedingly difficult to secure even approximate statistics of the Siberian catch of salmon, owing to the wide extent of coast, the totally inadequate means of transportation preventing close supervision, the presence of so many foreigners who go directly home with their catches at the end of the season, and the crude system of control in operation by the authorities.

The following table shows the catch of salmon in the four districts for the year 1898:

Districts.	Spring.	Summer.	Autumn.
Nikolaievsk	....	7,464,896	4,685,480
Chnirahsky	60,000	873,000	2,662,000
Pronga	1,067,000	316,950	665,500
Sakhalin	666,000	635,000	748,000
Total	1,793,000	9,289,846	8,760,980

In the Anadir district the catch in 1909 was as follows: Cape St. Michael, 91,616; above Cape Neuman, 8,234; Anadir River, 150,746; Anadir River estuary, 9,864; Hanchelar River, 6,121; Cape Observation, 270,000; total, 536,581. The catch by natives and small Russian fishermen is estimated at about 3,000,000 and 500,000 fish, respectively. In addition to this, 130 barrels of caviar, weighing 14 tons, were prepared, and there were 20 tons from Cape Observation.

According to the statistics of the Fisheries Control, the catch of salmon in the Amur River in 1910 was as follows: Spring salmon, 7,701,344; summer salmon, 21,384,549; autumn salmon, 9,546,254; in all, 38,632,147. Of this number 34,649,025 fish were marketed and the balance consumed locally. Japan bought 23,228,481 fish, valued at $473,800; the balance was valued at $681,345. In addition there were 4,766,784 pounds of salmon caviar, valued at an average price of $0.114 per pound, totaling $543,413, which brings the total value of the salmon catch and by-products up to $1,698,558. During the same year, in Peter the Great Bay, 8,263 salmon were caught.

The number of salmon caught in eastern and western Kamchatka and in the bays and rivers in this region not included in the Fishing Convention, and at the Russian river stations, in 1911, was as follows:

Species.	Western Kamchatka.	Eastern Kamchatka.	River stations.	Bays and river outlets.	Total.
Chavitch (king)	5,421	7,818	207	590	14,036
Keta (chum)	3,082,300	2,675,000	297,300	890,790	6,945,390
Krasnaia (red)	2,136,800	747,000	689,000	236,240	3,809,040
Garbusha (humpback)	39,448,500	1,411,000	1,320,200	175,980	42,355,680
Kishutch (coho)	327,200	179,000	114,200	7,770	628,170
Total	45,000,221	5,019,818	2,420,907	1,311,370	53,752,316

In the Okhotsk district the catch amounted to 827,274 keta and 37,790 krasnaia. Of salmon caviar 489 tons were prepared by the Japanese and 60 tons by the Russians.

In 1915 about 50,000 barrels of pickled salmon were prepared on the Amur River. In the sections covered by the Fishing Convention 6,000,000 salmon, mostly keta with a few krasnaia, were dry-salted, while 80,000,000 humpback salmon, called "salmon trout" in Japan, were so prepared. No fish were frozen for the European market, due to the war. A considerable quantity of caviar was prepared, but the quantity is unknown. The pack of canned salmon is shown elsewhere.

FREEZING SALMON.

As when the Russians owned Alaska, the exploitation of Siberia was carried on for many years by trading companies with large powers granted by the Government. In 1892 a very enterprising company was in charge, judging from the following extract from a letter written on February 2, 1893, by the late Eugene G. Blackford, the well-known fish dealer of New York, to the late Col. Marshall McDonald, then United States Commissioner of Fish and Fisheries:

I have just learned of the arrival in Chicago of 60,000 pounds of frozen salmon. They were caught in Petropavlovsk, Kamchatka. These fish are a new venture undertaken by a commercial trading company who control that country, and these salmon have been taken from a river where none have been caught before, and my information is that they catch fish weighing as much as 150 pounds each. The above lot of fish was brought frozen to Tacoma and then shipped by refrigerator car to Chicago where they were sold to Mr. Booth of the Booth Packing Co., Chicago. Mr. Booth has declined to pay for them because of their not being in satisfactory condition.

Nothing further appears to have been done in this line until in 1903, when a Berlin fish merchant outfitted and sent to the Siberian coast a refrigerator steamer with a capacity of 2,500 tons. The fish were caught mainly in the Amur River and were frozen immediately after being brought aboard. In all, 160,000 salmon were obtained, and these were in excellent condition when landed at Hamburg, Germany.

In 1907 the Salmon Steam Fishing Co., a combined British and Japanese company, chartered the steamers *Zenobia* and *Zephyrus*. These vessels were fitted with refrigerating apparatus and cold-storage chambers and sent to the Kamchatkan Peninsula to get a cargo. Both secured good cargoes.

In 1909 two refrigerating steamers visited the coast and froze salmon for the European market. One vessel was outfitted by a British company and the other by a German company, J. Lindenberger (Inc.). The latter reported that the chum salmon, the principal species frozen, were large and very bright. The British steamer left England in April and arrived home again late in December.

CANNING SALMON.

In 1900 the Kamchatka Commercial & Industrial Co. (Ltd.), was organized at St. Petersburg, Russia, by A. T. Prozoraf, president of the St. Petersburg Chamber of Commerce, P. M. Grunwalt, H. T. M. Court, and A. A. Prozoraf, secretary. A complete canning outfit was purchased in the United States, and the first cannery in Siberia established at Petropavlovsk, Avacha Bay, Kamchatka.

The San Francisco Trade Journal, under date of December 19, 1902, printed the following item relating to the operations of this cannery:

On December 8 the Russian barkentine *Bitte* arrived from Petropavlovsk, Siberia, with 10,436 cases canned salmon. This is the first consignment of salmon received from them.

The greater part of the pack comprised dog salmon, although they were labeled "pink" salmon, the rest being reds and kings.

In 1903 the company did not operate, the fishing season being devoted to moving the plant to Ust-Kamchatka, at the mouth of the Kamchatka River, where, after being in use altogether for two or three years, it was abandoned and left all standing.

In 1907 two canneries were established in the estuary of the Amur River, near Nikolaievsk, but beyond getting out samples they were never operated.

In 1910 A. G. Denbigh, an Englishman, built a modern cannery near the second site of the Kamchatkan Commercial & Industrial Co. That year the cannery produced only about 10,000 cases, but each year since the equipment of the plant has been enlarged and improved until in 1913 the pack amounted to 60,000 cases. Early in 1914 a complete one-line plant of American can-packing machinery was installed.

In 1912 Mr. Denbigh built another cannery 1½ miles away from the above plant. This plant was first operated with German and Norwegian sanitary machinery, but in 1914 a two-line American sanitary can-packing plant was installed, the can-making plant at the first plant making all the cans needed at the two canneries.

In 1915 a number of additions were made to both plants in the line of flat fillers, etc., while still more were in contemplation for 1916.

Mr. Denbigh also operates a hand cannery at Compocowa, on the west side of the Kamchatka Peninsula.

Up to 1912 very few canneries, and these very primitive affairs, had been built by the Japanese, owing to the uncertainty of tenure referred to previously. The "canneries" were mere sheds or shelters where the cans—which were brought from Japan, made or half made—were filled, closed, and cooked, furnace-heated, vertical retorts being used for the latter purpose. If the owner lost his concession at the end of the fishing season he simply took his retorts away with him and the buildings were left to his successor.

In 1912 a Tokyo company (Ichigumi & Co.) put up two canneries near the Ozernaya River in Kamchatka, while a Japanese from Niigata, Japan, also put up a small plant in the same vicinity. Both plants were cheaply built and operated with hand-power machinery and small vertical retorts. That year the two companies together packed about 13,500 cases of salmon.

The same season Ichigumi & Co. put up another hand-power cannery, and Tsutsumi & Co., of Hakodate, Japan, built two others of the same type near the Kamchatka River, on the east coast.

In 1913 Tsutsumi & Co. built a modern cannery at Ozernaya and installed a complete line of American sanitary can-making and can-packing machinery.

The same year Ichigumi & Co. put up two hand-power canneries near the Kamchatka River, having succeeded to the concessions formerly held here by Tsutsumi & Co. In 1914 they built a modern plant and installed a complete line of American sanitary can-making and can-packing machinery.

The St. Petersburg firm of S. Grooshetsky & Co., which has been engaged for a number of years in the freezing of salmon and in the preparation of salmon caviar, under the name of the Pacific Ocean Sea Industry Association, erected a cannery near Ozernaya in 1914, and installed in it a full line of American sanitary can-making and can-packing machinery. This plant will compare favorably with most of our Alaska canneries. The buildings are of iron.

In 1915 a number of extensive improvements in the way of new buildings, machinery, etc., were made to the various plants, and during the winter of 1915–16 several of the canning firms had representatives in this country selecting much additional machinery for use during the 1916 season.

The following table [a] shows the detailed pack of canned salmon made by the various companies operating in Siberia in 1915:

Name and cannery location.	Canneries.	One-pound flats.					Total.
		Reds.	Springs.	Silvers.	Chums.[a]	Humpbacks.	
		Cases.	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*
A. G. Denbigh, Kamchatka River (2) and Compocowa	3	58,000	....	26,000	38,000	....	122,000
S. Grooshetsky & Co., Bolsheretsk	1	6,000	....	....	23,000	....	29,000
Minard & Co.	1	....	....	....	7,000	....	7,000
Nichiro Fishing Co. (Ltd.), Kamchatka River	1	14,703	3,334	2,191	11,981	....	32,209
Sugamiya	1	2,200	....	....	....	....	2,200
Tsutsumi & Co., Ozernaya	1	[b]37,800	....	....	8,800	....	46,600
Hand-pack canneries, East and West Kamchatka	2	1,000	....	....	4,000	10,000	15,000
Total	10	119,703	3,334	28,191	92,781	10,000	254,009

[a] Called "Pinks" in Siberia. [b] Includes 10,800 cases one-half pound flats of 8 dozen each.

The following table [b] shows the pack of canned salmon in Siberia from 1910, the virtual inception of the industry, to 1915, inclusive:

Years.	Springs.	Reds.	Silvers.	"Pinks."[a]	Humpbacks.	Total.
	Cases.	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*
1910	....	5,500	2,500	2,000	....	10,000
1911	....	15,000	6,000	4,000	....	25,000
1912	....	43,500	18,000	16,000	....	77,500
1913	....	102,900	7,000	21,000	2,500	133,400
1914	....	85,000	22,500	27,000	2,000	136,500
1915	3,334	119,703	28,191	92,781	10,000	254,009
Total	3,334	371,603	84,191	162,781	14,500	636,409

[a] Chum salmon are marketed under a "Pink" label.

SALTING SALMON.

By far the greater part of the salmon catch of Siberia is either pickled or dry-salted. This was the earliest commercial method initiated on the coast and has been followed for a number of years, mainly by the Japanese. The coast is dotted with concessions worked by Japanese, while there are large numbers in operation along the rivers, these being restricted to Russians. An idea of the extent of

[a] From Pacific Fisherman Year Book for 1916, p. 44.
[b] Idem., p. 39.

this branch of the industry may be gathered when it is stated that in 1915 there were 50,000 barrels of pickled salmon prepared in the Amur region, while the Japanese dry-salted about 6,000,000 dog salmon, including also a few reds, and 80,000,000 humpbacks, or "salmon trout," as they are called in Japan.

In pickling salmon the fish are split down the back, the sides being held together by the belly. The roe, gills, and viscera are removed and the fish are then washed, and after salting are placed in large tanks for seven or more days, or until they are thoroughly struck, after which they are packed in barrels, flesh side up, except the two top layers, which have the skin side up. To about 700 pounds of fish 180 pounds of salt are used.

The dry-salting, next to drying, is the most primitive method employed in preserving salmon. The process consists simply in splitting the fish up the belly, removing the gills and entrails, and then filling the belly with salt. The fish are then placed in rows on matting and covered with salt, and other rows are placed on top of them until the pile is from 8 to 10 feet high, when the entire lot is covered with matting and left for about seven days, after which they are relaid and again covered with salt. For shipping the fish are packed in mats.

A very odd feature in connection with the operation of most of the Japanese plants is that the salt to be used in curing the fish is usually dumped loose onto some level spot, with absolutely no covering over it, and exposed to the elements.

The Japanese consume enormous quantities of these dry-salted salmon. During the Russian-Japanese war the latter country's fishermen were cut off from access to their usual fishing grounds, with the result that they were forced to look elsewhere for fish. During 1905 and 1906 large quantities were prepared in Alaska, British Columbia, and Washington for this trade, but as soon as the war ended and the Japanese got access once more to their old fishing grounds, the Japanese duty on salt fish, which had been suspended during and for a short period after the war, was reimposed. As a result our fishermen soon quit the business, and since then operations on this coast have been almost wholly restricted to Japanese operating in British Columbia waters.

At the height of the production on this coast Mr. King, the American consular agent at Hakodate, Japan, made the following suggestions to preparers and shippers of dry-salted salmon for the Japanese trade:

> The salmon should arrive in Japan by December 1. Most of these fish are used among the Japanese for New Year's presents. After the new year the price invariably declines 20 to 30 per cent, and for a month or two the fish are difficult to dispose of, as the consumers always stock up before the new year.

The salmon should weigh not less than 5 pounds when thoroughly cured. They should be free from spots, which are usually found on the salmon if caught in fresh or brackish water. No Japanese would think of giving a salmon with red and black spots to a friend for a New Year's present, and spotted fish never realize more than half the price obtainable for clean white fish. The salmon should be split up the belly and should be salted with fine salt. Coarse salt always tears the flesh of the fish when being rubbed in. Care should be taken that the salmon are not oversalted.

Semga salting is a more improved and sanitary method than that of straight pickling and is used when the fish are being prepared for the European market. Selected fish are cut open along the belly and the viscera and gills are carefully removed. In order that the salt may penetrate the flesh more thoroughly, the flesh on the inside is scored several times. The fish are then carefully washed and rubbed with brushes, after which they are kept on ice for 24 hours. The brine is carefully prepared and very strong. When properly struck the fish are repacked into barrels.

"Kolodka" is a very crude and cheap method of salting. The fish are half salted and half dried without being cut open, and are sold at the place where prepared.

The natives prepare a great many salmon for the winter use of themselves and their dogs, the same as do the Alaskan natives. The fish are dried without the use of salt. The product is known as "youkala."

Some salmon bellies are also cut out and salted, although this has never attained to prominence.

Some fresh salmon, as well as salted, are smoked for local consumption.

Barrels, or tierces, for packing salmon are made from cedar, larch, or fir, with a net capacity of 900 to 1,000 pounds of fish, and are bound with wooden and iron hoops.

VI. THE SALMON FISHERIES OF JAPAN.

Outside of Karafuto (that portion of Sakhalin Island, south of 50° north latitude, which belongs to Japan) and the Kuril Islands, the salmon fisheries of Japan are comparatively small, the principal portion of the immense catches made by Japanese fishermen being along the coasts of Siberia and Karafuto.

All of the five species of salmon found on the American side are to be found in the waters of Sakhalin during the usual spawning periods.

The chum salmon (*O. keta*), which is known in Japan as "sake," and when canned as "pink" salmon, is to be found on Hokkaido Island, running up the various streams for spawning purposes from September to December.

On the same island is to be found also the masu (*O. masou*), a salmon, according to Dr. Jordan,[a] very similar to the humpback, the scales being a little larger, the caudal fin without black spots, and the back usually immaculate. It is fairly abundant in the streams of Hokkaido, the island formerly known as Yezo, and is found nowhere else in the world. The author had an opportunity to examine a dry-salted masu (it might be well to state here that in Japanese masu means "trout") at the fish house of the Royal Fish Co., in Vancouver, British Columbia, in January, 1916. The manager, Mr. Emy, had imported the fish from his own country. Both in size and general appearance it closely resembled a humpback salmon, and when cut open the flesh had the same coloring observable in our humpback. This species, and the true humpback found in more northern waters, especially in Siberia, are dry-salted in immense numbers and are generally marketed under the name of "white trout" or "salmon trout."

In Japan the "red trout" seem to be our rainbow and brook trouts, which were introduced into Japanese waters some years ago. The red salmon (*O. nerka*) is to be found landlocked in Lake Akan in the northern part of the island. It is smaller in size than the sea species. This species has been introduced into the waters of Honshu.

The section of this report devoted to the salmon fisheries of Siberia treats quite fully of the activities of the Japanese in that quarter.

In Sakhalin, or Karafuto, as it is called in Japan, the Japanese have had a rather checkered career. At one time this island belonged to the Chinese Empire. Early in the nineteenth century the southern

[a] Fishes, by David Starr Jordan. p. 296. N. Y., 1907.

portion was occupied by the Japanese. In 1875 she bartered it to Russia in exchange for some small islands in the Kuril group. As a result of the Russo-Japanese War the southern half, or all that portion south of 50° north latitude, was in 1905 ceded to Japan.

The salmon fisheries of this island are of much importance. For many years the Japanese had a virtual monopoly of them, but very early in the present century the Russians attempted to restrict considerably the activities of the Japanese fishermen, and encouraged her own subjects to compete with them. Many hundreds of Russians and Koreans were encouraged to migrate to the island and engage in its fisheries. Despite these handicaps, the operations of the Japanese fishermen, according to the statistics shown below, do not seem to have suffered.

Years.	Salmon.[a]	Spring salmon.	Total.
	Koku.[b]	*Koku.*[b]	*Koku.*[b]
1897	8,589	34,246	42,835
1898	6,335	11,228	17,563
1899	8,379	22,959	31,338
1900	7,719	8,797	16,516
1901	3,089	12,735	15,824
1902	....	....	24,726

[a] Species not specified.

[b] Koku equals about 5½ bushels.

Considerable fishing is carried on around the island of Yetorofu, one of the Kuril group. Here are found red (*O. nerka*), silver (*O. kisutch*), and chum salmon (*O. keta*), also either the humpback or Dr. Jordan's masu.

CANNING INDUSTRY.

The salmon canning industry in Japan proper was inaugurated by the Hokkaido Colonization Department, a local branch of the Federal Government. For some time this department had operated a fishery school on Hokkaido Island, at which experimental work in the canning of salmon and other fishery products was carried on. This establishment canned considerable salmon during the Russo-Japanese War.

This same department also established a fishery school on Yetorofu Island, one of the Kuril group, which was, in 1908, taken over by Suhara Kakubei, a fisherman and graduate of the school, and used as a salmon cannery.

Some years earlier, however, about 1892 or 1893, Fujino Shirobei started canneries in Shibetsu and Bekkai, Nemuro Province, Hokkaido Island, and a short time later Idzumi Shozo also started a plant at Nemuro. For a number of years these three canneries were the only producers. The plants were quite primitive, the product small, and most of it was consumed by the Japanese Navy. A demand for the product was gradually worked up, however, and as a result there are now a number of small canning plants on Hokkaido

Island proper, the Kuril Islands, and Japanese Sakhalin. Most of these plants devote the major part of their energies to the packing of crab meat, the canning of salmon being in most cases a side issue. A few of the plants have been equipped with machinery, but the large majority are hand-pack plants, employing but a few persons.

Most of these plants pack what is called "white trout," which is really the humpback or masu salmon. In 1912 there were in Hokkaido and adjacent islands 21 canneries which packed 730 cases (48 one-pound flat cans each) of red (*O. nerka*) and 72,770 cases (48 one-pound cans each) of "white trout," a total of 73,500 cases.

On the Japanese portion of Sakhalin Island 4 canneries packed 10,120 cases (48 one-pound cans each) of "white trout" in 1912.

The pack of canned salmon in Japanese territory in recent years has been as follows:

Years.	Hokkaido and Kurils.	Karafuto (Japanese Sakhalin).	Total.
	Cases.	*Cases.*	*Cases.*
1912	73,500	10,120	83,620
1913	46,000	....	46,000
1914	50,450	15,000	65,450
1915 (estimated)	55,000	15,000	70,000

The following table shows the quantities and value of salmon and trout taken by the Japanese fishermen in certain years:

Years.	Salmon.		Trout.	
	Pounds.	Yen.	Pounds.	Yen.
1902	5,722,475	454,662	923,025	121,499
1907	9,286,207	892,879	4,500,008	332,316
1912	26,438,017	1,594,230	44,038,383	928,513

FISHERY METHODS.

In Japanese waters salmon are taken by means of trap nets, haul seines, and gill nets.

The haul seines used along the seashore have a length of about 500 fathoms. Each is carried by a boat of 9 feet beam with 30 men, and the right wing, called the "outing wing," is first paid out as the boat heads out from the beach. When the pocket, or bunt, is cast, the boat turns its course toward the right and steers gradually landward, casting the left wing. When the school is encircled the seine is hauled ashore by the seine ropes.

The floating trap net used for salmon is known as "kaku-ami," or square trap net. This consists of a main net and lead. The main net, or heart, is 70 fathoms long, 10 fathoms wide, and 10 fathoms deep, and the lead is 120 fathoms long. The latter guides the fish toward the main net. When being fished the pot is hauled up by a boat crew and the fish transferred to the boat by means of a dip net.

FISH CULTURE.

The artificial culture of salmon is carried on in 56 hatcheries, which are distributed in Hokkaido and the prefectures of Aomori, Akita, Yamagata, Niigata, Toyama, Kyoto, Iwate, and Miyagi. Nine of these belong to the government of Hokkaido and other prefectures, while the rest are owned by fishing associations, individuals, or corporations. The number of young salmon distributed by these hatcheries amounts to over 80,000,000 a year.

The largest hatchery is the one at Chitose, under the supervision of the Hokkaido Fishery Experimental Station. It was established in 1887, and it is estimated that the fish distributed by it number from 20,000,000 to 30,000,000 yearly.

The salmon hatchery of Murakami, Niigata prefecture, dates as far back as 1881, when a regulation pertaining to the preservation of young salmon in the River Miomote was enacted by the prefecture of Niigata. This was first called the "Murakami Salmon Raising Plant," but in 1891 it was turned into a hatchery, and is now distributing 2,000,000 young salmon a year. The salmon hatchery of Nitta River, Fukushima prefecture, is very similar in its history and organization to the above.

The industry has during the last few years become very popular in Yamagata prefecture, where 22 hatcheries are in operation as private enterprises.

In the prefectures of Shiga, Miye, Shizuoka, Nagano, Yamanashi, Kanagawa, Akita, Niigata, Hyogo, Miyazaki, and Hokkaido, the masu (*O. masou*) and the landlocked hime-masu (*O. nerka*) are raised and distributed in the lakes and rivers. There are eight hatcheries working on these species. The hatchery of Lake Towada, Akita prefecture, first transplanted hime-masu from Hokkaido in 1902, and it is now hatching from 5,000,000 to 10,000,000 eggs a year for the purpose of distributing the fish among the different districts.

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VII. METHODS OF PREPARING SALMON.

CANNING.

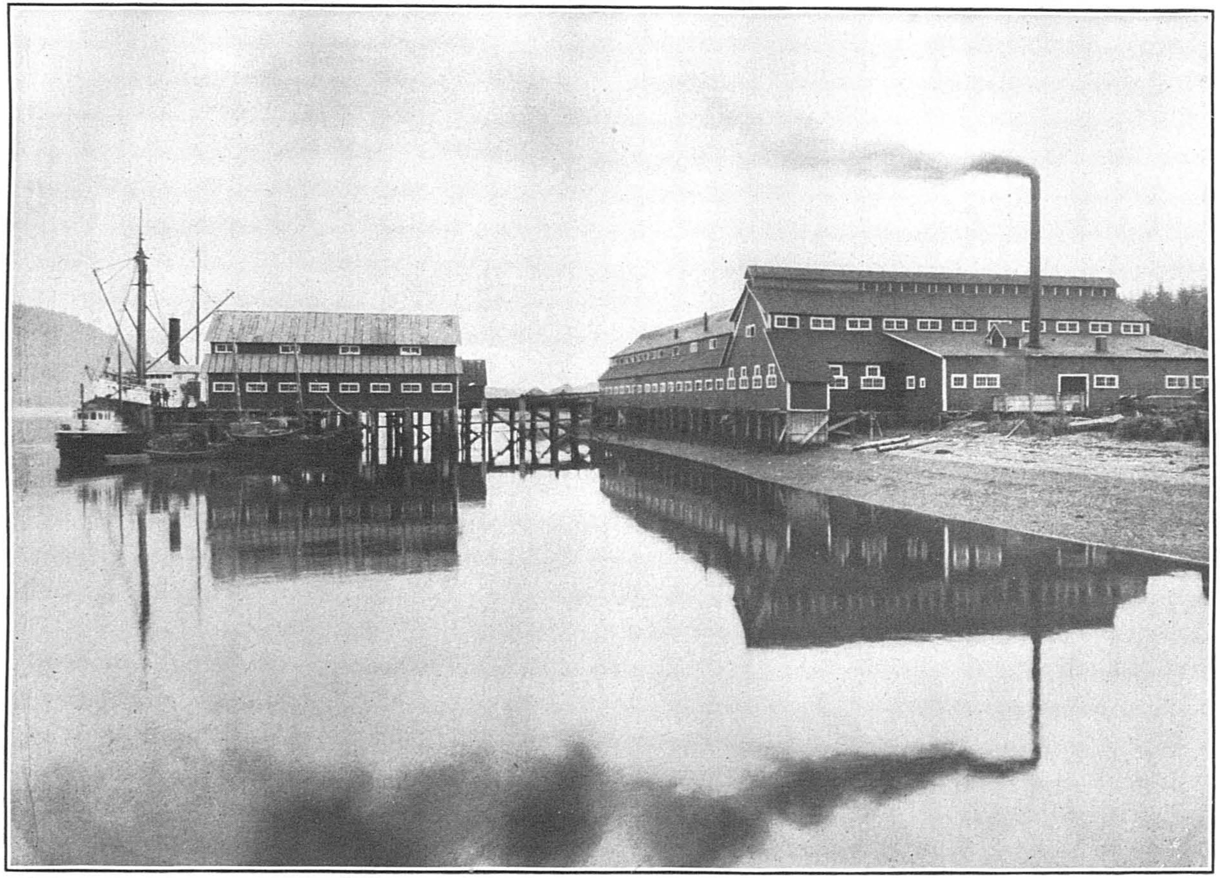
EARLY DAYS OF THE INDUSTRY.

In the salmon industry canning is, and has been almost from the time of the discovery of a feasible method of so preserving the fish, the principal branch. The first canning of salmon on the Pacific coast was on the Sacramento River in 1864, when G. W. and William Hume and Andrew S. Hapgood, operating under the firm name of Hapgood, Hume & Co., started the work on a scow at Washington, Yolo County, Cal. The Hume brothers, who came from Maine originally, had been fishing for salmon in the Sacramento River for some years before the idea of canning the fish had entered their minds, while Mr. Hapgood had previously been engaged in canning lobsters in Maine, and was induced by the Humes to participate in order that they might have the benefit of his knowledge of canning methods. The late R. D. Hume, who worked in the original cannery, and later became one of the best-known canners on the coast, thus describes the plant and the methods employed: [a]

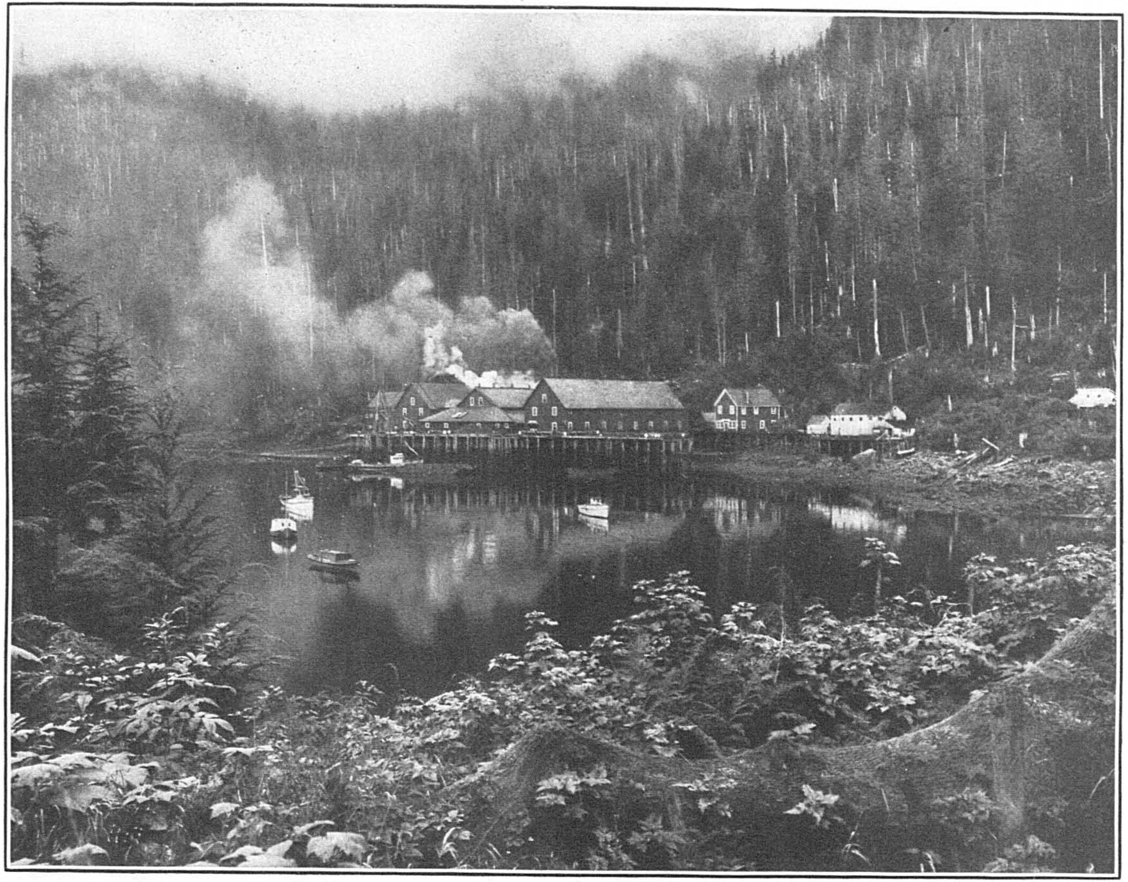
Before the arrival of Mr. Hapgood [from Maine] the Hume brothers had purchased a large scow, on which they proposed to do the canning of salmon, and had added an extension to the cabin 18 by 24 feet in area, to be used as a can-making shop. This had a shed on the side next to the river for holding any cans that might be made in advance of the packing season. A few days after the arrival of Mr. Hapgood [March 23, 1864], the tools and machinery were packed and put in position. Mr. Hapgood made some stovepipe and two or three sheet-iron fire pots, and in a short time was ready for can making. The following list of tools and machinery will show how primitive our facilities were as compared with present methods: 1 screw hand press, 1 set cast-iron top dies, 1 set cast-iron bottom dies, 1 pair squaring shears, 1 pair rotary shears, 1 pair bench shears, 1 pair hand shears or snips, 1 pair 24-inch rolls, 1 anvil (weight 50 pounds), 1 forging hammer, 1 tinner's hammer, 1 set punches for making stovepipe, 1 rivet set, 1 grooving set, 2 iron slabs grooved on one side to mold strips of solder, 1 iron clamp to hold bodies of cans while soldering the seams, 1 triangular piece of cast iron about three-eighths of an inch in thickness and 6 inches in length, with a wooden handle attached to the apex, also used for holding can bodies in place while being seamed.

The process of canning was as follows: The bodies of the cans were first cut to proper size by the squaring shears, a line was then scribed with a gage about three-sixteenths of an inch from one edge, and they were next formed into cylindrical shape by the rolls. They were then taken to the soldering bench and one edge lapped by the other until

[a] The first salmon cannery. By R. D. Hume. Pacific Fisherman, vol. II, no. 1, January, 1904, p. 19-21.



CANNERY, HOONAH, ALASKA.



CANNERY, SANTA ANA, ALASKA.

the edge met the line that had been scribed and fastened there by being soldered a small part of the length to hold them in place for the further purpose of seaming. They were then placed either in the iron clamp, which had a piece of wood attached to its under side, and held firmly, the clamp being closed by the operation of a treadle, or were slipped on a piece of wood, which was bolted to the bench, while being held in place by the triangular hand seamer, which was pressed down on the lap of the seam by the left hand of the operator. When this had been done a piece of solder, which had been prepared by shaking in a can together with rosin, was placed on the seam and melted and rubbed lengthwise of the seam. After cooling the bodies were ready for the end or bottom, which operation was brought about by first cutting out circular blanks with the rotary shears, and then placing them in the cast-iron die and bringing the handle of the screw press around with a swing with force enough to form up the end or bottom. In this operation there were many difficulties, as the ends or bottoms would many times stick to the upper part of the die and refuse to come off, and finger nails were pretty short in those days. To get the ends out of the lower part of the die was not so bad, as a wooden plunger operated by a treadle knocked them out, but sometimes they were in pretty bad shape. When the bottoms or ends were ready they were slipped on the bodies and the edge of the bottom rolled about in a pan of powdered rosin until the seam was well dusted. A piece of solder similar in size and preparation as used for the side seam was placed in the can. It was then placed on the smooth side of the cast-iron slabs, and the operator, with a hot soldering copper shaped to fit the circle of the can, melted the solder and by turning the can rapidly soldered the full circumference. The output of this can factory was very imperfect, as at least one-half of the seams burst, owing to the lack of experience of the manager or want of good judgment.

When the can making was well underway Mr. Hapgood then turned his attention to getting the apparatus for canning on board the house-boat. This in the cooking department consisted of a kettle made of boiler iron about 36 inches in diameter and 5 feet in depth, set in a brick furnace and fired from underneath. Alongside was a round-bottom, cast-iron pot holding about 60 gallons of water and heated in the same manner. These kettles, with a dozen coolers or circular sheet-iron pans with ropes attached and with holes cut in the bottoms for drainage, a set of 5-inch blocks and tackle, with a sheet-iron fire pot and a scratch awl, completed the bathroom outfit. The can filling and soldering room was furnished with a table through the center, where cutting the salmon in pieces to suit and the filling of the cans was done. On each side of the room there was a bench running the full length, on the end of one of which the cans were placed to receive the pickle, which was used at that time instead of the small quantity of salt that is placed in the cans during the operations of these later days. After the salmon had been cleaned by removing the entrails and washing them outside the covered portion of the scow, they were brought inside and placed on the table, and a man with a butcher knife in one hand and a stick in the other, which had a mark showing the length of the pieces desired, cut gashes in the side of the salmon as a guide and then cut the fish into sections corresponding to the length of the mark on the stick. He then proceeded to cut the sections in pieces to suit the cans. Then three or four operators placed the salmons in the cans and shoved them along the table to where a boy wiped the top edge and passed them along to two others who placed tops which fitted inside of the rim. The cans were then taken in wooden trays to the bench opposite the starting point, which was fitted with four sheet-iron pots, and at the one nearest the entrance to the house on the scow a man put a soldering flux on the top edge, which was made by adding zinc to muriatic acid, and then with a pointed soldering copper and a stick of solder melted the solder until a small portion could be drawn around the groove formed by the edge of the can and the bevel of the top. From there the cans were taken to the other parts of the bench, where two men finished soldering the head in, and then taken to the third man, who soldered, or, as it was called, buttoned, the end of the seam lap. The cooking department or bathroom, as it was called, was separated from the filling and soldering room by a partition. The cans were shoved through a hole in the partition.

At this time the process was a secret. Mr. Hapgood did the cooking and all the work done inside, no one but a member of the firm being allowed to go in. This privacy was continued until the firm moved to the Columbia River and, the labor becoming too arduous for Mr. Hapgood to perform alone, a boy by the name of Charlie Taylor was taken in as an assistant. * * *

But to return to the original proposition: When the filled cans had been soldered and entered the bathroom they were put in the coolers and lowered into the cast-iron pot, one cooler of cans being cooked at a time. The cooler was lowered into the boiling fresh water until the cans were submerged to within 1 inch of the top ends and left to cook for one hour; then they were hoisted out and the vent holes in the center of the top soldered up, after which they were dumped into the boiler-iron kettle, which held a solution of salt and water of density sufficient to produce, when boiling, a heat of 228° to 230° F. They were cooked in this solution for one hour and then taken out of the kettle with an iron scoop shaped like a dip net, with a wooden handle about 6 feet in length. They were dumped into a tank of water on the other side of the partition which separated the bathroom from the packing room through an opening in the partition, receiving many a bump and bruise in the operation. Then they were washed with soap and rag to remove the dirt and grease, each can being handled separately. When this was done they were piled on the floor of the packing room and in a few days were painted with a mixture of red lead, turpentine, and linseed oil, for at that time buyers would have no canned salmon, no matter how good the quality, unless the cans were painted red.

When packs of 10,000 to 15,000 cases were made in a season only the absolutely essential machinery was used, the rest of the work, such as cutting and cleaning the fish and placing them in the cans, being done by hand. When larger canneries were constructed, especially in Alaska, where labor is expensive and difficult to obtain, the greater part of the workmen having to be brought up from the States, machinery to do as much as possible of the work became absolutely essential. The inventive genius of the country came to the rescue and one by one machines for cutting, sliming, and cleaning the fish, filling the cans, putting the tops on, and washing them were invented and put into use, while automatic weighing machines were produced and extensive improvements and alterations were made in the machines previously in use. There are to-day many large manufacturing establishments which devote all or the greater part of their facilities to furnishing machinery and supplies to this giant branch of the salmon industry.

When salmon canning was in its infancy a pack of from 150 to 200 cases was considered a good day's work. Now it is not an uncommon occurrence for a cannery to turn out from 2,500 to 4,000 cases in one day, and there are a number which have even greater capacity.

During the height of the salmon run, a cannery is an exceedingly busy and interesting place, and a description of the methods used at the present time will show the giant strides the industry has made since the days of Hapgood, Hume & Co.

HANDLING THE SALMON.

At convenient spots near the fishing grounds large scows and lighters are anchored and the fishing crews deliver their catches aboard these, the tallyman on each scow keeping a record and giving the crew a receipt. Men fishing near the cannery deliver their catch alongside. Steamers and launches are used to tow out empty scows and bring in those filled. In the old days the fish were pitched by hand into bins on the wharves, but this laborious method has been superseded by the use of an elevator, which extends from a short distance above the top of the wharf to the water's edge, provision being made for raising or lowering the lower end according to the stage of the tide. This elevator is slanting, and is made of an endless chain operating in a shallow trough. About every 2 feet there is attached to the chain a crosspiece of wood. At the top of the elevator are chutes which deliver the fish at various convenient spots on the cutting-room floor.

At a few places tracks have been run down to the low-water stage and the steamers, launches, and scows come alongside. Small cars are run down to the vessels, to be filled by men pitching the fish from the boats, and the cars when filled are run up to the cutting room and dumped upon the floor. At other places men armed with pews (single-tined forks) pitch the fish up to the wharf, where other men pitch them to the cutters.

If the salmon have been in the scows from 20 to 24 hours they are used as soon as possible after being delivered at the cannery; otherwise that length of time is usually allowed to elapse, the cannerymen claiming that if not allowed to shrink the fish will be in such condition that when packed much juice will be formed, so that in "blowing," after cooking in the old-style method, light-weight cans will be produced.

Before dressing the fish a stream of water is kept playing over them in order to remove the dirt and slime, after which men with pews separate the different species into piles convenient to the dressing tables.

DRESSING.

A number of the small canneries still use the old hand method of dressing the fish, and in such places the selection of the butchering or dressing gangs is of prime importance. Two men constitute a "butcher's gang," and the number of these gangs is dependent upon the output of the plant. Boys place the fish, with the head out, upon the cutting tables. One man cuts off the heads, and is followed by another who removes the fins, tails, and viscera. The offal is thrown into a chute, whence it passes into the water under the cannery or into a scow moored underneath, while the dressed fish is transferred to a tank of water, to be scaled, washed, and scraped. It is then passed to another tank of water, where it receives a second washing, scraping, and final brushing with a whisklike broom, which removes any offal, blood, and scales that were overlooked in the first washing, after which it is removed to large bins on either side of the cutting machine.

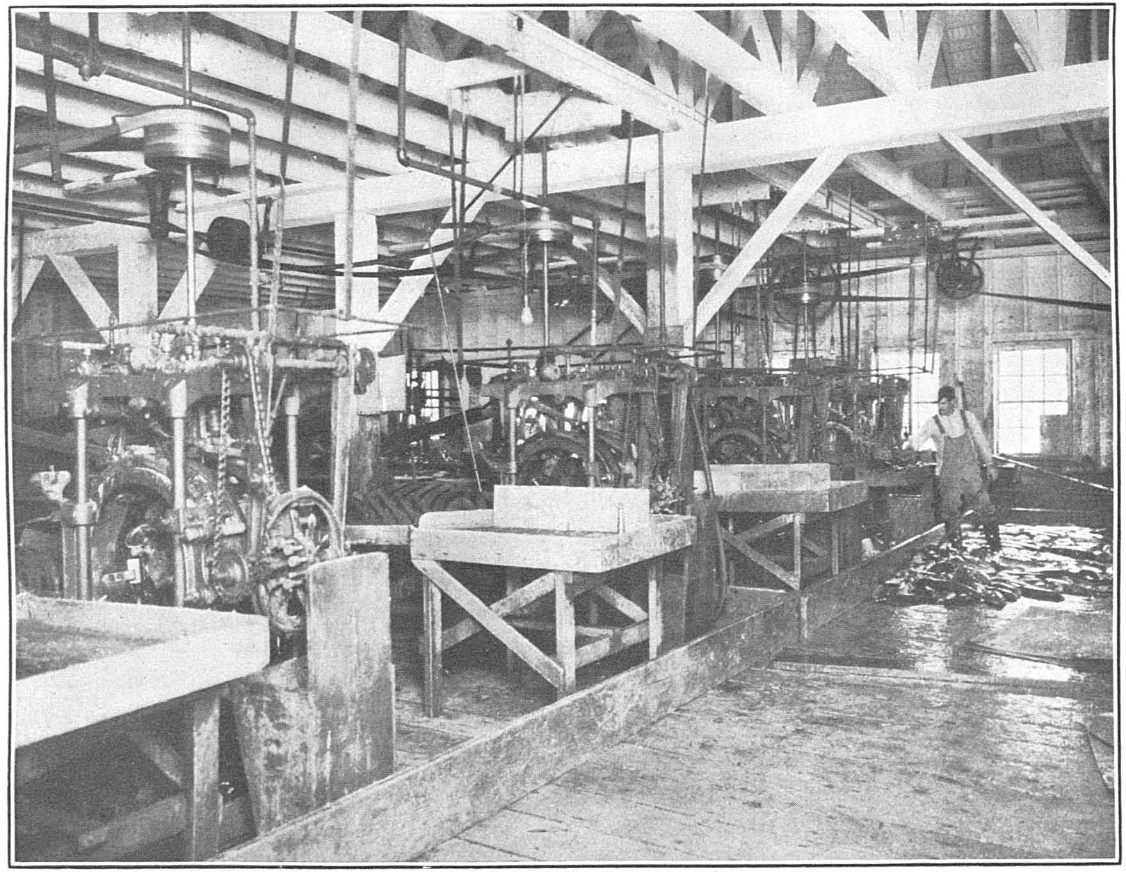
The most useful cannery inventions in recent years have been of machines for doing the work of the dressing gangs. Several have been invented and work more or less satisfactory. The one commonly known as the "Iron Chink," now in general use in canneries where such machines are employed, was first used in 1903 at Fairhaven (now Bellingham), Wash. It removes the head, tail, and fins and opens and thoroughly cleans the fish ready to cut into pieces for the cans. By the use of these machines the dressing gang is almost entirely done away with, dispensing with 15 to 20 men. This same machine is now so arranged that the fish after dressing are also "slimed"; i. e., the thick mucus covering the skin removed.

CUTTING.

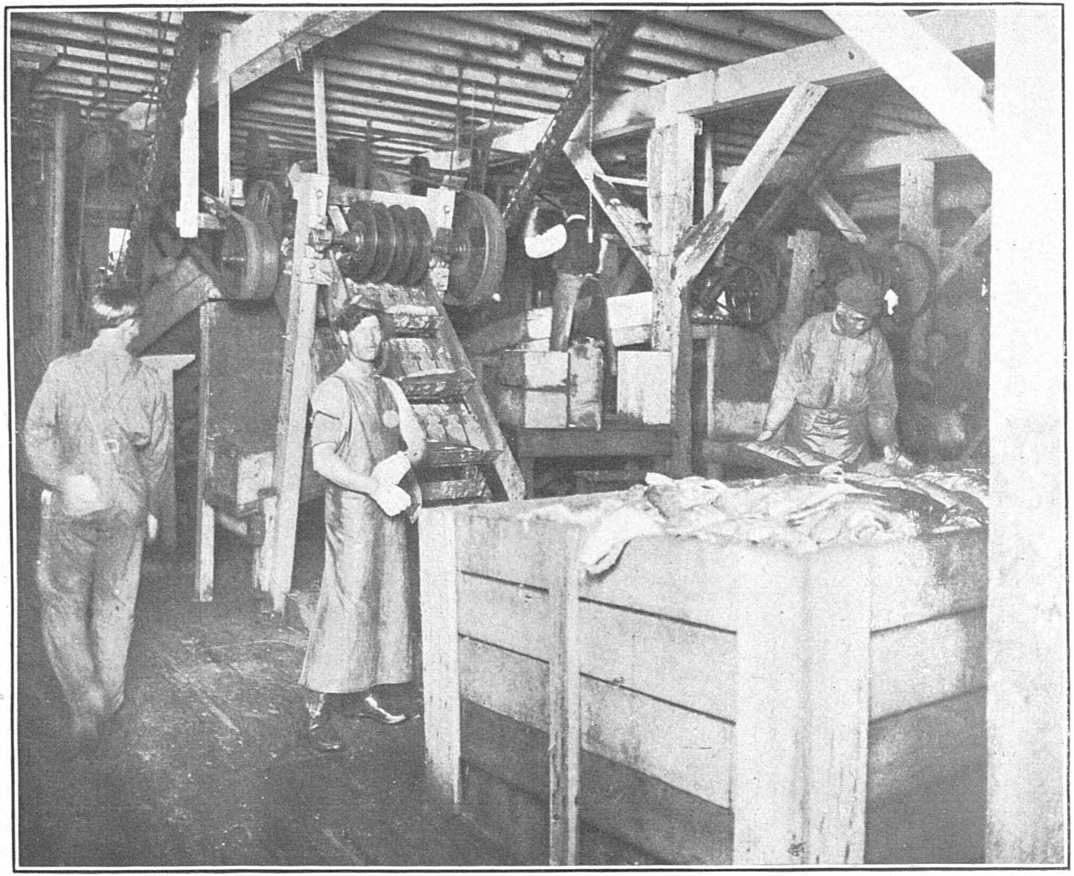
The usual method of cutting the salmon is by a machine. This is generally a large wooden cylindrical carrier, elliptical in shape, thus having a larger carrying capacity. Ledges or rests on the outside the length of the carrier are wide enough to hold the fish, and are slit in cross section through the ledges and outer casing to receive the gang knives. The latter are circular, fixed on an axle at the proper distances apart, and revolve at the highest point reached by the carrier and independently of the latter. The carrier and gang knives are set in motion, each revolving on its own shaft. As a rest on the carrier comes to a horizontal position, men stationed at the fish bins lay a fish on each ledge as it passes. Thence it is conveyed to the revolving gang knives and, after being divided, passes through on the downward course, sliding off the rest into the filling chute. The knives in these machines are so arranged as to cut the fish transversely in sections the exact length of the cans to be filled.

The rotary cutter shunts the tail pieces to one side, and these are carried by means of a chute to baskets. The tail pieces are canned separately. As the tail portion is much smaller, with less meat, it can not be placed in the cans with the middle and head sections without detracting from their value, but if packed under a distinct and separate label, as is now done, there is no reason why the tails should not supply the demand for a cheap grade of fish.

In some of the smaller canneries, especially in those packing flat cans, the gang knives are worked by hand. In this case the knives are not circular, but elongated or semicircular in shape, tapering at



A BATTERY OF "IRON CHINKS."



CUTTING SALMON INTO PIECES TO FIT THE CANS.

the outer ends. They are mounted on an axle having a large iron lever at one end, and when this lever is raised the ends of the gang knives are thrown up and back. The fish is then placed in position under them and the lever pulled forward, the knives, with a scimitar-like movement, dividing the fish.

The original method of cutting was by means of a long knife wielded by a Chinaman who stood at a regular butcher's block. Although his strokes were incredibly quick, the rotary cutting machine is a vast improvement over the old way.

SALTING.

Every can of salmon is seasoned with one-fourth of an ounce of salt, which, to insure uniformity, is added by mechanical means. A table is used, in the top of which are holes equal distances apart. On the underside of the top is a sheet-iron plate, with an equal number of holes, which slides in a groove at the sides, and is worked either by a hand or foot lever. Just below is an open space large enough to accommodate a tray holding 36 or 48 cans. A workman stands in front of the table and slides a tray of cans into the open space. He then throws a quantity of salt upon the table and immediately scrapes this off with a thin piece of wood, each hole being filled in the operation, and the salt being prevented from falling through by the iron plate underneath. The lever is then pressed, the iron plate moves forward until the holes in it are directly under the table top, when the salt drops through into the cans. This operation can be repeated four or five times in a minute. Some canneries now use a small salter attached to the filling machine and this deposits the required amount of salt in the can as it is passing by on its way to be filled.

FILLING THE CANS.

Most canneries now use filling machines, although a few, more particularly those packing flat and odd-sized cans, still fill by hand.

The filling machine consists of a chute with a belt to which are attached wire racks about 4 inches apart, set at an angle to prevent the salt from spilling out, into which the salted cans are fed from the floor above and pass into the machine. At the same time the divided sections of salmon pass down another chute into the mouth of what looks like a hand coffee mill. They pass through here down a smaller chute and are forced by two dogs into a receptacle through which the plunger, or filler, passes. Here the plunger comes opposite the open mouth of the empty can, which when it reaches this point is caught by a clasp or hook and held in front of the plunger, which is immediately thrust forward through a chamber filled with salmon, cutting the fish longitudinally and at the same time filling the can.

The next movement forces the can out upon a table. When running at full speed, one of these machines will fill about 80 cans a minute.

On being released by the clamp the cans roll upon a long table and are picked up by a man stationed here, who strikes each one upon a square piece of lead set in the table, in order to settle the contents down into the can and for the purpose of detecting any deficiency in weight. If not quite full the cans are pushed to the other side of the table, where a woman or man adds the quantity of fish needed, a supply of small pieces being kept at hand for this purpose. Generally the cans overrun in weight, frequently as much as an ounce. Occasionally a can is weighed in order to see that the machine is in perfect adjustment. In many canneries weighing machines are arranged in the "line" and these throw out the short weight cans.

In the hand method the fillers stand on each side of a long table with a trough running down the middle from end to end. This is filled with the cut pieces of salmon, and the fillers, usually women and children, put into the cans large pieces at first and then smaller pieces to occupy the vacant spaces.

WASHING THE CANS.

In the old style method the cans are put upon an endless belt by a workman and pass from the filling-machine table to the washing machine. This is a rotating apparatus, consisting of an iron framework holding 10 rests or stands on which the cans sit. Immediately overhead are small perpendicular shafts with an iron cap, the diameter of a can, fixed to the end of each. Each can as it reaches the machine is caught by one of the washers and the cap brought down over the top, a tight-fitting flange preventing water from getting inside. Revolving rapidly as it goes, with a stream of water against it of sufficient force to remove the dirt and grease, the can is carried until the machine has revolved 180 degrees, when it is released and passes out on a belt. A more modern method is to use jets of steam for washing, while one of the latest devices is to clean the cans by a cold-air blast which strikes directly on the top edge. A set of brushes against which the cans revolve is used in a few canneries.

After being washed the cans continue on an endless belt and pass two children whose duty is to put a small piece of scrap tin on the top of each. These pieces are called "chips," are from 1½ to 2 inches, and are scraps from the sheet tin used in making the tops of the cans. The shape is of no particular importance so long as the pieces are long enough to cover the hole in the top of the can, or the cap as it is called.

CAPPING.

The endless belt delivers the can to the capping or topping machine. On reaching this the can passes under a cap holding a top, the latter being fed in through a separate aperture, and the cap immediately falls with just sufficient force to put the top on the can without injuring either. The can is then forced out from under the capper by the rotation of the machine, and the next capper is brought around to receive another can. As the cans revolve they are carried under a crimper, situated directly opposite the capper, which presses the edge firmly around the body. While one can is being topped another is being crimped, after which it rolls out upon a belt on its side, and is taken through the acid trough. Before the tops are sealed the edges must be treated with a solution of muriatic acid, which is in a glass receptacle and is applied just before the cans are rolled through the acid trough on the endless belt.

SOLDERING.

For many years the tops and also all other parts of a can were soldered by hand, a long, tedious, and expensive process, which eventually gave way to the soldering machine. This is composed of an endless chain about 6 feet long, revolving around two shafts at either end of an iron trough. In the bottom of the trough is the solder, which is kept at molten heat by a row of oil blast jets underneath. Between the lower part of the chain and trough is just enough room for the cans to pass without jamming, and they are forced along the trough by a chain in contact with their sides. They enter the trough at an angle, their bottoms slightly inclined, which causes the top rim to be submerged in solder, thus distributing it evenly all around the edge.

In passing through the trough the cans make about half a dozen revolutions, which cause the tops to become very hot, and it is to prevent them from being blown off by the pressure of the steam which quickly generates that the center hole in the top is made. The "chip" previously mentioned prevents the hole from being choked with salmon.

A soldering machine having, instead of the endless chain to give motion to the cans, a metal spiral running the length of the machine and revolving on an axle through the center, is used in some canneries. Each loop grasps a can and follows it to the end, thus giving the cans the proper motion and preventing them from rolling side by side and lapping the solder over the ends, as is frequently the case with the chain machines.

A few canneries use a revolving cooler, which has a disk upon which the cans rest. This disk is filled with running water, and after it makes two revolutions the cans are forced into an inclined trough under a stream of water. The usual method, however, is for the cans on leaving the soldering machine to pass under several jets of water to set the solder and at the end of the belt to be transferred by workmen to coolers or crates, which are made of flat strap iron, square shaped, and holding about 96 cans. The cooler having been filled, it is placed upon a square truck and rolled aside, where the vent holes are stopped with a drop of solder.

TESTING.

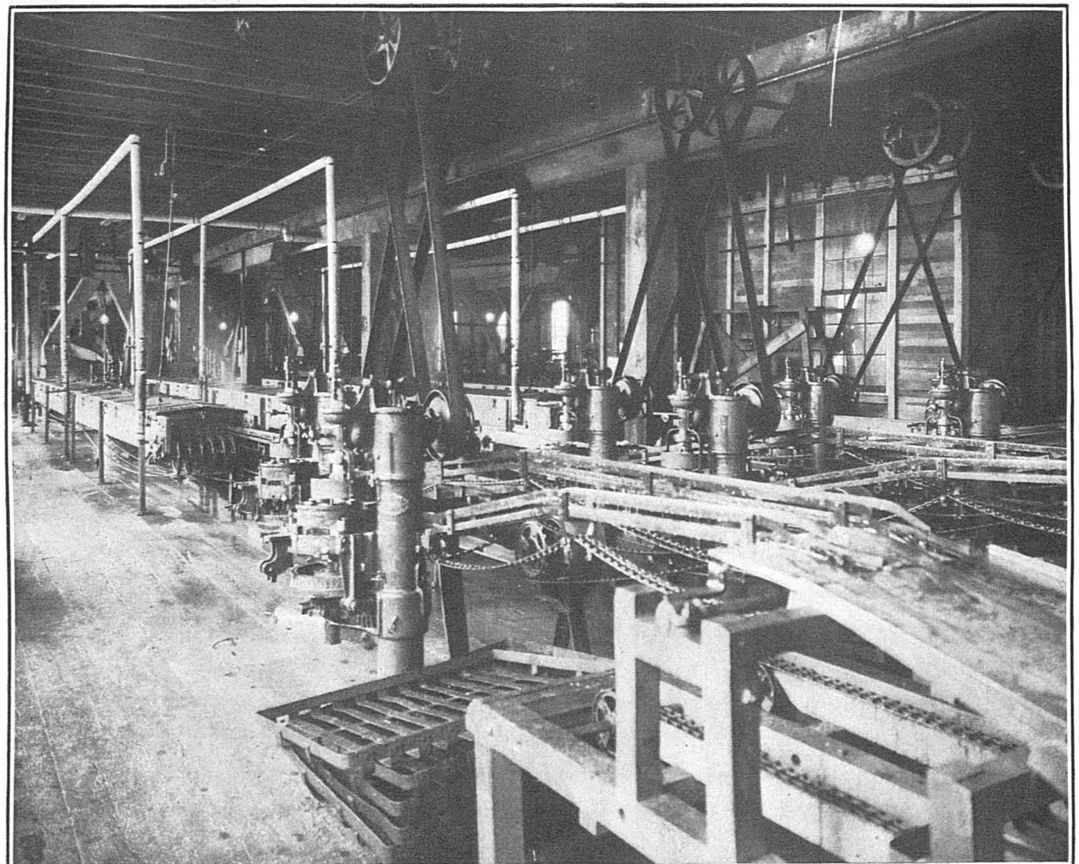
The testing tank is a square wooden tank filled with water heated almost to the boiling point by steam pipes arranged in a coil at the bottom. The coolers are hoisted into the test tank by a block and tackle attached to an overhead track, which permits them to be swung to any place desired.

This test is for the purpose of detecting leaks due to imperfect soldering and is conducted by two workmen skilled in this operation. The slightest leak is detected by the appearance of small bubbles issuing from the cans. The spots where the bubbles appear are marked with a small iron tool held in the hand, and the cans are taken out and placed in small wooden trays, in which they are carried to the bench men, whose duty it is to mend them. Cans that have been mended are again tested as before. The bench men are located in front of a long bench on which are numerous fire pots, supplied with oil and air led through small tubes, in which the soldering irons are kept heated, the heat and air being regulated by connecting valves. Kerosene oil and gasoline are the fuels generally used now.

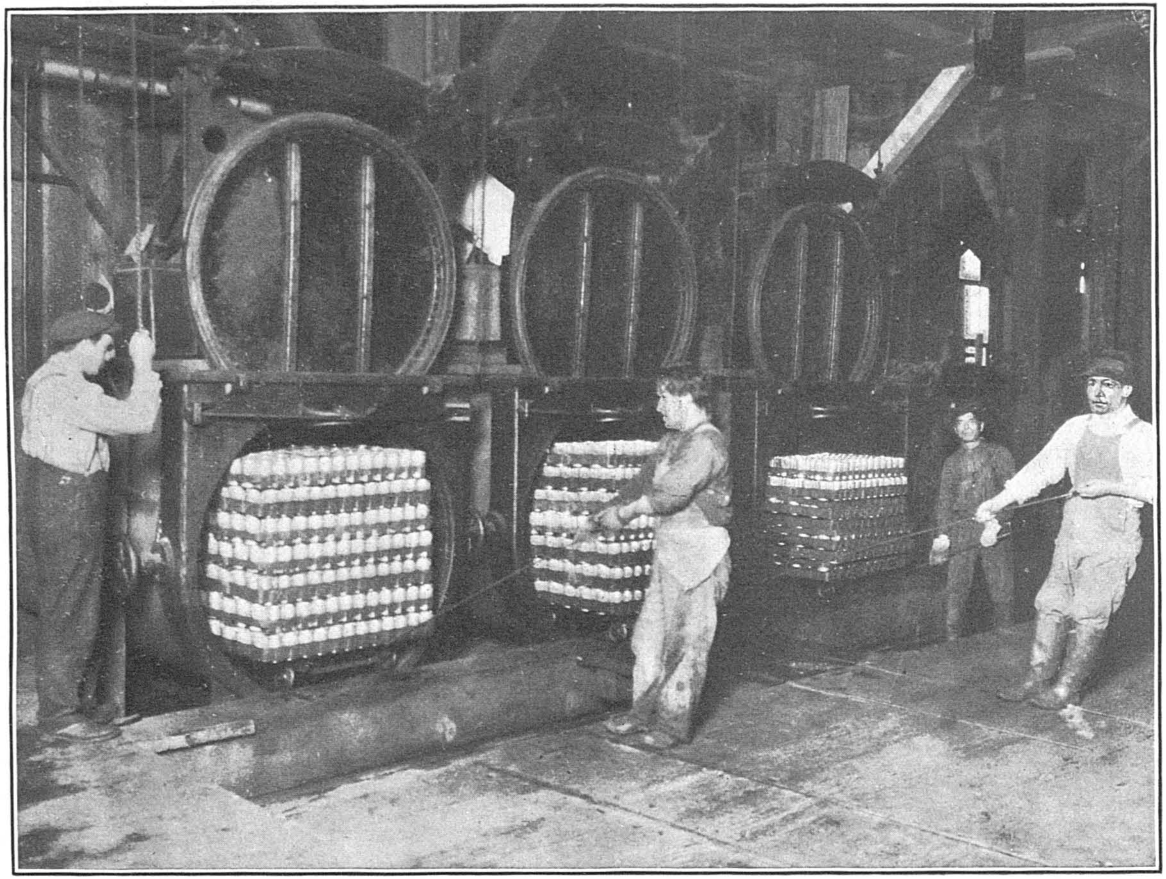
COOKING.

The salmon are invariably cooked in rectangular retorts which rest in a bed and have a track running the long way. In front of each is a turntable for the purpose of receiving trucks coming from any direction. Four trucks, each holding 6 coolers of cans, piled one upon another, are run into the retort, which is then closed and steam turned on, entering at the bottom. The amount of pressure is from 6 to 12 pounds, the heat 250° F. In most establishments the first cooking is continued about 60 minutes.

After the first cooking the coolers are taken out and placed on a long table called a "venting table," where the cans are pricked with a wooden-headed hammer fitted with a small brad, to allow the steam and superfluous water to escape. After the venting has been done the holes are soldered up, the coolers again loaded on a truck and rolled into the second retort, where they are subjected to the same pressure of steam and heat as in the first cooking and for a period of about 60 minutes.



EXHAUST BOXES AND THE DOUBLE SEAMERS.



COOKING THE SALMON IN RETORTS.

In some canneries the retorts for first cooking are made of heavy plank, well bolted to resist the steam pressure.

In the early days much secrecy and mystery was thrown about the cooking, and the work was carried on in a separate room, known as the "bathroom," under lock and key. The first cooking was done in common tubs. The early retorts were made of wood. Later, round iron kettles were substituted, nearly one-half consisting of cover, and round crates were used for holding the cans.

For many years cannery men believed that the double cooking of salmon was absolutely necessary, but in 1898 F. A. Seufert, at his cannery on the Columbia River, at Seuferts, Oreg., a short distance above The Dalles, discarded this idea, and has since used a one-cooking method. By the new process the cans are tested for leaks after the center hole in the top is soldered up, as before, and are left in the retort 70 minutes at 245° F. and 12 pounds steam pressure. According to its originator, this method saves more than one-half the labor in the bathroom, saves nearly one-half the labor in washing the cans after cooking, and also better retains the color of the fish.

SANITARY CANS.

A comparatively recent improvement in the salmon-canning business, and one which accomplishes the same purpose as the single cooking in retorts, is that of "sanitary cans," so called. These cans are now used by the majority of the salmon canneries. In order to use these cans a quite radical, but economical, change in machinery is necessary. As the cans leave the filling machine they pass to the clinching machine, which attaches the top of the can loosely to the body in such a way that it allows the gas in the can to escape, yet prevents the fish from coming in direct contact with the steam of the exhaust box. In this way the condensed steam which accumulates in the exhaust box is kept from entering the can, thus keeping water out of the can. This overcomes the difficulty caused by the bleaching of the fish.

The cans then pass into a steam exhauster, consisting in one type of a box about 30 feet in length, in which are three endless-chain belts running side by side. Under and over each belt are steam coils, and under each of the lower coils are single pipes, which through small holes throw jets of live steam upon the coils, creating an intense heat. The cans pass along the first belt, are then transferred to the second belt, on which they return to the entrance of the box, whence they pass to the third belt, and continuing along this to the end pass out to the topper and crimper, the whole operation occupying from 5 to 15 minutes' time. One style of exhauster has 10 ovals formed by the pipe, and the cans pass along these from side to side of the exhauster until discharged at the far end. Upright exhausters, in which the cans travel along a spiral, are also in use. By this means the contents of the can are heated and the greater part of the air exhausted, which is the object of the first cooking in the retort under the method formerly in general use.

A recent invention, which the inventor claims will do away with the steam exhaust box, and thus save a large amount of valuable floor space in the canning "line," is the power vacuum pump, known as vacuum exhausting machine, by means of which air is exhausted from the cans, accomplishing the same purpose as the steam exhaust box. Some of these machines have been in active use for several seasons, with most satisfactory results.

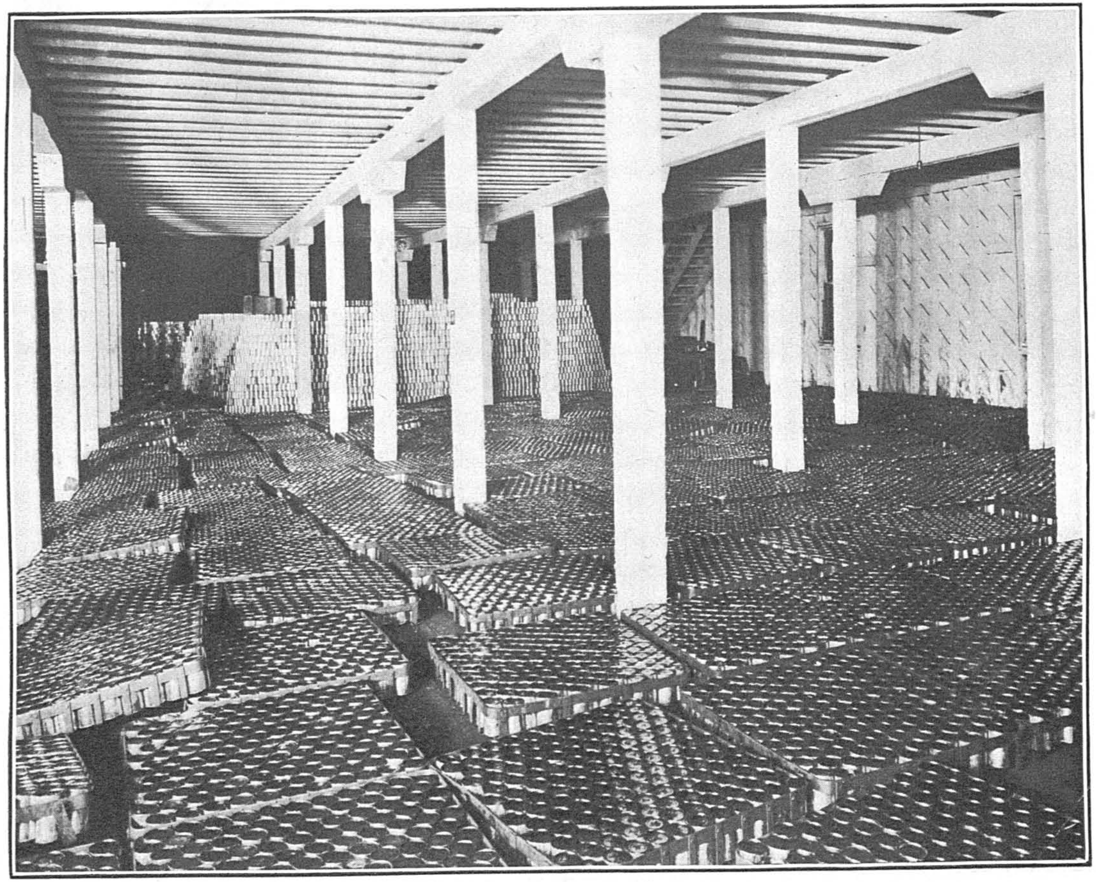
Leaving the exhauster the cans pass to the double seamer, which fastens the cover on tightly with a double seam or crimp. It should be stated that no solder is used in attaching the top on the can, the curled flanges of the cover being coated around the outer edge with cement or other sealing fluid to take its place. Solder, however, is used in joining the side seam of the can, this being done when the can is manufactured. The cans then leave the machine on an endless conveyer and pass to the men who transfer them to the coolers, and these are immediately placed upon the trucks and run into the retort for the one cooking they are to receive. The time they are to remain here is somewhat variable, 70 to 125 minutes with a temperature of 242° F. being the common period.

By the use of these cans the soldering machine is done away with. It also does away with the first cooking and the subsequent venting and soldering, a saving both in labor and time consumed.

REPAIRING CANS.

Imperfect cans which are repaired before the first cooking are naturally in the same condition as if there had been no defects. If the leaks are discovered after cooking and are repaired at once and the contents recooked, they are still very good, the only difficulty being that by blowing or venting them a second time they lose weight. The above goods usually go in with the regular pack of their kind and are not classed as regular "do-overs."

When, however, a cannery is running at full capacity, defective cans can not always be repaired and recooked at once and are sometimes set aside for days. Decomposition follows, of course, as with any other meat that is exposed to the air, and the fish becomes unfit for food. When recooked the meat becomes mushy and the blowing or venting makes the cans very light, a defect which is frequently corrected by adding salt water. This, the "do-over," is the lowest class of goods. In the old days, and even yet to some extent, such cans are sold without labels to brokers, or else are given some indefinite label, and sold in the lumber, mining, or negro districts, or



FILLED SALMON CANS COOLING.

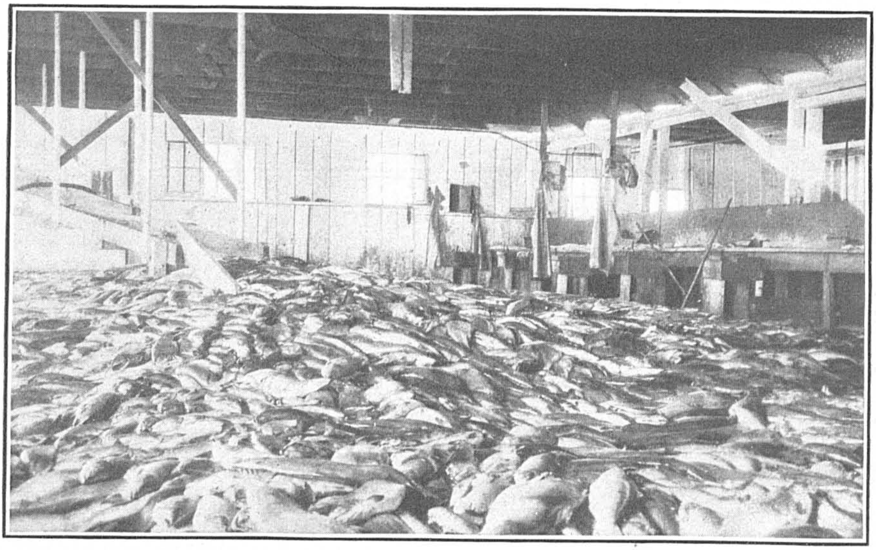


FIG. 1.—SALMON ON THE FLOOR OF THE CANNERY DRESS HOUSE.

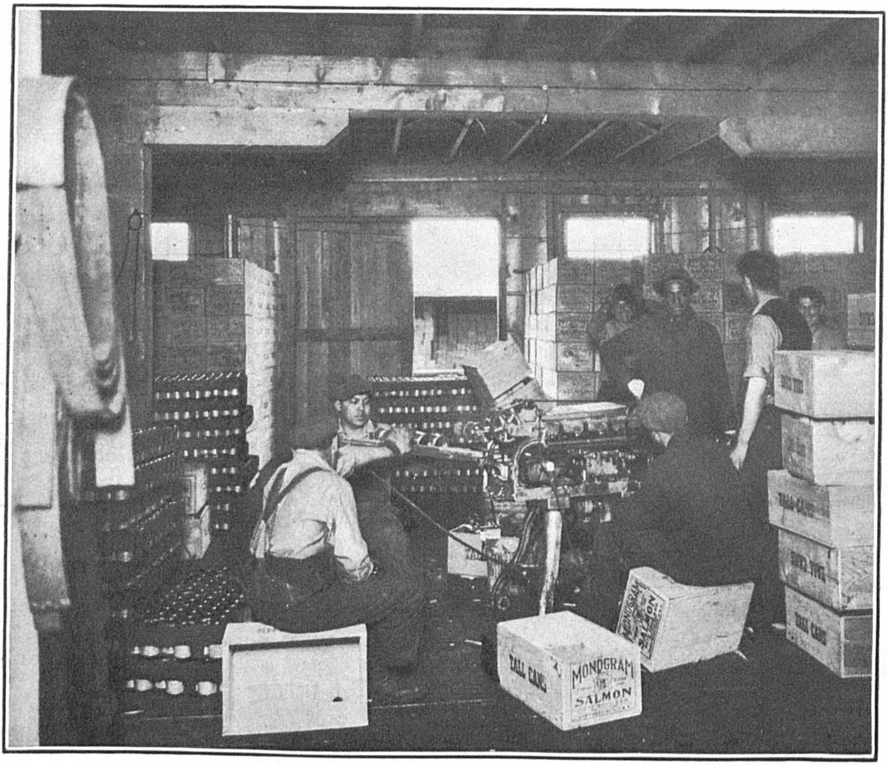


FIG. 2.—SALMON CAN-LABELING MACHINE.

shipped to foreign countries with less fastidious tastes in the matter of salmon. In 1910 one of the leading companies of Alaska adopted the policy of throwing overboard all "do-overs."

On coming from the second retort the coolers are lowered into a bath of lye, or, as in some canneries, the cans are run through such a bath on an endless belt, which, with the aid of a slight rinsing and a few rubs with a brush over the top, removes from the can all the grease and other material. The belt then passes them into another bath where the lye is washed off in hot fresh water. The cans then go to the cooling room, where a stream of water is played upon them, or, during rainy weather are placed out of doors upon the wharf, and there allowed to cool.

The top and bottom of the cans contract in cooling, and for several hours a sharp popping noise is heard. Here, as in nearly every process through which they pass, the cans are again tested, this time by tapping the tops with a small piece of iron about 6 inches long, or, sometimes, a 12-penny nail. The sound conveys to the ear of the tester an unmistakable meaning as to the condition of the can, and the faulty cans that escape notice during the other tests are almost invariably found in this one.

LACQUERING.

An almost universal custom in the salmon-canning industry, but one that is not common in the canning of vegetables, fruits, etc., is that of lacquering the cans. This idea of protecting the can on the outside has been followed from the very beginning, for two reasons: (1) That the English market which, at that time especially, absorbed the greater part of these goods, insisted on their shipments being finished in this way, and (2) from the fact, as these canners speedily found out, that if they did not protect their cans in some way enormous losses through rust would ensue.

The first experiment of this nature was to paint the cans by hand with red paint, treating each singly. Next a composition of logwood extract and alcohol was tried, which, however, did not produce satisfactory results for a very plain reason—the can was dyed instead of being lacquered. The next attempt was to varnish the cans with a japan varnish reduced with alcohol, but this was found to dry too slowly for speedy handling. After extended experimentation the quick-drying brown lacquer of the present time was evolved, which carries asphaltum in the form of an asphalt varnish as its base, this being supplanted in some cases by gilsonite. This lacquer can be procured in either a heavy or light body, is generally reduced with benzine or gasoline, and is applied according to the requirements of the market, which in some localities demands a heavy coating and in others a much lighter finish, the latter giving a rich golden brown color. Some experiments have also been made in using brighter colored lacquers for this work. Several of these, made to give a bright golden, copper, or other color, are extremely attractive in appearance, while at the same time protecting the tin against rust quite as well as the brown.

The industry soon outgrew the hand method of lacquering, and the process, which for a number of years was universal in the trade and is still used by some canneries, succeeded it. For this there are a number of rectangular box vats about 40 by 80 inches and 18 inches in depth, the number varying with the capacity of the cannery. These are usually lined with galvanized metal and provided with a gridiron-shaped iron frame, hung from a windlass or other tackle for lifting or lowering from top to bottom of the vat. The cans are loaded on this gridiron, being placed in an inclined position to allow the draining of the lacquer, and are lowered in the vat sufficiently to submerge them in the lacquer with which the vat is charged to a depth of 7 to 10 inches. The loaded gridiron is then raised to the top of the vat and the cans allowed to drain and dry before piling. This method, while being more effective in regard to the volume of work, was still of necessity a very slow and tedious operation. In damp or rainy weather, especially when it is not possible to open warehouse doors and windows, the gas arising from a number of these vats makes effective drying almost impossible.

Another principal objection to this method of lacquering, which applied also to all earlier attempts, was the impossibility of obtaining an even coat of lacquer when the can was allowed to dry in any stationary position. There was also a large waste by evaporation.

Notwithstanding repeated efforts at invention, however, it was not until 1901 that an effective machine for handling this difficult work was put on the market. The apparatus now in use by a number of canneries receives the cans on a revolving wheel fitted with rests for holding them while passing through the lacquer bath. From here they roll upon an endless chain which revolves the cans as they pass through a long box in which a hot blast dries them before they reach the end of the machine. The rotating or rolling motion given to the can after the lacquer bath, preventing the lacquer from draining to and consequently accumulating on any part of its surface, also has the effect of distributing the lacquer evenly and results in a clean and neatly finished can. The air blast facilitates the work of drying to such an extent that it requires only about two minutes after being deposited on the drying bed of the machine for the cans to be ready for handling, while the quantity of cans which can be handled in a day is vastly greater than by the old method.

A few flat and oval cans are not lacquered, but are protected from rust by wrapping in tissue paper, over which the label is placed.

LABELING.

While machines have been made for this purpose, and many of them are in use, the work is frequently done by hand. A number of men or women seat themselves about 4 feet apart in front of the pile of cans. Each man has in front of him a package of several hundred labels, and by bunching them on a slant so that successive margins protrude beyond each preceding, he can apply paste to the entire number with one stroke of the brush. A can is placed on the label, is quickly rolled, and the label is on much quicker than one can tell it. Each man places to his right the cans he labels, forming a pile of length and width equal to his unlabeled pile, and when the entire lot has been labeled it has been shifted only about 4 feet. Cans of fancy brands of salmon put up on the Columbia River and in the Puget Sound region are wrapped in colored tissue paper before the label is put on. Cartons similar to those used by the sardine packers would make good containers for fancy brands and would be much cheaper than the present method.

Several attempts have been made to popularize salmon packed in glass and porcelain jars, and while these have met with some favor, it was not sufficient to warrant a continuance of the practice for any length of time. But few are being so packed at the present time.

BRANDS.

A very important feature of the canning industry is the selection of appropriate brands or labels for the various grades of salmon. Each company has a number of these, which it has acquired either by designing them or by absorbing another company which owned them. A well-known brand has a value in itself and sometimes is a very important asset. A company will sometimes market a considerable part of its product in one section, and here, where the consumer has become familiar with the brand and pleased with the contents of the can, he will ask for and accept no other, despite the fact that the latter might be, and probably is, the equal of the product he has been using.

For many years but few salmon canners appreciated the value of a can label, and it has taken some bitter experiences to drive home to the rest that a properly designed label placed upon good goods and the owner protected in its use by the law, has real value, just as much as boats, nets, buildings, machinery, or the thousand and one material things required to carry on the business.

A free trade definition of a label would be that it is an artistic representation or intellectual production, stamped directly upon an article of manufacture, or upon a slip or piece of paper or other material, to be attached in any manner to manufactured articles, to bottles, boxes, and packages containing them, to indicate the contents of the package, the name of the manufacturer, or the place of manufacture, the quality and quantity of the goods, directions for use, etc.

Labels are subject to the copyright law and should be registered before use or publication. If not registered, there is no protection in law against infringement. The continued use of a label, however, will give the person so using a certain proprietary right in it, which can be enforced in a court of equity and may be defended by injunctions, which will generally be granted. Such procedings are expensive, annoying to a busy man, and at best will protect one only after at least a certain amount of damage has been done, and it is far safer to avoid this by registering the label at the time of issue, which will give one the further advantage in that a description of the character and quality of the article labeled can be set forth, which will, to a certain extent at least, be protected with the label.

The commercial value of a label and name is represented by the more or less general demand for the goods protected by it. In the canned-salmon industry, as in that of other food-packing industries, certain labels, through the good quality of the goods marketed under them and the publicity created for them, have become of very considerable value to the owners. A case in point is the label Royal Crown, owned by the late R. D. Hume. This was one of the earliest brands marketed in England, and some years later a certain Liverpool firm of salmon handlers paid Mr. Hume the sum of $10,000 for the exclusive right to its use in England.

In designing a label there are several things which should be borne in mind. It should bear an easily remembered name and design; a name difficult of pronunciation should be avoided at all costs. For many years glaring red labels have been popular, but the success met with by those using more subdued and artistic designs and coloring indicates that the public appreciate them more than they do the older and coarser types. The design should be as simple as possible, as experience has demonstrated that a simple form—so simple that it can be fully understood by a mere glance—will gain by regular repetition, while a more complicated design will lose in this process.

A good many now in the business still remember the small label that was used on salmon cans before 1870. Labels about 3 by 5 inches in size, printed in one color, on white or colored newspaper, served merely the purpose of distinguishing cans, telling contents and manufacturer, and were without commercial value. About the year 1870 a few canners commenced to import from the East and Europe full-sized labels, i. e., labels that went all around the can.

These were called by some "Pennington" labels, as a firm of that name supplied quite a number of them.

For some years they were used for the best grades only. They were printed in four and five colors, the design showing invariably a number of panels of different shapes and sizes. The lettering was not always plain and sometimes even intentionally irregular and puzzling. The colors were placed side by side, in boldest contrast, without any attempt to harmonize them.

It was soon discovered that the highly colored panels, while striking, lost all effect when massed on the retailer's shelves, and the different brands looked so much alike that the individual designs could not well be remembered by the customer, the only really distinctive feature being the name, and that was generally printed so small and indistinct that it could not readily be seen at a distance.

To remedy these defects, the designers soon reduced the number of panels and subdivisions, increasing meanwhile the size of the remaining ones and filling them with distinctive designs, still colored as simply as before, with no attempt at blending of colors. The background, at first perfectly plain, commenced to show patterns more or less complicated, and at times quite pretentious, so as to take away from the design proper.

Gradually the panel design disappeared. In place of it some showed one continuous picture on the label, which was very unsatisfactory and soon disappeared, as only a fraction of the picture could be seen at one time. Others had two subdivisions, one showing the name of the brand with its illustrations, occasionally used as a trade-mark, the other showing the article packed in the can, both named and illustrated. Unfortunately, these subdivisions were so large that the roundness of the can prevented one from seeing the picture as a whole, but this was soon remedied by making the subdivisions narrower and filling in between with directions, weight of contents, etc.

From this point on the general plan of labels underwent few changes except that the work, both of the artist and pressman, improved wonderfully, some of the labels now designed and printed being real works of art.

Up to a few years ago one of the most serious evils in the trade was the use of misleading and lying brands. The high-grade product would almost invariably be correctly and fully branded, but "chums" and "pinks" were usually branded as "Fresh salmon," "Choice salmon," etc., which would deceive all persons but those well acquainted with the industry. "Do-overs" and very poor fish were usually marketed under a brand which bore the name of a fictitious company or of no company at all.

The passage of State laws of varying degrees of efficiency governing the branding of salmon helped slightly to remedy this condition of affairs, but it was not until the pure food and drugs act, approved June 30, 1906, was put into force by the Government that any radical improvement was noticeable. At the present time but few misleading brands are in use.

BOXING OR CASING.

A case of salmon generally contains 48 one-pound cans or their equivalent, i. e., 24 two-pound cans or 96 half-pound cans. Some canneries pack their half-pound cans in cases of 48. These cases are usually made of wood and cost from 9 to 11 cents each knocked down.

CAN MAKING.

Some of the canneries in the coast States purchase their cans ready-made, but the usual method is to purchase the sheet tin and make up the cans in the canneries. This is especially necessary in Alaska, as it would be impossible to find room on the cannery ships for such a bulk as they would make in addition to the other supplies necessary. Furthermore, the making of cans provides work for a large part of the crew, otherwise unemployed while the rest are getting ready the other necessary paraphernalia. The work is done by machinery and occupies several weeks' time.

CANNING SMOKED SALMON.

A number of ventures in the line of canning smoked salmon have been made on this coast, but most of the pioneers were not content or able to invest the amount of capital needed and wait the time required to create a demand for such products, and soon quit.

One of the leading British Columbia packers, H. Bell-Irving & Co., some years ago put up in cans some pink salmon which had been treated to an artificial smoke in a vat, and these are said to have made a favorable impression in Australia. Another canner operating on the Fraser River smoked pink salmon, and then, cutting them to the proper length, packed them dry in half-pound cans.

In 1908 the Columbia Canning Co. put up at its cannery on Chilkoot Inlet, Alaska, some smoked salmon which had been shaved into thin strips like dried beef. These, called "Flaxamo," were packed in oil and were very good, especially in making sandwiches.

In 1915 two companies began in Seattle the smoking, slicing, and canning of coho and king salmon. These were put up in oblong flat cans of various sizes, similar to sardine cans, $2\frac{1}{4}$, $4\frac{1}{2}$, and $7\frac{1}{2}$ ounces, respectively, while for a special trade a $7\frac{1}{2}$-pound can was also packed. These fish were cut quite thin, about 40 to 50 slices to the pound, and were packed in hermetically sealed cans with cottonseed oil. The fish were all hard smoked before slicing and canning.

The same companies are also putting up kippered salmon in cans.

MAKING SALMON CANS.

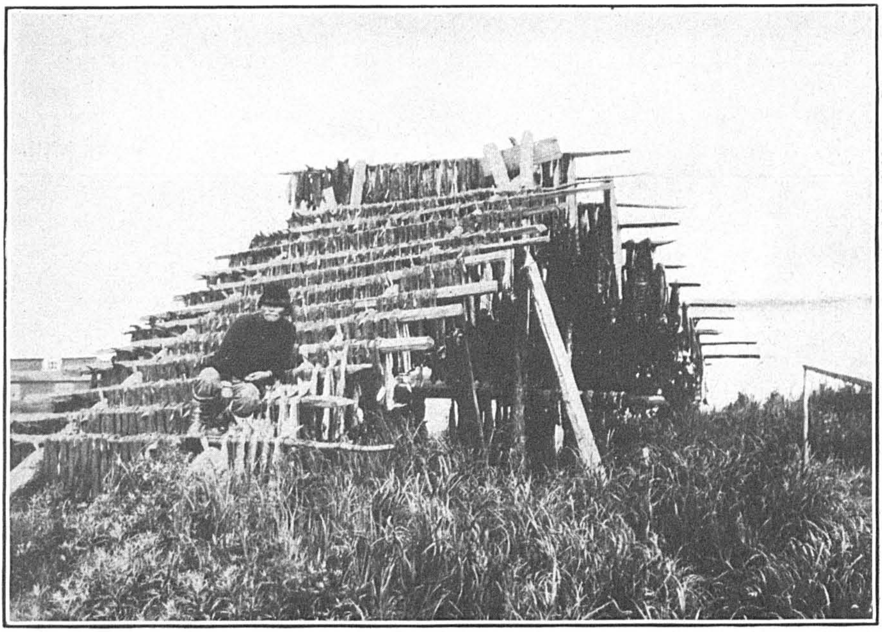


FIG. 1.—AN INDIAN SALMON DRYING RACK, BERING SEA, ALASKA.

FIG. 2.—THE BARONOVICH SALMON SALTERY; THE OLDEST SALTERY IN ALASKA.

Salmon loaf, made by mixing salmon with flour and various other ingredients, thus producing a paste, is also being canned by several packers.

A straight salmon paste, made solely from the flesh of the salmon, is being manufactured by one of the leading packers.

HOME CANNING.

At a number of places along the coast it has become the custom for the thrifty housewives to do a little home canning of salmon for winter use when the fish are abundant and cheap, and they find canning salmon as easy as canning vegetables and fruit. The fish is dressed, skinned, and the backbone removed. It is then cut into transverse strips of a size to fit either a pint or a quart glass jar, whichever is to be used. The jars are then filled with the pieces, salted to taste, the rubber ring put on, after which the can cover is put on loosely so that the steam may escape. Strips of thin wood are placed at the bottom of a kettle or wash boiler and the cans set down on them. Enough cold water is then poured into the kettle to bring it up to within an inch or two of the top of the cans. The kettle is then put on the stove and, after it comes to a boil, note is made of the time and the cans are cooked from one and one-half to three hours. There seems to be a great variation in the time of cooking on the part of the operators. Some even cook only one hour, but these generally use a preservaline. About two hours seems to be the best time, as the bones are then quite soft. At the end of the cooking period the tops are tightened, the kettle removed from the stove, and the water and cans allowed to cool in the kettle.

MILD CURING.

The beginning of the business of mild-curing salmon, or "sweet pickling," as it is sometimes called, is of comparatively recent date. In 1889 a German dealer came to the Columbia River and tried to interest some of the cannery men in the business. J. O. Hanthorn, M. J. Kinney, and J. W. Cook were persuaded to prepare some, and the plant of the Northwest Cold Storage Co., at Portland, was used to keep the fish at a low temperature during repacking and preparation for shipment. These fish were shipped to Germany, but the shippers received no financial returns, word coming back that the fish were not satisfactory.

Owing to this lack of success from the first effort, no further attempt was made until 1894, when Mueller & Loring, of Chicago, put up a carload of mild-cured salmon at Kalama, Wash., and shipped it to Germany. In 1896 Charles Ruckles and Wallace Bros., of Kalama, packed several carloads for the German market. It was not until 1898 that the business was permanently established on the Columbia, the Trescott Packing Co. and S. Schmidt & Sons putting up plants at Warrenton and Astoria, respectively.

In 1900 the Trescott Packing Co. began packing the spring and fall runs, and the Sacramento River Packers' Association packed the fall run on the Sacramento River, the business being carried on here every year since.

In 1901 the Sacramento River Packers' Association began at Monterey the mild curing of the spring salmon that were taken with hook and line in the open ocean.

S. Ellmore & Co. started the industry in 1902 at Tillamook, and the business began on Puget Sound in 1901, when the San Juan Fishing & Packing Co. and the Seattle Fish Co. took it up. The Pacific Cold Storage Co. began the next year at Anacortes.

Prior to 1906 several of the Alaska cannery men put up each season a few tierces of mild-cured salmon, but it was not until this time that the industry really began as such. In that year J. Lindenberger (Inc.) started packing at Ketchikan, Alaska. The following year several other plants were started, and in 1910 almost all of the king salmon taken in southeast Alaska were mild cured.

In mild curing the fish are split down the middle, the head, tail, and all fins except the pectorals removed, and the backbone cut out. The fish is then in two halves. Each of these halves, or sections, is then scored on the outside eight or nine times with the knife. They are then thrown into a cleaning vat, and here the inner side of each section is carefully scraped clear of blood and membrane with a knife, while the outside is thoroughly cleaned with a scrubbing brush. The sections are then laid carefully inner side up in another vat partly filled with clear, cold, running water, or into a tierce partly filled with fresh water and cracked ice, in which they remain for an hour. Formerly the fish were put into brine, but it has been found that ice water answers the purpose much better. After being thoroughly cooled, the sections are salted down in the tierces, each one being laid with its tail toward the center. Usually about 50 whole fish are required to fill a tierce. The pickle is made to a strength of 90° and should be strained before putting in the tierces. The tierces are then put in a cold storage chamber with a temperature of 35 to 38° F. They are held here from 14 to 21 days, care being taken to keep them full of pickle, which can be added through the hole in the head. The fish shrinks about 30 per cent during curing. After curing fish are taken from the tierces, the salt and slime are carefully removed and the fish repacked in the tierces without salt. When full of fish ice cold pickle with strength of 90° is added, the tierces tested to see if they are air-tight, and then taken back to the cold storage to await shipment.

In the early days of the industry different preparations, which included salicylic and boracic acids, were used to help preserve the fish. This caused much complaint from the Germans, and finally their Government subjected our product to a rigid inspection, with most salutary results, as now it is one of the purest and best products put up on this coast, the use of acids being done away with entirely.

The king salmon is almost invariably the species mild cured, being the only one large enough to answer the requirements of the trade. In 1907 a Ketchikan, Alaska, packer put up a quantity of coho, dog, and humpback salmon, but he found so much difficulty in disposing of the product that he abandoned further efforts in this line. A few cohos are put up each year.

The principal consumers of the mild-cured salmon are the smokers, who take them from the tierce, wash and soak them for a few minutes, and then have a practically fresh fish to smoke, and not, as in the days when hard-pickled salmon were used, one that had lost most of its oil and flavor through the excessive amount of salt needed to preserve it.

The greater part of the product put up on this coast goes to Europe, Germany being the principal consumer, but considerable quantities are sold in Norway, Sweden, and other countries, while the smokers of the cities east of the Rocky Mountains use large quantities every year.

In Germany, the principal market for mild-cured salmon, nearly all of the fish are smoked. One of the most popular ways of using the smoked salmon is in the making of sandwiches, and probably the greater portion of these are used in the beer halls and the automatic restaurants in that country.

PICKLING.

The earliest method of preserving salmon on the coast was by pickling. At times this industry attained to large proportions, but during the last 10 years it has been declining, largely because the canners are able to pay more for the raw fish than the salters. All species of salmon are pickled, but the most popular is the red salmon.

In dressing salmon for pickling the heads are removed, the fish split along the belly, the cut ending with a downward curve on the tail. The viscera and two-thirds of the backbone are removed, and the blood, gurry, and black stomach membrane scraped away. The fish are then thoroughly scrubbed and washed in cold water. They are next placed in pickling butts with about 15 pounds of salt to every 100 pounds of fish. The fish remain here about one week, when they are removed, rubbed clean with a scrub brush, and repacked in market barrels, one sack of salt being used to every three barrels of 200 pounds each. About 40 to 52 red salmon, 25 to 35 coho salmon, 70 to 80 humpback salmon, 10 to 14 king salmon, and 25 to 30 dog salmon are required in packing a barrel of pickled salmon.

A few salteries also pack "bellies." This product is merely the belly of the fish, which is the fattest portion, and as most of the packers threw away the rest of the fish, thus causing a very large waste of choice food, this method has come under the ban of the law in some of the coast States and in Alaska. As a result, but few "bellies" are packed now, and most of these only when some economic use is made of the remainder. Humpback salmon furnish the major part of the "belly" pack.

DRY SALTING.

During the progress of the Russian-Japanese War the preparation of dry-salted dog salmon became an important industry, but as soon as the Japanese fishermen resumed their former occupations the demand fell off so much that the industry was virtually abandoned in the United States, although a number of Japanese continue it in British Columbia. The fish, after being dressed, were packed in boxes, in salt, these boxes holding about 560 pounds of fish, and were shipped in this condition to Japan.

At a number of places in Alaska the bellies of red and coho salmon are cut out and salted, after which the backs are dried in the sun and, thus cured, are used for fox food at the numerous fox ranches. This product is called "ukalu."

SMOKING.

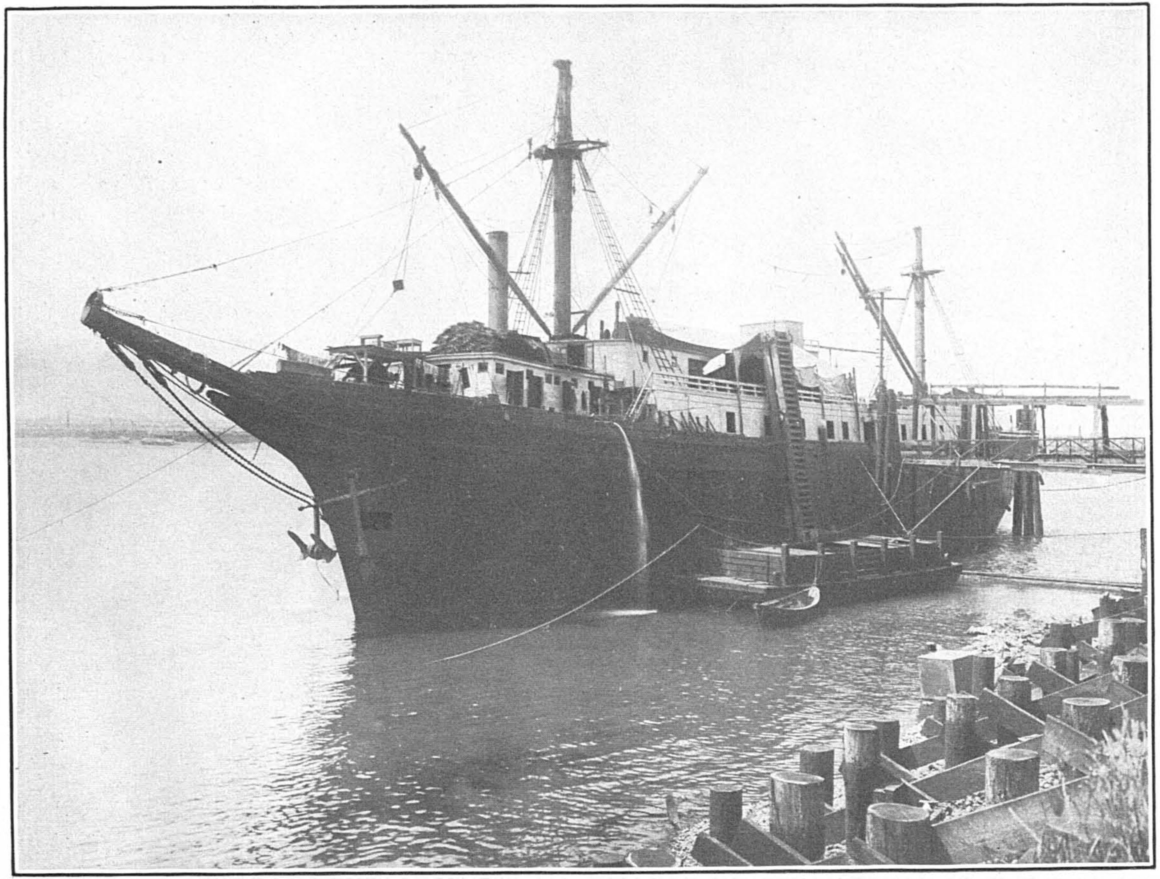
The smoking of salmon is virtually a continuation of the pickling, as the fish must be pickled before being smoked, the main purpose of the pickling being to preserve them until the time arrives for smoking, which may be weeks or months after the fish are caught. For smoking them the salmon are taken out of the barrel and soaked until as much as possible of the salt is removed. They are then put into the smokehouses and subjected to the heat and smoke of a fairly hot fire for about two days in order that they may be thoroughly dried and hardened. Exposure to a smoldering fire (alder wood is a favorite fuel) for about three days completes the process.

For shipment smoked salmon are packed in wooden boxes, oil paper being placed between the fish.

A variation of the smoking process is known as "kippering." With this method the salmon are dried in a hot fire for about 20 hours and then smoked over another hot fire for about 24 hours. The "buckling" process is also similar to this.

Dog and king salmon are often cut into steaks and kippered. As the sale of white-meated king salmon is somewhat hampered by the whiteness, the smokers use a coloring preparation, known in the

SALMON OFFAL READY FOR DELIVERY TO THE FERTILIZER PLANTS.



SHIP, WM. H. SMITH, FLOATING CANNERY AND COLD-STORAGE PLANT.

trade as Zanzibar carmine. This gives the outside of the fish a deep-colored red gloss, but leaves the inside its natural white color. The steaks, averaging 1 pound each, are wrapped in paper and packed in baskets holding 10 pounds each.

A smoked product, known locally as "beleke," is put up at Kodiak, Alaska, from red and coho salmons. Steelhead trout are the best for this purpose but are not often utilized owing to their scarcity in this region. In preparing "beleke" only the backs of the fish are used, the belly part being cut out and pickled separately. The backs are divided into three grades, according to size, viz, "small," "medium," and "large." They are first put into a brine, the "large" being put in first, followed by the "medium" and "small" at intervals of one hour each, so that all will be cured at about the same time. The coho backs, being the largest, are kept in the brine from 19 to 20 hours, while the red salmon backs, which are smaller, remain in the brine only about 16 hours. After being thoroughly salted the backs are removed from the brine and rinsed in fresh water, then hung in the air for about 24 hours to dry and to allow a thin skin to form on the outside. They are then hung in the smokehouse, in the presence of a little fire of cottonwood or alder. On dry days the gable windows are thrown open and the wind allowed to pass through while the smoking is going on. The smoking must be done slowly, two weeks being devoted to it.

There is a good demand for this product locally, the fish selling for from 15 to 20 cents a pair, but little effort has been made to extend its sale outside of central Alaska.

FREEZING.

The process of preserving fish by freezing was first introduced in 1888. Previous to this the comparatively ancient method of packing with ice, or in rare instances letting the fish freeze naturally during the winter months, was followed. Packing with ice is in quite general use to-day for shipments of fish which are to be preserved for short periods of time. Cooling with ice never results in a temperature lower than 32° F., which, of course, does not freeze the fish.

The freezing of salmon and steelhead trout began on the Sacramento and Columbia Rivers in the late eighties. It was taken up in a small way on Puget Sound in 1892. That year Wallace Bros. and Ainsworth & Dunn froze a small lot, the work being done for them by the Seattle Ice Co. (now the Ice Delivery Co.), and the venture was so successful that the next year nearly all of the wholesale dealers on the Sound took up the business. The Crescent Creamery, of Tacoma, also engaged in the business for the fish dealers for a year or two shortly thereafter. In 1902 the British Columbia Packers' Association bought a large cold-storage plant at New Westminster, British Columbia, at that time the only large and modern plant in the province, and began the active freezing of fish. Since then a number of excellent plants have been built and operated. In Alaska the preparing of frozen salmon began in 1902. The San Juan Fishing & Packing Co., soon to be succeeded by the Pacific Cold Storage Co., put up a cannery and cold-storage plant at Taku Harbor, in southeast Alaska, in 1901, though it did not operate the cold-storage portion until 1902. This is the only plant which was operated in Alaska until the New England Fish Co. erected in 1909 a large plant at Ketchikan for the freezing of halibut primarily, but considerable quantities of salmon have been frozen also.

In 1911 the schooner *Metha Nelson* was fitted up as a floating freezer by the Alaska Packers Association and sent to Kodiak Island. As the vessel arrived in San Francisco shortly before the State's closed season on salmon began, and it was a difficult matter to dispose of the catch before then, the business was abandoned.

In 1912 J. Lindenberger (Inc.) opened a freezing plant at Craig, on Fish Egg Island, Alaska, while the ship *William H. Smith* was outfitted as a floating cannery and freezer by the Weiding & Independent Fisheries Co., at Saginaw Bay, Alaska. The latter operated only one season.

The year 1913 saw quite a development in the industry. The Columbia & Northern Fishing & Packing Co., at Wrangell, the Juneau Cold Storage Co., at Juneau, the Booth Fisheries Co., at Sitka, and the floating cold-storage ship *Glory of the Seas*, by the Glacier Fish Co., at Idaho Inlet, were all started this year.

In 1914 the Ketchikan Cold Storage Co. opened a freezer for the general commercial freezing of fish.

The freezing of salmon is almost invariably carried on in connection with other methods of handling and preserving, and the purpose is usually to secure the fish when numerous and cheap, freeze them, and then hold them until the runs are over and the fish are once more in good demand at high prices. The business proved so profitable, however, that the dealers began to look for wider markets for their product. Europe, more especially Germany, was prospected and a profitable market soon developed, with the result that to-day frozen Pacific salmon can be secured in nearly every town of any size in western Europe, while large quantities are marketed all over our own country.

There are four important features in packing and using frozen salmon: (1) To get fresh fish; (2) to keep them cold (about 15° above zero) after they are frozen; (3) to keep a coat of ice on them; and (4) to allow them to thaw slowly in cold water before cooking.

In selecting salmon for freezing, only the finest and freshest of each species are used. The current belief that freezing destroys the flavor of the fish is erroneous, the flavor depending entirely upon the condition before freezing, and the quicker they are frozen after being caught the better will the natural flavor of the fish be preserved. Frozen salmon are just as wholesome as fresh, and their chemical constituents are almost identical. The danger lies in the temptation to freeze the fish after decomposition has set in, but, fortunately, this is now very rarely practiced in the salmon industry.

The coho, or silver, and the chum, or keta, salmon are the choicest of the salmons for freezing. The other species except the red, or sockeye, which is too oily and rarely frozen, are also frozen in varying quantities. The steelhead trout, which is ranked by the Pacific coast dealers among the salmon, is considered the choicest fish of all for freezing.

Some of the most modern plants in the country are on this coast. These have numerous freezers, generally, in which a temperature of from 25° to 30° F. below zero can be maintained if desired, although a temperature of more than 10° below zero is rarely ever required. All freezing is by direct expansion and each freezer is piped with about 2 feet of 1¼-inch pipe per cubic foot of freezing space. The bunkers in the freezers are in pairs, generally nine pipes wide, spaced 10 inches apart. This leaves about a 3½-foot passage through the center of each freezer opposite the swing doors. The salmon are laid on pans, which are placed on the tiers of pipes.

After freezing, the salmon are passed through openings in the rear of the freezers into the glazing room, which has a temperature of about 20° F., where they are dipped into water, and when removed are covered with a thin glaze of ice, which may be thickened by repeated dippings. This is an extra precaution to exclude the air from the fish.

After being thoroughly frozen and glazed, each fish is covered first with a parchment, like rolls of butter, and then with a piece of heavy brown paper. They are then packed in boxes holding about 250 pounds each, placed in the cold-storage cars and shipped.

UTILIZING SALMON EGGS.

Every year immense quantities of salmon roe are thrown away in the fisheries of the west coast, though there is but little doubt that, if properly prepared, a market could in time be found for this now waste part of the fish. In France there is a good market for a product known as "rogue," which is the spawn of cod, haddock, hake, and pollock salted in casks, and which is used as bait in the sardine fisheries. Salmon spawn is the choicest and most successful bait used on this coast, and if properly prepared would undoubtedly answer the purpose as well as the regular "rogue" if not better, owing to its oiliness and attractive color. The roes should be soaked for some days in old brine and then packed in strong casks holding about 25 gallons each. It might also prove to be a good bait for tolling mackerel on the Atlantic coast.

In 1910 a considerable quantity of salmon roe was prepared in Siberia and sold in competition with caviar, which is prepared from sturgeon eggs. The product met with favor in Europe and now large quantities are prepared each season.

In this country Miss Ida Tuholski, of San Francisco, who had been engaged in the preparation of sturgeon caviar for some years, put up a number of sample lots of salmon caviar which were fully the equal of the best sturgeon caviar. Capital has been chary, however, about engaging in the business, although undoubtedly it will be an important industry some day.

For making caviar the eggs should be as fresh as possible, and in order to make sure of this the salmon, all species, except the sockeye and coho, are utilized in Siberia: the chum eggs make the best caviar. They are taken alive, if possible, shortly after coming from the water, killed and bled, the belly opened up and the roe taken out. This work can best be done on work and living scows anchored close to the fishing camps. The roe is placed upon a stand, the top of which is formed of a small-meshed galvanized-iron wire screen. On the underside is arranged a zinc-lined trough. The operator gently rubs the mass of eggs back and forth over the screen, the mesh of which is just large enough to let the eggs drop through, and, as they are separated from the membrane by the rubbing, they fall through into the trough and are thence drawn off into tubs by means of a sliding door at the end of the trough.

After all the roe has been separated the tub is removed and a certain proportion of salt (the sturgeon caviar makers employ the best Luneburg, Germany, salt in this work, while some of the Siberian makers of salmon caviar use no. 2 Berkshire salt from England) is added to the roe, after which the mass is mixed with the hands. The most delicate part of the whole operation is in the manner of mixing. No direct rule can be given for doing this portion of the work, as the condition of the roe regulates the time consumed and the manner of handling. It requires practical experience to become proficient, but this should be an easy matter for one used to handling salted products. The sturgeon caviar makers use about 11 pounds of salt in preparing a keg of caviar.

After the salt has been added the mass of eggs first dries up, but in a few minutes the strength of the salt draws from the eggs their watery constituents and a copious brine is formed, which can be poured off when the tub becomes too full. In Siberia the caviar makers put the eggs into a brine solution of 19 to 22 per cent Baumé strength immediately after they come from the trough. The salted eggs are then poured into very fine-meshed sieves which hold about 10 pounds each. In the caviar house are arranged long, sloping boards with narrow strips nailed on each side. On these the sieves are placed and left here from 8 to 20 hours in order to thoroughly drain.

The Siberian caviar makers hasten the operation by putting the eggs into a brine solution as noted above, leave them there for from 25 to 45 minutes, then place them in bags and subject them to heavy pressure, after which they are packed. While this method occupies less time, it is not thought the resulting product is as good as that prepared by the slower method outlined above.

The eggs are then transferred to small casks (holding about 135 pounds). The sturgeon caviar makers use oak or pine casks, but some of the Siberian makers say that oak casks turn the salmon caviar black. The casks are steamed before use in order to prevent any possible leakage. It is especially necessary that the kegs or barrels used be air-tight, as otherwise the product will spoil. Barrels such as used in packing salt salmon are rarely ever tight enough to hold caviar. The casks are covered and allowed to stand until the gas escapes and the eggs settle. The vacant space caused by the settling is then filled, the cask headed up and put in a cool place until ready for shipment.

The Siberian salmon caviar makers use a small quantity of "preservaline" in each keg for the purpose of aiding in preserving them, as cold storage facilities are quite primitive as yet in that country, and it is the addition of this powder which forms the mysterious part to the uninitiated. No preservative would be needed in Alaska, however, as the kegs could be shipped in cold storage along with the mild-cured salmon.

Several establishments are putting up these eggs in jars and hermetically sealed cans for use as bait in sport fishing.

MISCELLANEOUS PRODUCTS.

A few years ago a company on the Columbia River put up what was known as "fish pudding." In preparing this the salmon was ground fine, mixed with milk and eggs, and then packed in tin cans. The preparation was soon abandoned.

In 1903 one of the Point Roberts canneries packed a new product which was called "salmon paste." For this the fish was ground up, cooked, seasoned with spices, etc., and made into fish balls, a very palatable dish when warmed over.

In 1905 a Seattle concern began the manufacture of wienerwurst sausages from halibut and salmon.

The Indians in the Bristol Bay region of Alaska occasionally dress the skins of salmon and make of them leather for the tops of boots, also bags and other small articles.

A product, which was first made in Norway, is prepared by means of an invention which quickly dries and pulverizes the flesh of fresh fish. The resulting powder, called "fish flour," is easy to transport from one place to another and has great nutritive value. It is probable that the tailpieces of the fish, which are at present thrown away, and the cheaper grades of salmon might be prepared in this way and thus furnish another market for salmon.

MEAL, FERTILIZER, AND OIL.

As early as 1888 there was a small plant at Astoria, Oreg., where the refuse of the canneries was utilized for the manufacture of oil and fertilizer. In that year 8,000 gallons of oil (chiefly from salmon heads), and 90 tons of fertilizer were prepared. The oil was worth 22½ cents per gallon and the fertilizer had a market value of $20 per ton. Most of the refuse was dumped into the river, however. In 1898 a similar plant was established in the Puget Sound district of Washington. At present the plants of the Robinson Fisheries Co. and Marani Products Co., at Anacortes; the Pacific American Fisheries at Eliza Island, near Bellingham; the Pacific Products Co. at Port Townsend, and the Japanese-American Fertilizer Co. on Lummi Island, all on Puget Sound, operate quite largely on the offal from the Sound salmon canneries.

In 1882 the Alaska Oil & Guano Co. established a fertilizer plant at Killisnoo, Alaska, for the extraction of oil and fertilizer from herring, and has operated the plant continuously ever since. In some years large quantities of whole salmon have been handled at this plant, and the resulting product was found to sell as well as that from herring.

In Alaska the Fish Canners By-Products (Ltd.), in 1914 built a large plant at Ward Cove, near Ketchikan, where salmon offal is used in the preparation of fertilizer, meal, and oil. The company is now experimenting in the preparation of various chemical products from the raw material.

Probably the most serious evil in the salmon industry to-day is the enormous wastage which annually occurs. Over one-fourth of the total weight of each fish handled at the various packing plants is thrown away. With the exception of the tailpiece, which is discarded at some canneries owing to the excessive amount of bone which would be in the product if canned, this waste material could not be utilized as food, comprising as it does the head, viscera, fins, and tail. When not conveniently near the very few fertilizer plants at present in operation this product is either allowed to pass through chutes into the water under the cannery, or is dumped into scows and towed to the ocean or the deeper waters of the sounds, and there thrown overboard. This procedure is not only exceedingly wasteful, but is also far from beneficial to the waters where deposited.

The great desideratum in the salmon fisheries of the Pacific coast at the present time is the invention of a small odorless fertilizer plant, costing not more than $2,500 or $3,000, which can be installed at the various salmon canneries and salteries. The offal from the cannery could there be utilized and the product obtained would doubtless net a fair return on such an investment, while at the same time the present (in the aggregate) enormous waste would be stopped, and the waters adjacent to the canneries rendered far more agreeable to the fishes as well as to the people on shore. It is absolutely essential that the plant shall be odorless, as the smell of the ordinary fertilizer establishment would be very offensive to persons visiting the cannery and would not enhance the demand for canned salmon. At the present time the cheapest plant available costs about $10,000, and very few canneries can afford to invest this sum of money in the disposal of their own offal alone.

A recent issue (1915) of Fertilizers, of London, England, has the following to say upon this subject:

Investigations conducted at the Agricultural Experiment Station at Harleshausen (Germany) go to show that, provided it is of good quality, fish meal forms a suitable supplementary feeding stuff for farm animals, especially for pigs. Unfortunately, however, it is made in cases from inferior products, such as decomposing fish and herring meal containing excessive quantities of salt, or it may be adulterated with bone meal and carcass meal. Fish meals made from low-grade material may have a harmful effect on the health of the animals to which they are fed. The German report goes on to say that fish meal is commonly produced partly from fish offal and partly from whole fish condemned as unfit for human consumption, or which is unsalable owing to an excessive supply. Purchasers are warned that great care is necessary in buying fish meal, as, apart from the varied nature of the raw material from which it is made, the methods of preparation may produce wide differences in its composition. From the analyses of a large number of different samples of fish meal the proportion of different constituents was found to vary between the following limits:

Water 5.90 to 18.91 per cent; crude protein, 38.83 to 58.96 per cent; digestible protein, 30.43 to 54.52 per cent; fat, 1.55 to 14.03 per cent; phosphate of lime, 7.80 to 36.16 per cent; salt, 0.70 to 20.10 per cent; ash, 20.53 to 45.07 per cent; sand, 0.10 to 6.05 per cent.

Its richness in protein renders fish meal especially suitable for combination with foods, such as roots and potatoes, which possess a low percentage of that constituent. If fed in too large quantities or containing too high a percentage of oil the meal is liable to give a fishy taste to the meat product. It has been commonly accepted that high-grade fish meal should not contain more than 2 to 3 per cent of fat, but when the proportion of meal used in the ration is not too high it is considered (says the report) that there is no objection to using meals containing up to 4 per cent. Among the mineral constituents contained in fish meal are phosphate of lime and salt, both of which are indispensable in the feeding of animals. In the case of salt, however, an excessive amount is valueless, and may even cause illness. For this reason the proportion of salt contained in fish meal should not exceed 3 per cent. The quantity of fish meal which may be fed with advantage to the different kinds of farm stock varies according to the class of stock and to the quality of the meal. It is suggested that the following amounts may be given daily if the meal is of good quality: Cattle, 2 pounds for every

1,000 pounds live weight; pigs, one-fourth to one-half pound per head according to weight; and sheep, one-tenth to one-fifth pound for every 100 pounds live weight.

A great impetus has been given to the industry during the last two years, owing to the big demand which has come from the farmers and poultrymen for fish meal or scrap, which, after it has been mixed with other ingredients, can be fed to cattle, hogs, and poultry. Experiments carried out at various agricultural experiment stations, both here and in Europe, show conclusively that this class of food increases the appetite of the animal, and consequently the weight, while it does not affect the flavor of the flesh of the animals.

SHIPPING SALMON DIRECT TO CONSUMER.

An important new feature in the salmon industry is the shipping of individual salmon direct to consumers by express, or, for certain short distances, by parcel post, for a certain fixed sum, which includes the fish itself and the cost of delivering same to the buyer.

This business began in Tacoma, Wash., in 1914, and those who originated it advertised throughout the country that they would ship a fresh salmon to any express office in the United States (except Southern Express), express prepaid, for $1.25, weight 7 to 8 pounds. In 1915 the cost, delivered east of the Mississippi River, was raised to $1.50 each, the old rate of $1.25 still being in force for shipments west of the Mississippi River. The number of shippers has increased very much, and the business is now carried on from a number of places in Washington, Oregon, and California.

In shipping an individual fish, it is packed in a box containing 20 pounds of cracked ice. These boxes are collected by the express companies and are generally sent out in their own regular cars attached to trains leaving in the evening. About every 15 to 20 hours the box is opened and from 5 to 7 pounds, depending upon the weather, of cracked ice added to the box to make up the loss through melting.

As the Post Office Department will not accept packages in which ice is used for preserving fish, the use of the parcel post for shipments of individual fish is limited to the first postal zone (up to 50 miles from the initial point), except in winter, when the postmasters are authorized, in their discretion, to accept shipments for the second zone (50 to 100 miles from the initial point). In making fresh fish shipments by parcel post, frozen fish are generally used.

Most of the orders come from the Middle West, where fresh fish are not abundant, but orders are received from all sections of the country.

The success met with in shipping fresh salmon led to a considerable expansion of the industry, with the result that now one can obtain not only a fresh salmon, but also may purchase salt, smoked, and kippered salmon, salt codfish, and fresh halibut, smelt, crabs, and other sea food in its season.

VIII. NUTRITIVE QUALITIES OF SALMON.

More and more attention is being paid by the consuming public to the nutritive qualities of the food products offered them, and this is especially true as regards fishery products.

The proper functions of food are two-fold, first, to furnish protein for building and repairing the body, and second, to supply energy for heat and muscular work. Foods which supply an abundance of both at a reasonable price are of the greatest importance from an economical standpoint.

Despite the great prominence of the salmon industry, but little time has been devoted to it by the chemist.

Prof. W. O. Atwater was the first American investigator to devote any portion of his energies to the analysis of Pacific salmon. In Farmers Bulletin No. 142, United States Department of Agriculture, he gives the following analysis of canned Pacific coast salmon: Water, 63.5 per cent; protein, 21.8 per cent; fat, 12.1 per cent; ash, 2.6 per cent; fuel value per pound, 915 calories.[a]

C. F. Langworthy, in "Fish as food" (Farmers Bulletin No. 85, United States Department of Agriculture), gives the following analyses of fresh and canned Pacific coast salmon:

Fresh salmon, California (sections): Refuse (bone, skin, etc.), 5.2 per cent; water, 60.3 per cent; protein, 16.5 per cent; fat, 17 per cent; mineral matter, 1 per cent; total nutrients, 34.5 per cent; fuel value per pound, 1,025 calories.

Canned salmon—refuse (bone, skin, etc.), 3.9 per cent; salt, 1 per cent; water, 59.3 per cent; protein, 19.3 per cent; fat, 15.3 per cent; mineral, 1.2 per cent; total nutrients, 35.8 per cent; fuel value per pound, 1,005 calories.

Dr. Harvey W. Wiley gives the following as the composition of a Pacific coast salmon (species not given):[b]

Fresh—Water, 63.61 per cent; protein, 17.46 per cent; fat, 17.87 per cent; ash, 1.06 per cent. Dry—Protein, 52.31 per cent; fat, 49.05 per cent; ash, 2.92 per cent.

On page 137 of the same work Dr. Wiley gives the following as the mean of three samples of Pacific coast canned salmon:

Composition of canned salmon.—Mean of three samples. Water-free substance: Protein, 53.52 per cent; fat, 40.52 per cent; ash, 6.24 per cent.

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[a] The unit used to show the fuel value is the "calorie," and is the amount of heat which would raise the temperature of about 1 pound of water 4° Fahrenheit.

[b] Foods and their adulteration, etc. By Harvey W. Wiley, p. 135. (8 vo., Phila., 1907.)

Prof. Knisely,[a] of the Oregon State Agricultural College at Corvallis, Oreg., analyzed canned salmon packed at the Funter Bay (Alaska) cannery of the Thlinket Packing Co., with the following results:

Species.	Moisture.	Protein.	Fat.	Ash.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Sockeye, or red	64.74	24.19	9.11	2.06
Coho, or medium red	68.22	26.56	3.61	1.66
Hum pback, or pink	69.43	24.00	4.86	1.68
Keta, or chum	67.08	25.06	6.59	1.26

H. M. Loomis, chief of the Seattle food and drug inspection laboratory, Bureau of Chemistry, United States Department of Agriculture, reports as follows on analyses of both canned and fresh Pacific salmon made at this laboratory.[b]

CANNED SALMON (1911 PACK).

[Each sample is average of two or more cans. All samples, except no. 2, are old form 1-pound tall cans. No. 2 is ½-pound flat cans.]

Samples.	Water.	Ethyl ether extract.[a]	Protein (Nx6.25).	Total ash.	NaCl.[b]	Ammoniacal nitrogen.	
						Richardson method.	Alcohol vapor method.
	Per ct.	*Per cent.*	*Per cent.*	*Per ct.*	*Per cent.*	*Per cent.*	*Per cent.*
No. 1. Puget Sound sockeye	62.44	15.17	20.25	2.50	0.79	0.0403	0.0348
No. 2. Puget Sound sockeye	61.84	13.74	21.77	2.73	1.10	.0437	.0410
No. 3. Alaska medium red	69.97	7.81	20.40	2.58	1.09	.04965	....
No. 4. Alaska chum	73.48	2.88	21.33	2.57	.83	.0563	.0557
No. 5. Alaska pink or humpback	74.12	4.75	19.75	1.98	.50	.0404	....
No. 6. Alaska red	70.88	5.26	21.79	2.35	.64	.0455	....

[a] Represents the fat. [b] Represents the salt.

ANALYSES OF FRESH SALMON, EDIBLE PORTIONS.

Samples.	Water.	Ethyl ether extract.	Protein (Nx6.25).	Total ash.	NaCl.	Ammoniacal nitrogen.	
						Richardson method.	Alcohol vapor method.
	Per ct.	*Per cent.*	*Per cent.*	*Per ct.*	*Per cent.*	*Per cent.*	*Per cent.*
Puget Sound sockeye salmon (caught May 7, 1912)	67.48	8.86	22.24	1.36	....	0.0121	0.0205
Puget Sound steelhead or salmon trout (caught May 7, 1912)	67.89	9.39	21.80	1.35	....	.0135	.0218

[a] Pacific Fisherman, vol. VI, no. 1, January, 1908, p. 21.

[b] Eighth International Congress of Applied Chemistry, vol. XVIII, p. 239-245.

IX. THE SALMON OUTPUT IN 1915.

STATISTICS OF THE CATCH.

The following tables show, by sections and species, and also by waters for Alaska, Washington, Oregon, and California, the catch of salmon and steelhead trout in American territory on the Pacific coast in 1915, and show their value to the fisherman. Part of these data were obtained from the various State fish commissions and from the United States Bureau of Fisheries.

CATCH OF SALMON IN 1915,[a] BY STATES AND SPECIES.

Species.	Alaska.		Washington.		Oregon.		California.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Coho, or silver	7,989,504	$133,159	10,720,401	$382,148	4,596,252	$150,456	296,719	$14,836	23,602,876	$680,599
Chum, or keta	38,556,064	225,123	14,180,872	264,592	2,079,911	32,499	....	....	54,816,847	522,214
Humpback, or pink	123,585,576	624,941	29,644,561	222,331	....	....	....	....	153,230,137	847,272
King, spring, or chinook	13,440,834	362,184	19,884,530	902,575	23,539,866	1,382,148	8,212,506	410,625	65,077,736	3,057,532
Sockeye, red, or blueback	129,394,055	2,729,577	5,187,130	532,384	265,466	13,274	....	....	134,846,651	3,275,235
Steelhead trout	....	....	2,023,979	121,635	2,341,858	140,511	33,206	1,992	4,399,043	264,138
Total	312,966,033	4,074,984	81,641,473	2,425,655	32,823,353	1,718,888	8,542,431	427,453	435,973,290	8,646,980

a The published report of the Dominion of Canada for 1915 does not show the catch by species; the salmon as landed is reported at 136,939,400 pounds, valued at $5,743,893.

CATCH OF SALMON IN ALASKA WATERS IN 1915, BY APPARATUS AND SPECIES.

Apparatus and species.	Southeast Alaska.		Central Alaska.		Western Alaska.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Seines:								
Coho, or silver	1,404,228	$23,404	349,494	$5,825	....	....	1,753,722	$29,229
Chum, or keta	17,279,232	86,396	1,534,216	11,507	1,488	$19	18,814,936	97,922
Humpback, or pink	46,170,204	230,851	2,879,772	21,598	....	....	49,049,976	252,449
King, or spring	251,592	5,718	20,658	469	117,546	2,671	389,796	8,858
Red, or sockeye	4,652,170	139,565	7,755,465	155,109	6,129,160	122,583	16,536,795	417,257
Total	69,757,426	485,934	12,539,605	194,508	6,248,194	125,273	88,545,225	805,715

CATCH OF SALMON IN ALASKA WATERS IN 1915, BY APPARATUS AND SPECIES—Contd.

Apparatus and species.	Southeast Alaska.		Central Alaska.		Western Alaska.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Gill nets:								
Coho, or silver	1,285,860	$21,431	430,314	$7,172	595,350	$9,923	2,311,524	$38,526
Chum, or keta	388,944	1,945	816	6	4,316,728	37,771	4,706,488	39,722
Humpback, or pink	391,200	1,956	4,536	21	148,000	555	543,736	2,532
King, or spring	1,707,882	38,815	832,194	18,913	3,101,428	70,487	5,641,504	128,215
Red, or sockeye	2,418,410	72,552	5,388,525	107,771	72,809,100	1,456,182	80,616,035	1,636,505
Total	6,192,296	136,699	6,656,385	133,883	80,970,606	1,574,918	93,819,287	1,845,500
Traps:								
Coho, or silver	2,355,792	39,263	956,172	15,936	144,300	2,405	3,456,264	57,604
Chum, or keta	11,335,912	56,680	2,051,608	16,387	1,647,120	14,412	15,034,640	87,479
Humpback, or pink	73,234,128	366,171	757,736	3,789	....	....	73,991,864	369,960
King, or spring	503,866	11,451	1,254,594	28,513	615,120	13,980	2,373,580	53,944
Red, or sockeye	7,099,035	212,971	17,215,560	344,311	4,970,080	99,402	29,284,675	656,684
Total	94,528,733	688,536	22,235,670	408,936	7,376,620	130,199	124,141,023	1,225,671
Lines:								
Coho, or silver	467,994	7,800	....	....	....	....	467,994	7,800
King, or spring	4,990,766	170,140	....	....	....	....	4,990,766	170,140
Total	5,458,760	177,940	....	....	....	....	5,458,760	177,940
Dip nets:								
King, or spring	....	....	45,188	1,027	....	....	45,188	1,027
Red, or sockeye	....	....	956,550	19,131	....	....	956,550	19,131
Total	....	....	1,001,738	20,158	....	....	1,001,738	20,158
Total:								
Coho, or silver	5,513,874	91,898	1,735,980	28,933	739,650	12,328	7,989,504	133,159
Chum, or keta	29,004,088	145,021	3,586,640	27,900	5,965,336	52,202	38,556,064	225,123
Humpback, or pink	119,795,532	598,978	3,642,044	25,408	148,000	555	123,585,576	624,941
King, or spring	7,454,106	226,124	2,152,634	48,922	3,834,094	87,138	13,440,834	362,184
Red, or sockeye	14,169,615	425,088	31,316,100	626,322	83,908,340	1,678,167	129,394,055	2,729,577
Grand total	175,937,215	1,487,109	42,433,398	757,485	94,595,420	1,830,390	312,966,033	4,074,984

CATCH OF SALMON IN WASHINGTON WATERS IN 1915, BY APPARATUS AND SPECIES.

Apparatus and species.	Puget Sound.		Grays Harbor.		Willapa Harbor.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Drag seines:						
Coho, or silver	40,770	$1,699	27,708	$1,154	....	....
Chum, or keta	64,864	1,216	272	5	....	....
Humpback, or pink	9,084	68	....	....	....	....
King, or spring	15,488	704	29,590	1,345	....	....
Steelhead trout	730	44	....	....	....	....
Total	130,936	3,731	57,570	2,504	....	....
Purse seines:						
Coho, or silver	3,106,365	76,466	....	....	....	....
Chum, or keta	10,247,648	192,140	....	....	....	....
Humpback, or pink	17,444,812	130,836	....	....	....	....
King, or spring	224,510	10,205	....	....	....	....
Sockeye, red, or blueback	1,223,465	210,112	....	....	....	....
Steelhead trout	113,975	6,839	....	....	....	....
Total	32,360,775	626,598	....	....	....	....
Gill nets:						
Coho, or silver	683,214	28,467	504,420	9,478	22,590	$941
Chum, or keta	774,416	14,520	425,592	6,684	13,688	257
Humpback, or pink	143,932	1,080	....	....	....	....
King, or spring	510,114	23,187	340,940	14,216	139,788	6,354
Sockeye, red, or blueback	99,250	8,933	1,448,815	86,935	....	....
Steelhead trout	16,450	987	11,780	707	110	7
Total	2,227,376	77,174	2,731,547	118,020	176,176	7,559

Catch of Salmon in Washington Waters in 1915, by Apparatus and Species—Continued.

Apparatus and species.	Puget Sound. Pounds.	Puget Sound. Value.	Grays Harbor. Pounds.	Grays Harbor. Value.	Willapa Harbor. Pounds.	Willapa Harbor. Value.
Trap nets:						
Coho, or silver	3,825,648	$159,402	272,640	$11,360	150,258	$6,261
Chum, or keta	1,422,112	26,665	145,056	2,720	93,744	1,758
Humpback, or pink	11,630,852	87,224	....	....	1,593	16
King, or spring	5,221,106	237,323	405,196	18,418	350,812	15,946
Sockeye, red, or blueback	2,091,650	197,249	....	....	....	....
Steelhead trout	144,230	8,654	12,650	759	....	....
Total	24,335,598	716,517	835,542	33,257	596,407	23,981
Reef nets:						
Coho, or silver	22,584	941	....	....	....	....
Chum, or keta	8,944	168	....	....	....	....
Humpback, or pink	92,952	697	....	....	....	....
King, or spring	5,016	228	....	....	....	....
Sockeye, red, or blueback	6,790	611	....	....	....	....
Steelhead trout	2,500	150	....	....	....	....
Total	138,786	2,795	....	....	....	....
Set nets:						
Coho, or silver	411,372	17,140	121,170	5,049	35,856	1,464
Chum, or keta	170,840	3,203	124,336	2,331	100,768	1,889
Humpback, or pink	152,120	1,141	....	....	....	....
King, or spring	131,186	5,963	158,664	7,212	104,786	4,763
Sockeye, red, or blueback	16,865	1,518	250	23	4,145	373
Steelhead trout	6,480	389	1,730	104	30	2
Total	888,863	29,354	406,150	14,719	245,585	8,491
Bag nets:						
Coho, or silver	3,600	150	....	....	....	....
Humpback, or pink	2,100	16	....	....	....	....
Total	5,700	166	....	....	....	....
Lines:						
Coho, or silver	480,000	20,000	....	....	....	....
King, or chinook	3,080,000	140,000	....	....	....	....
Total	3,560,000	160,000	....	....	....	....
Grand total:						
Coho, or silver	8,573,553	304,265	925,938	27,041	208,704	8,666
Chum, or keta	12,688,824	237,912	695,256	11,740	208,200	3,904
Humpback, or pink	29,475,852	221,062	....	....	1,593	16
King, or spring	9,187,420	417,610	934,396	41,191	595,386	27,063
Sockeye, red, or blueback	3,438,020	418,423	1,449,065	86,958	4,145	373
Steelhead trout	284,365	17,063	26,160	1,570	140	9
Total	63,648,034	1,616,335	4,030,809	168,500	1,018,168	40,031

Apparatus and species.	Columbia River. Pounds.	Columbia River. Value.	Total. Pounds.	Total. Value.
Drag seines:				
Coho, or silver	40,338	$1,681	108,816	$4,534
Chum, or keta	5,224	98	70,360	1,319
Humpback, or pink	148	1	9,232	69
King, or spring	1,017,456	46,248	1,062,534	48,297
Sockeye, red, or blueback	60,820	5,474	60,820	5,474
Steelhead trout	236,390	14,363	237,120	14,407
Total	1,360,376	67,865	1,548,882	74,100
Purse seines:				
Coho, or silver	82,524	3,436	3,188,889	79,902
Chum, or keta	139,584	2,617	10,387,232	194,757
Humpback, or pink	141,400	1,061	17,586,212	131,897
King, or spring	58,600	2,664	283,110	12,869
Sockeye, red, or blueback	3,895	350	1,227,360	210,402
Steelhead trout	174,480	10,469	288,455	17,308
Total	600,483	20,597	32,961,258	647,195

CATCH OF SALMON IN WASHINGTON WATERS IN 1915, BY APPARATUS AND SPECIES—Continued.

Apparatus and species.	Columbia River.		Total.	
	Pounds.	Value.	Pounds.	Value.
Gill nets:				
Coho, or silver	74,724	$3,114	1,284,948	$42,000
Chum, or keta	231,960	4,349	1,445,656	25,810
Humpback, or pink	4,996	37	148,928	1,117
King, or spring	3,474,402	157,941	4,465,244	201,698
Sockeye, red, or blueback	24,065	2,166	1,572,130	98,034
Steelhead trout	368,892	22,134	397,232	23,835
Total	4,179,039	189,741	9,314,138	392,494
Trap nets:				
Coho, or silver	722,844	30,118	4,971,390	207,141
Chum, or keta	207,992	3,900	1,868,904	35,043
Humpback, or pink	18,840	141	11,651,285	87,381
King, or spring	4,008,224	182,192	9,985,338	453,879
Sockeye, red, or blueback	89,945	8,095	2,181,595	205,344
Steelhead trout	891,202	53,476	1,048,082	62,889
Total	5,939,047	277,922	31,706,594	1,051,677
Reef nets:				
Coho, or silver	....	....	22,584	941
Chum, or keta	....	....	8,944	168
Humpback, or pink	....	....	92,952	697
King, or spring	....	....	5,016	228
Sockeye, red, or blueback	....	....	6,790	611
Steelhead trout	....	....	2,500	150
Total	....	....	138,786	2,795
Set nets:				
Coho, or silver	1,776	77	570,174	23,730
Chum, or keta	3,832	72	399,776	7,495
Humpback, or pink	1,732	13	153,852	1,154
King, or spring	40,216	1,828	434,852	19,766
Sockeye, red, or blueback	9,870	888	31,130	2,802
Steelhead trout	11,790	717	20,030	1,212
Total	69,216	3,595	1,609,814	56,159
Bag nets:				
Coho, or silver	....	....	3,600	150
Humpback, or pink	....	....	2,100	16
Total	....	....	5,700	166
Wheels:				
King, or chinook	128,436	5,838	128,436	5,838
Sockeye, red, or blueback	107,305	9,657	107,305	9,657
Steelhead trout	30,560	1,834	30,560	1,834
Total	266,301	17,329	266,301	17,329
Lines:				
Coho, or silver	90,000	3,750	570,000	23,750
King, or spring	440,000	20,000	3,520,000	160,000
Total	530,000	23,750	4,090,000	183,750
Grand total:				
Coho, or silver	1,012,206	42,176	10,720,401	382,148
Chum, or keta	588,592	11,036	14,180,872	264,592
Humpback, or pink	167,116	1,253	29,644,561	222,331
King, chinook, or spring	9,167,334	416,711	19,884,530	902,575
Sockeye, red, or blueback	295,900	26,630	5,187,130	532,384
Steelhead trout	1,713,314	102,993	2,023,979	121,635
Total	12,944,462	600,799	81,641,473	2,425,665

CATCH OF SALMON IN OREGON IN 1915, BY WATERS AND SPECIES.

Species.	Columbia River.		Coastal streams.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Blueback	264,770	$13,239	696	$35	265,466	$13,274
Chum	1,561,337	24,396	518,574	8,103	2,079,911	32,499
Chinook	20,515,436	1,230,926	3,024,430	151,222	23,539,866	1,382,148
Silverside	2,493,650	87,278	2,102,602	63,178	4,596,252	150,456
Steelhead	2,279,202	136,752	62,656	3,759	2,341,858	140,511
Total	27,114,395	1,492,591	5,708,958	226,297	32,823,353	1,718,888

CATCH OF SALMON IN CALIFORNIA IN 1915, BY WATERS AND SPECIES.

Location.	Chinook.		Silvers.		Steelhead.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Eel, Mad, Klamath, and Smith Rivers	1,649,189	$82,460	286,719	$14,336	33,206	$1,992	1,969,114	$98,788
Fort Bragg, Mendocino County	56,247	2,812	....	....	....	....	56,247	2,812
San Francisco Bay and tributaries	3,471,624	173,581	....	....	....	....	3,471,624	173,581
Monterey Bay	3,035,446	151,772	10,000	500	....	....	3,045,446	152,272
Total	8,212,506	410,625	296,719	14,836	33,206	1,992	8,542,431	427,453

PACK OF CANNED SALMON IN 1915.

The following table shows by sections, species, and styles of can the pack of Pacific coast (exclusive of Siberia and Japan) canned salmon in 1915:

Species, grades, and sizes.	Alaska.	Puget Sound.	Queets River.	Soleduck River.	Quinault River.	Grays Harbor.	Willapa Harbor.	Columbia River.
Coho, or silver:	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*
½-pound flat	4,201	38,196	....	....	126	2,848	....	12,757
1-pound flat	2,338	28,765	....	20	409	4,328	....	3,381
1-pound tall	120,031	113,822	....	1,300	853	6,860	4,008	17,198
Total	126,570	180,783	....	1,320	1,388	14,036	4,008	33,336
Chinook, or king, red:								
Fancy—								
½-pound flat	....	4,540	....	....	....	....	....	168,383
1-pound flat	....	6,692	....	....	....	....	....	161,171
1-pound tall	....	15,260	....	....	....	....	....	17,650
1-pound oval	....	....	....	....	....	....	....	1,807
Standard—								
½-pound flat	4,111	....	....	....	127	458	....	22,429
1-pound flat	3,735	....	....	....	22	630	492	14,819
1-pound tall	77,848	....	....	388	71	685	2,656	30,227
Total	85,694	26,492	....	388	220	1,773	3,148	416,486
Chinook, or king, white:								
½-pound flat	....	1,038	....	....	155	169	....	....
1-pound flat	....	....	....	26	88	777	....	....
1-pound tall	....	936	....	800	681	1,500	....	....
Total	....	1,974	....	826	924	2,446	....	....

Species, grades, and sizes.	Alaska.	Puget Sound.	Queets River.	Soleduck River.	Quinault River.	Grays Harbor.	Willapa Harbor.	Columbia River.
	Cases.	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*
Chum, or keta:								
½-pound flat		1,368						4,026
1-pound flat	317	1,878		12	8	37		9,278
1-pound tall	484,091	408,528		180	1,985	22,700	5,686	73,226
Total	484,408	411,774		192	1,993	22,737	5,686	86,530
Humpback, or pink:								
½-pound flat	4,321	26,919						
1-pound flat	3,508	11,680						
1-pound tall	1,862,544	545,050						
Total	1,870,373	583,649						
Sockeye, or red:								
2-pound nominals	1,529							
½-pound flat	53,965	55,411	344		19,532			4,709
1-pound flat	111,698	8,476	200		3,085			
1-pound tall	1,755,104	697	968		355			750
Total	1,922,296	64,584	1,512		22,972			5,459
Steelhead trout:								
½-pound flat								6,836
1-pound flat								8,935
1-pound tall								10,952
Total								26,723
Grand total	4,489,341	1,269,256	1,512	2,726	27,497	40,992	12,842	568,534

Species, grades, and sizes.	Nehalem River.	Tillamook Bay.	Nestugga River.	Siletz River.	Alsea Bay and River.	Siuslaw River.	Umpqua River.	Coos Bay and River.	Coquille River.
	Cases.	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*
Coho, or silver:									
½-pound flat	200		1,900	1,525	1,640	346	949	1,050	1,360
1-pound flat					213			2,000	
1-pound tall	1,400	4,949	2,100	1,000	1,600	1,409	3,039	450	3,765
Total	1,600	4,949	4,000	2,525	3,453	1,755	3,988	3,500	5,131
Chinook, or king, red:									
Standard—									
½-pound flat									1,795
1-pound flat	200	250	190	103	155		76		
1-pound tall	600	5,425		1,400	1,209		1,030		484
1-pound oval			1,481						
Total	800	5,675	1,671	1,503	1,364		1,106		2,279
Chum, or keta: 1-pound tall	500	10,599	460	650	50				5,131
Grand total	2,900	21,223	6,131	4,678	4,867	1,755	5,094	3,500	12,541

Species, grades, and sizes.	Rogue River.	Smith River.	Klamath River.	Sacramento River.	Monterey Bay.	British Columbia.	Total.
	Cases.	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*
Coho, or silver:							
½-pound flat		788				67,683	135,575
1-pound flat	515		2,500			15,521	59,990
1-pound tall		290				63,752	347,826
Total	515	1,078	2,500			146,956	543,391
Chinook, or king, red:							
Fancy—							
½-pound flat	1,643						174,566
1-pound flat	17,451						185,314
1-pound tall							32,910
1-pound oval							1,807
Standard—							
½-pound flat		1,295			750	35,310	66,275
1-pound flat			10,400	5,679	100	1,327	38,178
1-pound tall		660		500	100	14,492	137,775
½-pound oval						206	206
1-pound oval						399	1,880
Total	19,094	1,955	10,400	6,179	950	51,734	638,911
Chinook, or king, white:							
½-pound flat						289	1,651
1-pound flat						524	1,415
1-pound tall						5,557	9,474
Total						6,370	12,540
Chum, or keta:							
½-pound flat							5,394
1-pound flat						2,739	14,269
1-pound tall						79,261	1,093,047
Total						82,000	1,112,710
Humpback, or pink:							
½-pound flat						76,072	107,312
1-pound flat						26,290	41,478
1-pound tall						264,990	2,672,584
Total						367,352	2,821,374
Sockeye, or red:							
½-pound oval						3,737	3,737
1-pound oval						1,579	1,579
2-pound nominals							1,529
½-pound flat						335,705	469,666
1-pound flat						44,225	167,684
1-pound tall						90,796	1,848,670
Total						476,042	2,492,865
Steelhead trout:							
½-pound flat						978	7,814
1-pound flat						273	9,208
1-pound tall						1,676	12,628
Total						2,927	29,650
Grand total	19,609	3,033	12,900	6,179	950	1,133,381	7,651,441

X. STATISTICAL DATA FOR OTHER YEARS.

CANNING INDUSTRY OF PACIFIC COAST FROM 1864 TO 1915.

From the beginning of the canning of salmon on this coast it has been the most important branch of the industry, and the following table shows in condensed form the number of cases packed in each year on the Pacific coast of North America from the beginning of the industry in 1864 to 1915.

As British Columbia is a province of the Dominion of Canada it does not come strictly within the scope of this report, but in order to show the pack of canned salmon on the North American shores of the Pacific Ocean, which would be incomplete without that of the province, it has been included also.

PACK OF CANNED SALMON ON THE PACIFIC COAST, BY YEARS AND WATERS.

Years.	Puget Sound.	Coastal streams of Washington.	Grays Harbor.	Willapa Harbor.	Columbia River.	Coastal streams of Oregon.	Smith River, Cal.
	Cases.	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*
1866					4,000		
1867					18,000		
1868					28,000		
1869					100,000		
1870					150,000		
1871					200,000		
1872					250,000		
1873					250,000		
1874					350,000		
1875					375,000		
1876					450,000		
1877	5,500				380,000	7,801	
1878	238		5,420		460,000	16,634	4,277
1879	1,300				480,000	8,571	
1880	5,100				530,000	7,772	7,500
1881	8,500				550,000	12,320	
1882	7,900				541,300	19,186	
1883	1,500				629,400	16,156	
1884	5,500				620,000	12,376	5,500
1885	12,000				553,800	9,370	1,550
1886	17,000				448,500	49,147	
1887	22,000				356,000	73,996	
1888	21,975		37,000	22,500	372,477	92,863	2,347
1889	11,674				309,885	98,800	
1890	8,000				435,774	47,009	
1891	20,529		500	8,000	398,953	24,500	
1892	26,426		16,500	14,500	487,338	83,600	
1893	89,774		22,000	16,195	415,876	52,778	2,000
1894	95,400		21,400	15,100	490,100	54,815	2,000
1895	179,968		11,449	22,600	634,696	77,878	2,250
1896	195,664		21,274	24,941	481,697	87,360	
1897	494,026		13,300	29,600	552,721	60,158	
1898	400,200		12,100	21,420	487,944	75,679	
1899	919,611		24,240	21,314	332,774	82,041	
1900	469,450		30,800	26,300	358,772	12,237	
1901	1,380,590		41,500	34,000	390,183	58,618	
1902	581,659		31,500	39,492	317,143	44,236	
1903	478,488			5,890	339,577	54,861	
1904	291,488		27,559	26,400	395,104	98,874	
1905	1,018,641		22,050	14,950	397,273	89,055	
1906	430,602		22,000	14,440	394,898	107,332	
1907	698,080		14,000	13,382	324,171	79,712	
1908	448,765		14,000	20,457	253,341	52,478	
1909	1,632,949		19,787	12,024	274,087	58,169	
1910	567,883		51,130	14,508	391,415	103,617	
1911	1,551,028	18,431	75,941	25,497	543,331	138,152	
1912	416,125	19,914	47,287	28,148	285,666	84,074	
1913	2,583,463	13,124	19,895	12,050	266,479	38,492	
1914	817,354	21,459	32,434	16,837	454,621	106,617	3,006
1915	1,269,206	31,735	40,992	12,842	558,534	80,499	3,033
Total	17,185,556	104,663	676,0[illegible]	513,387	19,068,830	2,277,776	33,457

PACK OF CANNED SALMON ON THE PACIFIC COAST, BY YEARS AND WATERS—Con.

Years.	Klamath River, Cal.	Eel River, Cal.	Sacramento River.	Alaska.	British Columbia.	Total.
	Cases.	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*[a]
1864			2,000			2,000
1865			2,000			2,000
1866						4,000
1867						18,000
1868						28,000
1869						100,000
1870						150,000
1871						200,000
1872						250,000
1873						250,000
1874			2,500			352,500
1875			3,000			378,000
1876			10,000		7,247	467,247
1877		8,500	21,500		58,387	481,691
1878		10,500	34,017	8,159	89,946	629,191
1879			13,855	12,530	61,093	577,349
1880		6,250	62,000	6,539	61,849	687,010
1881			181,200	8,977	169,576	930,573
1882			200,000	21,745	240,461	1,030,592
1883		15,000	123,000	48,337	163,438	981,831
1884		8,200	81,450	64,886	123,706	907,918
1885		5,750	90,000	83,415	108,517	857,042
1886		12,500	39,300	142,065	152,964	848,976
1887			36,500	206,677	204,083	899,256
1888	4,400		68,075	412,115	184,040	1,217,792
1889			57,300	719,196	417,211	1,614,066
1890			25,065	682,591	411,257	1,609,696
1891			10,353	801,400	314,511	1,578,746
1892	1,017		2,281	474,717	248,721	1,354,083
1893	1,600		23,336	643,654	610,202	1,876,915
1894	1,700		28,463	686,440	492,232	1,887,150
1895	1,600		25,185	626,530	587,692	2,169,848
1896			13,387	966,707	617,782	2,408,812
1897			38,543	909,078	1,027,183	3,124,609
1898			29,731	965,097	492,551	2,484,722
1899	1,600		32,580	1,078,146	765,519	3,257,825
1900			39,304	1,548,139	606,540	3,091,542
1901			17,500	2,016,804	1,247,212	5,186,407
1902	2,500		14,043	2,536,824	627,161	4,194,558
1903			8,200	2,246,210	473,847	3,607,073
1904	3,400		14,407	1,953,756	465,894	3,276,882
1905			2,780	1,894,516	1,167,822	4,607,087
1906				2,219,044	629,460	3,817,776
1907				2,169,873	547,459	3,522,506
1908				2,606,973	566,303	3,962,317
1909	5,633			2,395,477	993,060	5,393,670
1910	8,016	6,000		2,413,054	760,830	4,316,453
1911	7,604	8,400	4,142	2,823,817	948,965	6,145,308
1912	18,000	11,000		4,054,641	996,576	5,961,431
1913	6,376		950	3,739,185	1,353,901	8,033,915
1914	11,000		17,315	4,056,653	1,111,039	6,648,325
1915	12,900		[b]7,129	4,489,016	1,133,381	7,639,267
Total	86,329	50,650	1,382,391	52,732,983	21,239,618	115,021,957

[a] Reduced to a common basis of forty-eight 1-pound cans to the case.
[b] Includes 950 cases packed at Monterey.

CANNING INDUSTRY, BY SPECIES AND WATERS.

The tables which follow show separately, by waters and as far as possible by species, the salmon canned on the Pacific coast from the beginning of the industry until 1915. It is only within recent years that the published statistics have shown the pack of the different species separately. In the early years of canning the chinook, or quinnat, salmon was used exclusively, the other species not being utilized until the chinook had begun to decrease in abundance, or a demand had arisen for a cheaper product. There is a very great difference in the selling value of the highest and lowest grades, and it is necessary to have complete statistical data now in order intelligently to comprehend the trend of the industry. While every effort has been made to make these tables complete, there are, unfortunately, some gaps which it was found impossible to fill. Such ellipses indicate that either the canneries did not operate or that no data were available for such periods.

Trade names of each species as known in each district, follow:

Districts.	1	2	3	4	5
Alaska	Red	King	Coho. Medium red. Silver.	Pink	Chum. Keta.
British Columbia	Sockeye	Spring	Coho	Humpback	Chum.
Puget Sound	do	Tyee, spring.	do	do	Do.
Columbia River	Blueback	Chinook	Silverside	None packed	Do.
Outside rivers	Quinault	Quinnat	do	do	Do.

Although there are only five species of salmon found on the Pacific coast, each bears several common names which are in general use in one or more of the many fishing districts.

PACK OF CANNED SALMON ON PUGET SOUND IN SPECIFIED YEARS.

Years.	Canneries operated.	Chinook.		Sockeye.		Medium red, or silver.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.
1877	1	....	....	....	....	5,000	....
1878	1	....	....	....	....	238	....
1879	1	....	....	....	....	1,300	$5,690
1880	1	....	....	....	....	....	....
1881	1	....	....	....	....	....	....
1882	1	....	....	....	....	....	....
1883	1	....	....	....	....	....	....
1884	1	....	....	....	....	....	....
1888	4	....	....	....	....	....	....
1889	2	240	$1,200	....	....	7,180	37,400
1890	1	1,000	5,000	....	....	3,000	15,000
1891	2	382	2,101	5,538	$24,921	5,869	19,368
1892	2	86	473	2,954	11,816	7,206	24,500
1893	3	1,200	6,480	47,852	103,371	11,812	59,000
1894	3	....	....	41,781	188,014	22,418	89,672
1895	7	1,542	7,325	65,143	273,108	50,865	154,218
1896	11	13,495	67,475	72,979	350,299	82,640	264,448
1897	12	9,500	39,045	312,048	1,248,192	91,900	282,133
1898	18	11,200	50,624	252,000	1,058,400	98,600	335,240
1899	19	24,364	103,180	499,646	2,368,334	111,387	418,176
1900	19	22,350	134,100	229,800	1,149,000	128,200	512,800
1901	....	....	....	1,220,000	....	....	....
1902	21	30,049	150,245	372,301	2,047,655	85,817	429,085
1903	22	14,500	72,500	167,211	1,003,260	103,450	413,800
1904	13	14,441	69,352	109,264	653,871	118,127	447,851
1905	24	1,804	9,922	825,453	4,952,718	79,335	337,174
1906	16	8,139	48,834	178,748	1,251,236	94,497	472,485
1907	14	1,814	16,326	93,122	698,416	119,472	476,288
1908	11	95,210	666,470	170,951	1,196,657	128,922	644,922
1909	24	13,019	72,604	1,097,904	6,183,300	143,133	630,446
1910	15	10,064	60,324	248,014	1,673,095	162,755	895,153
1911	21	21,823	172,582	127,769	1,168,145	256,123	1,711,178
1912	21	20,252	101,706	184,680	1,060,173	149,727	761,200
1913	32	1,234	5,247	1,673,099	10,871,178	61,019	235,372
1914	22	27,140	179,532	339,787	2,751,832	158,933	715,995
1915	40	28,466	145,555	64,584	676,769	180,783	902,335

PACK OF CANNED SALMON ON PUGET SOUND IN SPECIFIED YEARS—Continued.

Years.	Canneries operated.	Chum.		Pink.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.
1877	1	....	....	500	....	5,500	....
1878	1	....	....	....	....	238	....
1879	1	....	....	....	....	1 300	$5,690
1880	1	....	....	....	....	5,100	....
1881	1	....	....	....	....	8,500	....
1882	1	....	....	....	....	7,900	....
1883	1	....	....	....	....	1,500	....
1884	1	....	....	....	....	5,500	....
1885	....	....	....	....	....	12,000	....
1886	....	....	....	....	....	17,000	....
1887	....	....	....	....	....	22,000	....
1888	4	....	....	....	....	21,975	126,356
1889	2	1,145	$3,435	2,809	$7,584	11,674	49,619
1890	1	4,000	12,000	....	....	8,000	32,000
1891	2	3,093	10,825	5,647	15,246	20,529	72,461
1892	2	16,180	56,630	....	....	26,426	93,419
1893	3	11,380	31,295	17,530	47,331	89,774	247,537
1894	3	22,152	60,918	9,049	24,432	95,400	363,036
1895	7	38,785	94,741	23,633	62,556	179,968	591,948
1896	11	26,550	73,013	....	....	195,664	755,235
1897	12	23,310	64,103	57,268	171,804	494,026	1,805,277
1808	18	38,400	105,600	....	....	400,200	1,549,864
1899	19	31,481	86,427	252,733	734,241	919,611	3,710,358
1900	19	89,100	245,025	....	....	469,450	1,940,925
1901	....	....	....	....	....	1,380,590	....
1902	21	93,492	467,460	....	....	581,659	3,091,445
1903	22	12,001	30,002	181,326	407,981	478,488	1,927,546
1904	13	49,656	124,251	....	....	291,488	1,295,328
1905	24	41,057	102,643	70,992	212,976	1,018,641	5,615,433
1906	16	149,218	708,781	....	....	430,602	2,481,336
1907	14	50,219	150,847	433,423	1,300,269	698,080	2,642,140
1908	11	47,607	142,821	6,075	18,225	448,765	2,669,095
1909	24	53,688	128,916	370,993	902,312	1,632,949	7,917,608
1910	15	146,942	514,297	108	388	567,883	3,143,256
1911	21	98,321	391,123	1,016,992	4,302,344	1,551,028	7,745,372
1912	21	60,760	151,193	700	2,185	416,125	2,679,457
1913	32	56,225	124,970	791,886	2,092,401	2,583,463	13,329,168
1914	22	290,477	903,675	1,017	4,615	817,354	4,555,649
1915	40	411,724	1,155,474	583,649	1,795,285	1,269,206	4,675,418

PACK OF CANNED SALMON ON QUEETS RIVER IN SPECIFIED YEARS.

Years.	Canneries operated.	Chinook.		Sockeye.		Silverside.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.
1912	1	750	$4,500	200	$2,080	2,500	$11,500
1913	1	1,082	7,574	220	1,848	1,680	5,712
1914	1	1,175	5,875	200	2,134	1,800	6,966
1915	1	....	....	1,512	9,072	....	....

Years.	Canneries operated.	Chum.		Steelhead.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.
1912	1	1,000	$2,400	....	....	4,450	$20,480
1913	1	670	1,461	600	$3,300	4,252	19,895
1914	1	1,020	2,887	500	2,750	4,695	20,612
1915	1	....	....	....	....	1,512	9,072

Canned Salmon Pack on Soleduck River in Specified Years.

Years.	Canneries operated.	Chinook, or black.		Sockeye.		Silverside.		Pink.[a]		Chum.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.
1912	1	414	$2,484	15	$156	940	$4,324	103	$268	76	$182	1,548	$7,414
1913	1	206	1,442	...	...	1,040	3,536	...	...	28	61	1,274	5,039
1914	1	237	1,185	...	...	1,439	5,574	189	567	103	291	1,968	7,617
1915	1	388	1,940	...	...	1,320	6,072	826	2,478	192	538	2,726	11,028

[a] These are virtually all light-colored chinooks.

Pack of Canned Salmon on Quinault River in Specified Years.

Years.	Canneries operated.	Chinook.		Sockeye.		Silverside.		Chum.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.
1911 [a]	1	5,000	$35,000	2,031	$16,000	6,000	$42,000	5,400	$27,000	18,431	$120,000
1912	2	...	...	4,500	40,500	3,916	18,014	5,500	13,200	13,916	71,714
1913	1	...	...	[b] 22,397	188,135	7,106	24,160	...	...	7,598	212,295
1914	2	51	255	12,074	120,740	1,623	6,281	1,048	2,966	14,796	130,242
1915	2	1,144	6,864	22,972	239,989	1,388	6,807	1,993	5,580	27,497	259,240

[a] Previous to this date the fish were transported to the Aberdeen and Hoquiam canneries and prepared there.
[b] The greater portion of these were brought to Aberdeen and canned.

Pack of Canned Salmon on Grays Harbor in Specified Years.

Years.	Canneries operated.	Chinook.		Silverside.		Chum.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.
1878	1	...	...	...	...	...	...	5,420	$29,268
1879	1	...	...	...	...	...	...	...	...
1885	...	...	...	...	...	...	...	8,200	...
1886	...	...	...	...	...	...	...	18,700	...
1888	4	...	...	...	...	...	...	37,000	212,750
1891	1	...	...	500	$1,500	...	...	500	1,500
1892	1	4,500	$15,390	9,000	30,780	3,000	$9,415	16,500	55,585
1893	1	4,500	22,500	12,000	48,000	5,500	14,850	22,000	85,350
1894	1	12,300	61,500	4,100	16,400	5,000	13,500	21,400	91,400
1895	1	56	202	8,876	28,403	2,517	6,922	11,449	35,527
1896	2	7,816	36,806	9,278	29,689	4,180	11,495	21,274	57,090
1897	1	3,100	11,741	8,300	23,481	1,900	5,000	13,300	40,222
1898	2	5,100	23,052	4,800	16,320	2,200	6,050	12,100	45,422
1899	1	5,000	21,250	15,740	59,025	3,500	8,750	24,240	89,025
1900	2	6,700	33,500	12,900	51,600	11,200	30,800	30,800	115,900
1901	...	...	...	...	...	...	...	41,500	...
1902	1	4,000	20,000	10,000	45,000	17,500	70,000	31,500	135,000
1904	2	4,339	20,163	14,904	51,854	8,316	21,022	27,559	93,039
1905	2	2,050	9,225	13,000	52,000	7,000	18,200	22,050	79,425
1906	2	2,500	10,000	11,500	43,900	8,000	21,500	22,000	75,400
1907	1	1,000	7,000	9,500	47,500	3,500	11,500	14,000	66,000
1908	1	1,000	7,000	9,500	47,500	3,500	11,500	14,000	66,000
1909	1	5,721	20,819	9,019	38,146	5,047	11,608	[a] 19,787	70,573
1910	3	15,495	90,718	21,768	108,840	13,867	48,534	[b] 51,130	248,092
1911	4	15,773	110,411	28,991	202,937	[c] 31,177	155,885	75,941	469,233
1912	5	9,060	54,360	26,162	120,345	12,065	28,956	47,287	203,661
1913	4	1,253	8,771	5,723	19,458	12,919	28,163	19,895	56,392
1914	4	11,899	59,495	9,156	35,434	11,379	32,203	32,434	127,132
1915	4	4,219	20,089	14,036	61,707	22,737	63,678	40,992	145,474

[a] Also 1,649 cases, valued at $9,051, with sockeyes brought from Puget Sound.
[b] Also 4,350 cases of "Quinault," or sockeye, salmon.
[c] Includes 6,730 cases of humpbacks.

Pack of Canned Salmon on Willapa Harbor in Specified Years.

Years.	Canneries operated.	Chinook or black.		Silverside.		Chum.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.
1886	...	...	...	...	...	...	...	13,600	...
1887	4	...	...	...	...	...	...	...	...
1888	3	...	...	...	...	...	...	22,500	$129,375
1891	1	...	...	8,000	$24,000	...	...	8,000	24,000
1892	1	3,000	$10,260	9,000	30,780	2,500	$7,745	14,500	48,785
1893	1	1,700	9,180	7,895	31,580	6,600	18,150	16,195	58,910
1894	1	2,700	14,580	5,600	22,400	6,800	18,700	15,100	55,680
1895	2	4,636	23,180	13,047	41,150	4,917	13,222	22,600	77,552
1896	2	4,551	22,755	11,940	38,208	8,450	21,238	24,941	82,201
1897	1	8,100	33,291	14,600	44,822	6,900	18,975	29,600	97,088
1898	2	5,865	26,510	9,809	33,351	5,746	15,802	21,420	75,663
1899	3	5,650	25,425	10,675	40,031	4,989	13,720	21,314	79,176
1900	3	6,700	33,500	12,400	49,600	7,200	19,800	26,300	102,900
1901	...	...	...	...	...	...	...	34,000	...
1902	2	5,836	29,186	9,128	41,076	24,528	97,112	39,492	167,368
1903	1	2,390	13,800	2,390	10,755	1,200	3,300	5,890	27,855
1904	2	3,000	12,000	7,400	28,440	16,000	38,700	26,400	79,140
1905	2	4,650	20,925	4,300	17,200	6,000	15,000	14,950	53,125
1906	2	4,000	16,000	5,340	21,360	5,100	13,260	14,440	50,620
1907	2	3,530	15,354	9,228	36,682	624	2,496	13,382	54,532
1908	2	4,017	20,585	5,923	23,692	10,517	36,809	20,457	81,086
1909	1	1,455	5,869	4,822	17,359	5,747	13,163	12,024	36,391
1910	1	2,923	15,077	5,096	25,480	3,489	22,711	14,508	63,268
1911	2	5,717	40,019	9,298	65,086	10,482	52,410	25,497	157,515
1912	3	6,123	36,738	8,030	36,938	9,533	22,879	[a] 28,148	108,156
1913	2	67	469	3,111	10,577	8,872	19,368	12,050	30,414
1914	3	2,924	14,431	7,179	27,749	6,734	19,077	16,837	61,256
1915	2	3,148	19,380	4,008	18,437	5,686	15,921	12,842	53,738

[a] Includes 4,462 cases of humpbacks, valued at $11,601.

PACK OF CANNED SALMON ON THE COLUMBIA RIVER FROM THE INCEPTION OF THE INDUSTRY TO 1915.

Years.	Canneries operated.	Chinook.		Blueback.		Silverside.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.
1866	1	4,000	$64,000				
1867	1	18,000	288,000				
1868	2	28,000	392,000				
1869		100,000	1,350,000				
1870		150,000	1,800,000				
1871		200,000	2,100,000				
1872		250,000	2,325,000				
1873		250,000	2,250,000				
1874	13	350,000	2,625,000				
1875	13	375,000	2,250,000				
1876		450,000	2,475,000				
1877		380,000	2,052,000				
1878	30	460,000	2,300,000				
1879	30	480,000	2,640,000				
1880	29	530,000	2,650,000				
1881	35	550,000	2,475,000				
1882		541,300	2,600,000				
1883		629,400	3,147,000				
1884		629,400	2,915,000				
1885		553,800	2,500,000				
1886	39	448,500	2,135,000				
1887		356,000	2,124,000				
1888	28	372,477	2,327,981				
1889	21	266,697	1,600,182	17,797	$101,051		
1890	21	335,604	1,946,087	57,345	290,069		
1891	22	353,907	2,038,566	15,482	284,242		
1892	24	344,267	1,996,388	66,547	372,909	4,176	$20,880
1893	24	288,773	1,559,374	30,459	152,295	29,107	116,428
1894	24	351,106	1,895,976	43,814	224,430	42,758	171,032
1895	24	444,909	2,428,658	18,015	86,523	99,601	329,683
1896	24	370,943	1,840,511	16,983	81,518	44,108	141,145
1897	22	432,753	1,804,221	12,972	51,888	60,850	197,762
1898	23	320,566	1,490,394	66,670	300,015	65,431	222,465
1899	17	255,824	1,458,175	23,969	134,723	29,608	112,055
1900	16	262,392	1,821,258	13,162	92,184	44,925	202,163
1901							
1902	14	270,580	1,428,743	17,037	86,465	10,532	44,732
1903	16	301,762	1,610,614	8,383	42,867	12,181	49,869
1904	20	320,378	1,944,690	12,911	78,048	31,254	118,357
1905	19	327,106	1,962,636	7,768	46,608	26,826	114,011
1906	19	311,334	1,868,007	7,816	54,712	41,446	124,338
1907	19	258,433		5,504		31,757	
1908	14	210,096		8,581		31,432	
1909	15	162,131	1,203,546	[a] 27,908	214,561	42,178	185,070
1910	15	244,285	1,882,137	6,234	34,287	68,922	363,688
1911	15	405,862	2,204,185	5,988	47,904	79,416	549,478
1912	15	220,317	1,988,526	8,210	85,384	31,842	177,248
1913	15	192,116	1,664,670	11,152	93,677	40,969	175,412
1914	17	289,464	2,573,502	35,311	376,924	69,769	380,666
1915	19	406,486	3,694,361	5,459	56,707	33,336	173,234
Total							

[a] Of these, 2,846 cases, valued at $23,203, were packed with sockeyes brought from Puget Sound.

PACK OF CANNED SALMON ON THE COLUMBIA RIVER FROM THE INCEPTION OF THE INDUSTRY TO 1915—Continued.

Years.	Canneries operated.	Chum.		Steelhead trout.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.
1866	1					4,000	$64,000
1867	1					18,000	288,000
1868	2					28,000	392,000
1869						100,000	1,350,000
1870						150,000	1,800,000
1871						200,000	2,100,000
1872						250,000	2,325,000
1873						250,000	2,250,000
1874	13					850,000	2,625,000
1875	13					375,000	2,250,000
1876						450,000	2,475,000
1877						380,000	2,052,000
1878	30					460,000	2,300,000
1879	30					480,000	2,640,000
1880	29					530,000	2,650,000
1881	35					550,000	2,475,000
1882						541,300	2,600,000
1883						629,400	3,147,000
1884						629,400	2,915,000
1885						553,800	2,500,000
1886	39					448,500	2,135,000
1887						356,000	2,124,000
1888	28					372,477	2,234,862
1889	21			25,391	$108,587	309,885	1,809,820
1890	21			42,825	171,300	435,774	2,407,456
1891	22			29,564	118,156	398,953	2,440,964
1892	24			72,348	288,892	487,338	2,679,069
1893	24	2,311	$6,933	65,226	260,904	415,876	2,095,934
1894	24			52,422	209,688	490,100	2,501,126
1895	24	22,493	62,591	49,678	203,542	634,696	3,110,997
1896	24			49,663	198,652	481,697	2,261,826
1897	22			46,146	165,440	552,721	2,219,311
1898	23			26,277	60,352	487,944	2,073,226
1899	17	11,379	33,836	11,994	39,186	332,774	1,777,975
1900	16	17,696	63,706	20,597	102,985	358,772	2,282,296
1901						390,183	1,942,660
1902	14	10,401	41,604	8,593	42,965	317,143	1,644,509
1903	16	10,000	37,500	7,251	36,255	339,577	1,777,105
1904	20	20,693	52,691	9,868	48,892	395,104	2,242,678
1905	19	25,751	65,206	9,822	49,110	307,273	2,237,571
1906	19	27,802	69,505	6,500	32,500	394,898	2,149,062
1907	19	22,556		5,921		324,171	1,763,490
1908	14	16,884		10,726		253,341	1,380,708
1909	15	24,542	57,115	17,382	99,796	[a] 274,087	1,760,088
1910	15	66,538	232,883	5,436	31,203	391,415	2,544,198
1911	15	53,471	203,198	8,594	47,399	543,331	3,052,164
1912	15	18,699	46,590	6,958	22,108	285,666	2,319,856
1913	15	13,303	29,486	8,939	49,142	266,479	2,012,387
1914	17	49,285	305,541	10,792	59,356	454,621	3,695,989
1915	19	86,530	251,632	26,723	120,358	558,534	4,305,292
Total						19,068,830	110,178,619

[a] 55 cases of humpbacks, valued at $132, were also packed with humpbacks brought from Puget Sound.

Pack of Canned Salmon on the Nehalem River, Oreg., in Specified Years.

Years.	Canneries operated.	Chinook.		Silverside.		Chum.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.
1887	1							5,000	$30,000
1889								6,000	32,000
1890								9,000	45,500
1891	1							3,500	14,000
1892	1			10,000	$40,000			10,000	40,000
1893	1	1,692	$6,768	5,031	20,124			6,723	26,892
1894	1	1,627	6,508	4,866	19,464			6,493	25,972
1895	1	1,752	7,008	5,152	16,486			6,901	23,494
1896	1	2,828	8,484	5,218	15,654			8,016	24,138
1897	2	3,384	10,152	8,366	25,098			11,750	35,250
1898	1	3,808	9,891	5,700	19,380			9,508	29,271
1899	1	1,384	5,536	7,405	26,658	1,288	$3,864	10,077	36,058
1900	1								
1901	1	268	1,139	3,273	13,092	2,669	7,206	6,210	21,437
1902	1	271	1,431	3,169	13,468	2,570	10,280	6,010	25,179
1903	1	686	3,670	4,615	19,614			5,301	22,284
1904	1	500	2,500	5,000	20,000	6,000	12,000	11,500	34,500
1905	1	2,700	16,200	2,900	12,325	6,000	15,000	11,600	43,525
1906	1	3,987	23,922	4,976	14,928	2,057	5,143	11,020	42,993
1907	1	4,000	28,000	6,600	19,800	2,000	6,000	12,600	53,800
1908	1	5,000	35,000	6,100	18,300	2,016	6,048	13,116	59,348
1909	1	1,985	10,512	4,554	20,253	909	2,091	7,448	32,886
1910	1	3,500	24,500	5,400	29,700	1,500	4,500	10,400	58,700
1911	2	5,821	46,568	14,878	81,829	3,439	13,048	24,138	141,445
1912	2			13,331	73,321	1,571	3,927	14,902	77,248
1913	1	300	1,500	764	3,056	5	11	1,069	4,567
1914	2	4,841	32,887	11,800	63,720	1,668	4,170	18,309	101,777
1915	2	400	2,400	5,400	24,840	2,260	6,328	8,060	33,568

Pack of Canned Salmon on Tillamook Bay, Oreg., in Specified Years.

Years.	Canneries operated.	Chinook.		Silverside.		Chum.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.
1884								4,500	
1885								9,800	
1886	2							37,000	
1887	2							21,000	$115,500
1888	2							14,633	84,140
1889								9,500	52,250
1890								14,009	79,049
1891	1								
1892	1			18,000	$72,000			18,000	72,000
1893	1	497	$1,988	4,000	16,000	6,919	$17,297	11,416	35,285
1894	1	700	2,800	7,763	31,052	700	1,750	9,163	35,602
1895	1			6,514	20,845	7,001	19,253	13,515	40,098
1896	1	2,200	6,600	4,860	14,580			7,060	21,180
1897	1	2,000	6,000	9,000	27,000			11,000	33,000
1898	1	5,000	13,000	10,342	35,162			15,342	48,162
1899	1	2,180	8,720	3,889	14,036	5,121	15,363	11,190	38,119
1900	1								
1901	1	848	4,240	2,133	9,598	2,901	10,728	6,882	24,566
1902	1	215	1,135	2,287	9,720	4,093	16,372	6,595	27,227
1903	1			2,727	11,590	2,620	10,480	5,347	22,670
1904	1			4,400	17,600	6,500	13,000	10,900	30,600
1905	1	1,100	6,600	1,700	7,650	8,800	22,000	11,600	36,250
1906	1	1,870	11,220	2,364	7,092	1,270	2,175	5,504	21,487
1907	1	2,000	14,000	3,410	10,230	2,314	6,942	7,724	31,172
1908	1	2,300	16,100	6,000	21,000	4,000	12,000	12,300	49,100
1909	1	2,615	15,663	5,029	21,809	3,712	8,538	11,356	46,010
1910	1	2,900	20,300	4,500	24,750	2,000	6,000	9,400	51,050
1911	2	8,433	67,464	12,663	69,647	5,277	20,053	26,373	157,164
1912	2	3,811	26,677	6,418	32,090	4,550	11,375	14,779	70,142
1913	1	2,600	15,600	1,000	4,000	1,000	2,200	4,600	21,800
1914	2	4,734	33,138	4,131	22,307	6,707	16,867	15,572	72,312
1915	3	5,675	34,300	4,549	20,925	9,099	25,477	19,323	70,702

PACK OF CANNED SALMON ON NESTUCCA RIVER, OREG., IN SPECIFIED YEARS.

Years.	Canneries operated.	Chinook.		Silverside.		Chum.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.
1887	1	....	....	....	....	....	....	4,300	$23,650
1888	1	....	....	....	....	....	....	5,000	28,750
1889	....	....	....	....	....	....	....	6,700	36,850
1891	1	....	....	....	....	....	....	....	....
1899	1	1,109	$4,436	3,034	$10,922	513	$1,539	4,656	16,897
1900	1	....	....	....	....	....	....	....	....
1901	1	279	1,116	3,553	13,323	396	1,089	4,228	15,528
1905	1	3,000	18,000	1,000	4,250	400	1,000	4,400	23,250
1906	1	2,622	15,732	2,468	7,404	165	413	5,255	23,549
1907	1	2,100	14,700	3,540	10,620	150	450	5,790	25,770
1908	1	2,000	14,000	3,000	10,500	100	300	....	24,800
1910	1	2,000	14,000	3,300	18,150	140	420	5,440	32,570
1911	1	3,562	28,496	7,124	39,182	641	2,436	11,327	70,114
1912	1	3,000	18,540	6,180	30,900	708	1,770	9,978	51,210
1913	1	126	756	243	972	....	....	369	1,728
1914	1	3,542	24,794	5,730	30,942	265	662	9,537	56,308
1915	1	200	1,300	3,930	18,078	800	2,240	4,930	21,618

PACK OF CANNED SALMON ON SILETZ RIVER, OREG., IN SPECIFIED YEARS.

Years.	Canneries operated.	Chinook.		Silverside.		Chum.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.
1896	1	2,500	$7,500	1,900	$5,700	....	....	4,400	$13,200
1897	1	3,510	10,530	5,015	15,045	....	....	8,525	25,575
1898	1	3,200	8,360	4,330	14,722	....	....	7,530	23,082
1899	1	2,200	9,900	2,319	8,696	200	$550	4,719	19,146
1900	1	....	....	....	....	....	....	....	....
1901	1	876	4,380	3,740	16,830	360	1,260	4,976	22,470
1902	1	600	3,168	1,917	8,147	500	2,000	3,017	13,315
1904	1	1,000	5,000	3,300	13,200	1,000	2,000	5,300	20,200
1905	1	1,500	9,000	1,700	7,225	900	2,250	4,100	18,475
1906	1	2,635	15,810	3,192	9,576	167	418	5,994	25,804
1907	1	2,333	16,331	4,300	12,900	200	600	6,833	29,831
1908	1	2,100	14,700	4,700	16,450	300	900	7,100	32,050
1910	1	2,200	15,400	4,600	25,300	250	750	7,050	41,450
1911	1	3,584	25,672	7,164	39,402	237	901	10,985	68,975
1912	1	3,277	19,662	6,554	32,770	283	707	10,114	53,139
1913	1	15	75	354	1,416	17	37	386	1,528
1914	1	3,356	23,492	6,712	36,245	196	490	10,264	60,227
1915	1	100	600	3,000	13,800	100	280	3,200	14,680

PACK OF CANNED SALMON ON YAQUINA BAY AND RIVER, OREG., IN SPECIFIED YEARS.[a]

Years.	Canneries operated.	Chinook.		Silverside.		Chum.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.
1887	2	....	....	....	....	....	....	....	....
1888	3	....	....	....	....	....	....	5,088	$29,256
1889	....	....	....	....	....	....	....	5,000	27,500
1891	1	....	....	....	....	....	....	....	....
1896	1	1,714	$5,142	615	$1,845	....	....	2,329	6,987
1898	1	170	442	1,530	5,202	....	....	1,700	5,644
1899	2	316	1,422	3,234	12,127	1,300	$3,575	4,850	17,124
1900	1	....	....	....	....	....	....	....	....
1901	1	96	480	2,848	12,816	549	1,647	3,493	14,943
1903	1	....	....	1,238	5,262	315	787	1,553	6,049
1904	1	50	200	2,600	8,840	450	1,080	3,100	10,120
1905	1	200	1,200	2,050	8,613	62	155	2,312	9,968
1906	1	500	3,000	3,100	9,300	60	150	3,660	12,450
1907	1	834	5,838	1,000	3,000	49	147	1,883	8,985
1908	1	....	....	4,000	14,000	....	....	4,000	14,000
1909	1	....	....	1,139	4,556	33	76	1,172	4,632
1910	1	....	....	2,669	13,345	....	....	2,669	13,345
1911	1	....	....	1,009	5,549	51	289	1,060	5,838

[a] Cannery not operated from 1912 to 1915, both years inclusive.

PACK OF CANNED SALMON ON ALSEA RIVER AND BAY, OREG., IN SPECIFIED YEARS.

Years.	Canneries operated.	Chinook.		Silverside.		Chum.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.
1886	1								
1887	2							11,180	$64,285
1888	3							9,620	55,315
1889								10,000	55,000
1891	1								
1892	1			3,600	$14,400			3,600	14,400
1893	1	1,260	$6,300	3,240	12,960			4,500	19,260
1894	1	440	2,200	4,160	16,640			4,600	18,840
1895	1	1,700	6,375	3,280	11,808			4,980	18,183
1896	1	3,500	10,500	3,400	10,200			6,900	20,700
1897	1	1,800	5,400	3,200	9,600			5,000	15,000
1898	1	4,296	11,170	2,170	7,378			6,466	18,548
1899	1	2,150	9,138	5,010	19,038			7,160	28,176
1900	1								
1901	1	695	3,475	4,629	18,790	891	$3,118	6,215	25,383
1902	1	701	3,702	4,530	19,253	670	2,680	5,901	25,635
1903	1	1,031	5,516	4,242	18,029	44	88	5,317	23,633
1904	1	1,000	5,000	6,500	26,000	300	600	7,800	31,600
1905	1	2,500	15,000	1,800	7,650	700	1,750	5,000	24,400
1906	1	3,702	22,212	3,843	11,529			7,545	33,741
1907	1	800	5,600	5,100	15,300	350	1,050	6,250	21,950
1908	1	1,200	8,400	6,000	21,000	400	1,200	7,600	30,600
1909	1	1,119	6,714	5,486	24,027	80	184	6,685	30,925
1910	1	2,500	17,500	5,900	31,950	100	300	8,500	49,750
1911	2	4,161	33,288	9,329	51,309	688	2,614	14,178	87,211
1912	2	3,731	22,386	8,286	41,430	524	1,310	12,541	65,126
1913	2	1,607	8,035	4,304	17,216	160	352	6,071	25,603
1914	2	4,546	31,822	6,728	36,331	73	183	11,347	68,336
1915	2	1,668	10,763	6,966	32,044	178	498	8,812	43,305

PACK OF CANNED SALMON ON THE SIUSLAW RIVER, OREG., IN SPECIFIED YEARS.

Years.	Canneries operated.	Chinook.		Silverside.		Chum.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.
1878	2							10,300	$55,620
1879	2								
1886	1							1,500	
1888	1							11,960	68,770
1889	1							12,000	66,000
1891	2								
1892	2			18,000	$72,000			18,000	72,000
1893	2	1,471	$7,355	11,830	47,320			13,301	54,675
1894	2	1,871	9,355	14,987	59,948			16,858	69,303
1895	2	1,637	6,139	10,465	35,274			12,102	41,413
1896	1	2,700	8,100	9,000	27,000			11,700	35,100
1897	1	1,100	3,300	3,900	11,700			5,000	15,000
1898	1	850	2,210	10,000	34,000			10,850	36,210
1899	1	1,162	4,648	7,323	26,363	115	$345	8,600	31,356
1900	2								
1901	1	1,735	8,675	7,488	29,952			9,223	38,627
1902	1	1,288	6,800	4,320	18,260			5,608	25,060
1903	1	1,519	8,127	6,842	29,079			8,361	37,206
1904	1	500	2,500	6,500	26,000			7,000	28,500
1905	1								
1906	2	4,500	27,000	15,000	45,000	1,500	3,750	21,000	75,750
1907	1			15,773	47,319			15,773	47,319
1908	1			8,600	30,100			8,600	30,100
1909	2	632	3,792	7,436	32,956			8,068	36,748
1910	2	856	5,992	12,800	70,400	8,502	25,506	22,158	101,898
1911	2	1,120	8,960	10,266	56,463	5,000	19,000	16,392	84,423
1912	2			6,108	30,540			6,108	30,540
1913	[a] 1			4,281	17,124			4,281	17,124
1914	1			9,266	50,036			9,266	50,036
1915	1			1,755	8,073			1,755	8,073

[a] The two canneries combined and operated one plant.

PACK OF CANNED SALMON ON THE UMPQUA RIVER, OREG., IN SPECIFIED YEARS.

Years.	Canneries operated.	Chinook.		Silverside.		Chum.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.
1878	2	...	...	...	...	...	...	8,100	$43,740
1879	2	...	...	...	...	...	...	...	...
1884	2	...	...	...	...	...	...	3,700	...
1885	1	...	...	...	...	...	...	10,500	...
1886	1	...	...	...	...	...	...	18,600	...
1887	1	...	...	...	...	...	...	4,000	22,000
1888	1	...	...	...	...	...	...	9,000	51,750
1889	1	...	...	...	...	...	...	12,000	66,000
1891	1	...	...	...	...	...	...	...	...
1892	1	...	...	10,000	$40,000	...	...	10,000	40,000
1893	1	809	$4,045	3,204	12,816	...	...	4,013	16,861
1894	1	235	1,175	6,875	27,500	...	...	7,110	28,675
1895	1	992	3,720	7,697	28,863	...	...	8,689	32,583
1896	1	1,300	3,900	8,000	24,000	...	...	9,300	27,900
1899	2	925	3,860	7,576	27,006	115	$345	8,616	31,211
1900	2	...	...	...	...	...	...	...	...
1903	1	23	123	6,733	28,615	...	...	6,756	28,738
1904	1	500	2,500	9,500	38,000	500	1,000	10,500	41,500
1905	1	6,100	36,600	10,500	44,625	...	...	16,600	81,225
1906	1	1,143	6,858	5,613	16,839	...	...	6,756	23,697
1909	1	500	3,000	7,753	31,012	...	...	8,253	34,012
1910	1	2,000	14,000	11,000	60,500	...	...	13,000	74,500
1911	1	300	2,400	6,118	33,649	...	...	6,418	36,049
1912	1	30	210	3,759	18,795	...	...	3,789	19,005
1913	1	...	...	398	1,990	...	...	398	1,990
1914	1	1,000	8,000	2,000	10,000	...	...	3,000	18,000
1915	2	...	...	5,100	23,460	...	...	5,100	23,460

PACK OF CANNED SALMON ON COOS BAY AND RIVER, OREG., IN SPECIFIED YEARS.

Years.	Canneries operated.	Chinook.		Silverside.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.
1887	2	...	...	...	...	11,300	$62,150
1888	1	...	...	...	...	5,500	31,625
1889	1	...	...	...	...	7,000	38,500
1891	2	...	...	...	...	...	...
1893	1	...	...	3,125	$12,500	3,125	12,500
1894	1	163	$815	8,428	33,712	8,591	34,527
1895	1	5,110	19,163	2,332	8,934	7,442	28,097
1896	1	13,000	39,000	2,000	6,000	15,000	45,000
1897	1	6,200	18,600	2,200	6,600	8,400	25,200
1898	2	3,142	8,169	7,180	24,412	10,322	32,581
1899	2	1,273	5,092	5,174	18,626	6,447	23,718
1900	2	...	...	...	...	...	...
1901	1	1,215	6,075	4,082	16,328	5,297	22,403
1902	1	412	2,175	2,640	11,220	3,052	13,395
1904	1	2,033	7,725	7,200	24,480	9,233	32,205
1906	1	2,043	12,258	1,755	5,265	3,798	17,523
1909	1	275	1,475	3,959	17,927	4,234	19,402
1910	1	500	3,500	5,500	30,250	6,000	33,750
1911	2	2,630	21,040	7,260	39,930	9,890	60,970
1912	2	1,457	10,199	3,989	19,945	5,446	30,144
1913	2	...	...	7,383	29,532	7,383	29,532
1914	1	...	...	9,300	50,220	9,300	50,220
1915	1	...	...	3,500	16,100	3,500	16,100

PACK OF CANNED SALMON ON THE COQUILLE RIVER, OREG., IN SPECIFIED YEARS.

Years.	Canneries operated.	Chinook.		Silverside.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.
1883	1					7,000	
1884	1					7,300	
1885	1					3,800	
1886	2					8,300	
1887	3						
1888	2					11,000	$63,250
1889						8,600	47,300
1891	1						
1892	1			5,000	$20,000	5,000	20,000
1893	1			6,500	26,000	6,500	26,000
1894	a 1			2,000	8,000	2,000	8,000
1895	2	760	$2,887	8,724	32,615	9,484	35,502
1896	2	1,225	3,675	7,800	23,400	9,025	27,075
1898	2	541	1,407	7,485	25,499	8,026	26,906
1899	2	950	3,800	7,550	28,500	8,500	32,300
1900	1	2,636	13,180	9,601	38,404	12,237	51,584
1901	1	133	665	5,096	20,384	5,229	21,049
1902	1	286	1,510	5,877	24,927	6,163	26,437
1903	1	331	1,771	8,685	36,911	9,016	38,682
1904	2	600	2,400	13,686	54,744	14,286	57,144
1905	2	2,100	12,600	11,343	48,208	13,443	60,808
1906	2	821	4,926	17,979	53,937	18,800	58,863
1907	2	306	2,142	13,220	39,660	13,526	41,802
1908	2			19,174	67,109	19,174	67,109
1909	2	250	1,255	9,818	42,687	10,068	43,942
1910	2	420	2,940	16,637	91,504	17,057	94,444
1911	2	715	5,720	16,676	91,718	17,391	97,438
1912	2	377	2,639	6,040	30,200	6,417	32,839
1913	2			8,910	35,640	8,910	35,640
1914	2			12,097	65,324	12,097	65,324
1915	2	1,079	6,474	5,131	25,515	6,210	31,989

a Burned.

PACK OF CANNED SALMON ON ROGUE RIVER, OREG., IN SPECIFIED YEARS.[a]

Years.	Canneries operated.	Chinook.		Silverside.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.
1877	1					7,804	
1878	1					8,534	
1879	1					8,571	
1880	1					7,772	
1881	1					12,320	
1882	1					19,186	
1883	1					16,156	
1884	1					12,376	
1885	1					9,310	
1886	1					12,147	
1887	1					17,216	
1888	1					21,062	$121,107
1889	1					22,000	132,000
1890	1					24,000	120,000
1891	1					21,000	105,000
1892	1	10,000	$59,000	9,000	$36,000	19,000	95,000
1893	b 1	3,200	16,000			3,200	16,000
1895	1	10,377	41,508	4,385	15,347	14,762	56,855
1896	1	15,000	75,000	3,000	9,000	18,000	84,000
1897	1	15,355	61,420	3,653	10,959	19,008	72,379
1898	1	12,964	51,550	501	1,303	13,465	52,853
1899	1	5,481	30,145	1,745	6,980	7,226	37,125
1900	1						
1901	1	2,681	13,405	4,184	17,736	6,865	31,141
1902	1	3,799	20,058	4,091	17,387	7,890	37,445
1903	1	8,418	45,036	4,792	20,366	13,210	65,402
1904	1	16,000	64,000	3,255	11,392	19,255	75,392
1905	1	18,500	111,000	1,500	6,375	20,000	117,375
1906	1	12,000	72,000	6,000	18,000	18,000	90,000
1907	1	7,537	56,528	1,796	8,980	9,333	65,508
1908	1	4,354	32,655	2,650	13,250	6,004	45,905
1909	1	186	1,300	699	2,977	885	4,277
1910	1	232	1,786	2,711	16,266	1,943	18,052
1913	1	3,020	27,160	2,403	11,857	5,423	39,017
1914	1	6,938	62,060	987	5,453	7,925	67,513
1915	2	19,094	135,301	515	2,369	19,609	137,670

a Shut down in 1911 and 1912 through the closing of the river to all fishing.
b Burned down during season. Not opened the next year.

PACK OF CANNED SALMON ON SMITH RIVER, CAL., IN SPECIFIED YEARS.

Years.	Canneries operated.	Quinnat.		Silverside.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.
1878	1	4,277	$23,096			4,277	$23,096
1880	1	7,500	41,250			7,500	41,250
1884	1	5,500	33,000			5,500	33,000
1885	1	1,550	9,300			1,550	9,300
1888	1	2,347	14,082			2,347	14,082
1893	1	1,500	7,500	500	$1,500	2,000	9,000
1894	1	1,500	7,500	500	1,500	2,000	9,000
1895	1	2,250	9,990			2,250	9,990
1914	1			3,000	18,000	3,000	18,000
1915	1	1,955	13,685	1,078	6,220	3,033	19,905

PACK OF CANNED SALMON ON KLAMATH RIVER, CAL., IN SPECIFIED YEARS.

Years.	Canneries operated.	Quinnat.		Silverside.		Total.	
		Cases.	Value.	Cases.	Value.	Cases.	Value.
1888	1	4,400	$26,400			4,400	$26,400
1892	1	1,047	4,188			1,047	4,188
1893	1	1,600	6,400			1,600	6,400
1894	1	1,700	6,800			1,700	6,800
1895	1	1,200	5,321	400	$1,500	1,600	6,821
1899	1	1,600	8,800			1,600	8,800
1902	1	2,500	13,500			2,500	13,500
1904	1	3,400	20,800			3,400	20,800
1909	1	5,633	33,000			5,633	33,000
1910	1	8,016	52,000			8,016	52,000
1911	1	7,400	46,000	204	816	7,604	48,816
1912	2	18,000	117,000			18,000	117,000
1913	2	6,376	40,500			6,376	40,500
1914	1	7,500	48,500	3,500	14,000	11,000	62,500
1915	1	10,400	72,800	2,500	13,000	12,900	85,800

PACK OF CANNED SALMON ON EEL RIVER, CAL., IN SPECIFIED YEARS.[a]

Years.	Canneries operated.	Quinnat.		Years.	Canneries operated.	Quinnat.	
		Cases.	Value.			Cases.	Value.
1877	1	8,500	$51,000	1885	1	5,750	
1878	1	10,500	56,700	1886	1	12,500	$75,000
1880	1	6,250		1910	1	6,000	42,000
1883	1	15,000		1911	1	8,400	52,500
1884	1	8,200		1912	1	11,000	71,500

[a] Shut down in 1913, 1914, and 1915.

Pack of Canned Salmon on the Sacramento River in Specified Years.

Years.	Canneries operated.	Quinnat. Cases.	Quinnat. Value.	Years.	Canneries operated.	Quinnat. Cases.	Quinnat. Value.
1864	1	2,000	....	1891	....	10,353	....
1865	1	2,000	....	1892	....	2,281	....
1874	....	2,500	....	1893	3	23,336	....
1875	....	3,000	....	1894	2	28,463	....
1876	2	10,000	....	1895	3	25,185	$111,821
1877	....	21,500	....	1896	....	13,387	....
1878	6	34,017	$183,692	1897	....	38,543	....
1879	4	13,855	59,577	1898	....	29,731	....
1880	9	62,000	....	1899	....	32,580	150,688
1881	....	181,200	....	1900	....	39,304	....
1882	19	200,000	....	1901	....	17,500	....
1883	21	123,000	....	1902	....	14,043	....
1884	....	81,450	....	1903	....	8,200	....
1885	6	90,000	....	1904	2	14,407	66,936
1886	9	39,300	....	1905	1	2,780	....
1887	....	36,500	....	1911	1	4,142	28,994
1888	6	68,075	423,750	1913	1	950	6,650
1889	3	57,300	....	1914	2	17,315	95,232
1890	....	25,065	....	1915 [a]	2	6,179	42,753

[a] In 1915 a cannery at Monterey packed 950 cases of chinook salmon, valued at $7,300, which has been included.

Pack of Canned Salmon in Alaska, by Districts, from the Inception of the Industry.

Years.	Southeast Alaska. Canneries operated.	Southeast Alaska. Pack.	Central Alaska. Canneries operated.	Central Alaska. Pack.	Western Alaska. Canneries operated.	Western Alaska. Pack.	Total. Canneries operated.	Total. Pack.
		Cases.		Cases.		Cases.		Cases.
1878	2	8,159	....	....	....	....	2	8,159
1879	2	12,530	....	....	....	....	2	12,530
1880	1	6,539	....	....	....	....	1	6,539
1881	1	8,977	....	....	....	....	1	8,977
1882	1	11,501	2	10,244	....	....	3	21,745
1883	4	20,040	2	28,297	....	....	6	48,337
1884	4	22,189	2	42,297	1	[a] 400	7	64,886
1885	3	16,728	2	52,687	1	14,000	6	83,415
1886	4	18,660	2	74,583	3	48,822	9	142,065
1887	5	31,462	2	102,515	3	72,700	10	206,677
1888	6	81,128	6	241,101	4	89,886	16	412,115
1889	12	141,760	21	461,451	4	115,985	37	719,196
1890	12	142,901	19	421,300	4	118,390	35	682,591
1891	11	156,615	14	511,367	5	133,418	30	801,400
1892	7	115,722	6	295,496	2	63,499	15	474,717
1893	8	136,053	11	399,815	3	107,786	22	643,654
1894	7	142,544	10	435,052	4	108,844	21	686,440
1895	7	148,476	10	327,919	6	150,135	23	626,530
1896	9	262,381	12	485,990	8	218,336	29	966,707
1897	9	271,867	13	382,899	7	254,312	29	909,078
1898	9	251,385	14	395,009	7	318,703	30	965,097
1899	9	310,219	14	356,095	9	411,832	32	1,078,146
1900	16	456,639	14	492,223	12	599,277	42	1,548,139
1901	21	735,449	13	562,142	21	719,213	55	2,016,804
1902	26	906,676	12	583,690	26	1,046,458	64	2,536,824
1903	21	642,305	12	417,175	27	1,186,730	60	2,246,210
1904	12	569,003	11	499,485	32	885,268	55	1,953,756
1905	13	433,607	9	371,755	25	1,089,154	47	1,894,516
1906	20	767,285	8	473,024	19	978,735	47	2,219,044
1907	22	887,503	8	522,836	18	759,534	48	2,169,873
1908	23	1,011,648	8	425,721	19	1,169,604	50	2,606,973
1909	19	852,870	8	391,054	18	1,151,553	45	2,395,477
1910	23	1,066,399	10	432,517	19	914,138	52	2,413,054
1911	32	1,580,868	11	499,743	21	743,206	64	2,823,817
1912	51	2,033,648	14	625,062	22	1,395,931	87	4,054,641
1913	42	1,782,898	14	447,249	23	1,509,038	79	3,739,185
1914	44	1,776,075	14	658,791	23	1,621,787	81	4,056,653
1915	46	2,540,111	17	632,734	24	1,316,171	87	4,489,016
Total	....	29,360,820	....	13,059,318	....	19,312,845	....	52,732,983

[a] Experimental pack.

PACK OF CANNED SALMON IN ALASKA FROM 1898 TO 1915, BY SPECIES.

Years.	Coho, or silver.		Chum, or keta.		Humpback, or pink.	
	Cases.	Value.	Cases.	Value.	Cases.	Value.
1898	54,711	....	5,184	....	109,399	....
1899	39,402	....	1,931	....	149,159	....
1900	50,984	....	30,012	....	232,022	....
1901	65,509	....	47,464	....	541,427	....
1902	82,723	....	159,849	....	549,602	....
1903	120,506	....	35,052	....	355,799	....
1904	85,741	....	21,178	....	299,333	....
1905	67,394	$215,875	41,972	$113,056	168,597	$498,194
1906	109,141	382,109	254,812	730,235	348,297	1,046,951
1907	85,190	337,384	184,173	547,757	561,973	1,799,280
1908	68,827	274,089	218,513	554,197	644,132	1,733,379
1909	56,556	231,029	120,712	274,110	464,873	1,114,839
1910	114,026	559,666	254,218	773,409	554,322	1,764,056
1911	133,908	762,647	323,795	1,199,563	1,005,278	3,972,706
1912	166,198	741,377	664,633	1,584,130	1,280,138	3,296,598
1913	75,779	261,654	290,918	643,948	1,372,881	3,550,587
1914	157,063	690,086	663,859	2,240,765	986,049	3,459,116
1915	126,570	588,903	484,408	1,356,469	1,870,373	5,019,436

Years.	King, or spring.		Red, or sockeye.		Total.	
	Cases.	Value.	Cases.	Value.	Cases.	Value.
1898	12,862	....	782,941	....	965,097	....
1899	23,400	....	864,254	....	1,078,146	....
1900	37,715	....	1,197,406	....	1,548,139	....
1901	43,069	....	1,319,335	....	2,016,804	....
1902	59,104	....	1,685,546	....	2,536,824	....
1903	47,609	....	1,687,244	....	2,246,210	....
1904	41,956	....	1,505,548	....	1,953,756	....
1905	42,125	$141,999	1,574,428	$5,335,547	1,894,516	$6,304,671
1906	30,834	116,222	1,475,961	5,620,875	2,219,044	7,896,392
1907	43,424	181,718	1,295,113	5,915,227	2,169,873	8,781,366
1908	23,730	99,867	1,651,770	7,524,251	2,606,973	10,185,783
1909	48,034	207,624	1,705,302	7,610,550	2,395,477	9,438,152
1910	40,221	214,802	1,450,207	7,774,390	2,413,054	11,086,322
1911	45,518	295,088	1,315,318	8,363,233	2,823,817	14,593,237
1912	43,317	243,331	1,900,355	10,426,481	4,054,641	16,291,927
1913	34,370	139,053	1,965,237	8,936,362	3,730,185	13,531,604
1914	48,039	241,105	2,201,643	12,289,517	4,056,653	18,920,589
1915	85,694	458,000	1,921,971	11,907,202	4,489,016	19,930,010

PACK OF CANNED SALMON IN BRITISH COLUMBIA SINCE THE INCEPTION OF THE INDUSTRY, BY WATERS.

Years.	Canneries operated.	Fraser River.	Skeena River.	Rivers Inlet.	Nass River.	Outlying districts.	Total.
		Cases.	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*
1876	2	7,247	....	....	....	....	7,247
1877	5	55,387	3,000	....	....	....	58,387
1878	8	81,446	8,500	....	....	....	89,946
1879	9	50,490	10,603	....	....	....	61,093
1880	9	42,155	19,694	....	....	....	61,849
1881	11	142,516	21,560	....	....	5,500	169,576
1882	16	199,204	24,522	5,635	6,500	4,600	240,461
1883	20	105,701	31,157	10,780	9,400	6,400	163,438
1884	14	34,037	53,786	20,383	8,500	7,000	123,706
1885	9	89,617	12,900	....	....	6,000	108,517
1886	16	99,177	37,587	15,000	....	1,200	152,964
1887	20	130,088	58,592	11,203	....	4,200	204,083
1888	21	76,616	70,106	20,000	12,318	5,000	184,040
1889	28	310,122	58,405	21,722	19,800	7,162	417,211
1890	33	244,352	91,645	33,500	24,700	17,060	411,257
1891	38	177,989	77,057	36,500	11,058	11,907	314,511
1892	36	98,491	90,750	14,955	26,100	18,425	248,721
1893	44	474,237	59,021	35,416	15,680	25,848	610,202
1894	42	363,566	61,005	40,161	20,000	7,500	492,232
1895	49	432,920	69,356	58,575	20,541	6,300	587,692
1896	56	375,344	97,863	107,473	14,649	22,453	617,782
1897	65	879,776	61,310	40,090	20,000	26,007	1,027,183
1898	67	264,225	80,102	105,362	20,000	22,862	492,551
1899	68	527,396	112,562	76,428	19,442	29,691	765,519
1900	69	331,371	135,424	74,196	20,200	45,349	606,540
1901	78	998,913	125,845	66,794	15,004	40,656	1,247,212
1902	69	327,197	155,936	70,298	23,212	50,518	627,161
1903	61	237,162	98,688	69,389	18,094	50,514	473,847
1904	51	128,903	154,869	94,292	29,587	57,243	465,894
1905	64	846,998	114,085	83,122	32,725	90,892	1,167,822
1906	59	226,744	162,420	122,878	32,534	84,854	629,460
1907	42	163,116	159,255	94,064	31,832	99,192	547,459
1908	50	89,184	209,177	75,090	46,908	145,944	566,303
1909	86	567,230	142,740	91,014	40,990	151,086	993,060
1910	53	223,148	222,035	129,398	39,720	147,900	762,201
1911	69	301,344	254,410	101,066	65,684	226,461	948,965
1912	60	173,921	254,258	71,162	137,697	359,538	996,576
1913	81	732,059	164,055	53,423	68,096	336,268	1,353,901
1914	56	328,390	237,634	109,052	94,890	341,073	1,111,039
1915	61	289,199	279,161	146,838	104,289	313,894	1,133,381
Total	....	11,227,008	4,081,075	2,105,259	1,050,150	2,777,507	21,240,999

PACK, BY SPECIES AND DISTRICTS, OF CANNED SALMON IN BRITISH COLUMBIA FROM 1903 [a] TO 1915.

Districts and species.	1903	1904	1905	1906	1907	1908	1909
	Cases.	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*
Fraser River district:							
Chums	....	1,066	....	....	....	....	....
Cohos	25,728	45,667	30,836	34,413	35,766	24,198	21,540
Pinks	4,504	....	3,304	15,543	63,530	415	1,987
Sockeyes	204,809	72,688	837,489	183,007	59,815	63,126	542,248
Springs, red	2,084	9,482	5,507	6,503	3,448	1,427	1,428
Springs, white	....	....	....	1,020	557	18	....
Total	237,125	128,903	877,136	240,486	163,116	89,184	567,203
Skeena River district:							
Chums	....	35,329	....	....	....	....	....
Cohos	9,648	5,515	7,247	16,897	15,247	10,085	12,249
Pinks	20,045	....	7,523	38,991	25,217	45,404	28,120
Sockeyes	50,968	93,404	84,717	86,394	108,413	139,846	87,901
Springs, red	18,008	20,621	14,598	20,138	10,378	13,374	11,727
Springs, white	....	....	....	....	....	468	742
Total	98,669	154,869	114,085	162,420	159,255	209,177	140,739
Rivers Inlet district:							
Chums	....	61	....	....	....	....	....
Cohos	219	358	....	66	5,040	9,505	1,400
Pinks	180	....	....	....	700	479	....
Sockeyes	68,119	93,862	82,771	122,631	87,874	64,652	89,027
Springs, red	872	11	351	181	450	454	587
Total	69,390	94,292	83,122	122,878	94,064	75,090	91,014
Nass River district:							
Chums	....	31	....	....	....	....	....
Cohos	2,187	1,697	3,083	5,997	6,093	8,348	6,818
Pinks	....	....	1,840	3,450	5,957	6,612	3,589
Sockeyes	8,438	15,000	24,462	22,166	17,813	27,584	28,246
Springs, red	1,475	2,357	3,340	858	1,288	3,263	2,280
Springs, white	....	....	....	....	....	....	57
Steelheads	....	....	....	63	681	1,101	....
Total	12,100	19,085	32,725	32,534	31,832	46,908	40,990
Outlying districts:							
Chums	....	1,155	....	....	....	....	....
Cohos	14,136	13,114	3,292	11,759	25,754	29,781	19,911
Pinks	2,653	....	1,303	10,321	23,300	23,538	12,848
Sockeyes	36,383	48,272	51,234	45,481	40,150	59,815	98,019
Springs, red	3,218	6,204	4,563	3,581	7,595	6,915	2,196
Springs, white	....	....	....	....	2,382	2,245	....
Steelheads	....	....	....	....	2	36	....
Total	56,390	68,745	60,392	71,142	99,192	122,330	127,974
TOTAL BY SPECIES.							
Chums	....	37,642	....	....	....	....	....
Cohos	51,918	66,351	44,458	69,132	87,900	81,917	61,918
Pinks	27,382	....	13,970	[b] 68,305	[b] 118,704	[b] 76,448	[b] 46,544
Sockeyes	368,717	323,226	1,080,673	459,679	314,074	355,023	840,441
Springs, red	25,657	38,675	28,359	31,261	23,159	25,433	18,218
Springs, white	....	....	....	1,083	2,939	2,731	799
Steelheads	....	....	....	....	683	1,137	....
Grand total	473,674	465,894	1,167,460	629,460	547,459	542,689	967,920

[a] In 1901 in the Fraser River district 920,313 cases of sockeyes were packed, and in 1902 sockeyes were packed as follows: 293,477 cases in Fraser River district, 117,677 cases in Skeena River district, 68,819 cases in Rivers Inlet district, 20,953 cases in Nass River district, and 30,510 cases in outlying districts.

[b] Pinks and chums combined.

PACK, BY SPECIES AND DISTRICTS, OF CANNED SALMON IN BRITISH COLUMBIA FROM 1903 to 1915—Continued.

Districts and species.	1910	1911	1912	1913	1914	1915
	Cases.	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*
Fraser River district:						
Chums	52,177	47,237	12,961	22,220	74,726	18,539
Cohos	27,855	39,740	28,574	11,648	38,639	34,114
Pinks	128	142,101	574	9,973	6,057	128,555
Sockeyes	133,045	58,487	108,784	684,596	185,483	89,040
Springs, red	1,018	7,028	14,655	3,573	9,485	15,388
Springs, white	8,925	6,751	8,373	49	14,000	3,532
Steelheads	....	....	....	....	....	31
Total	223,148	301,344	173,921	732,059	328,390	289,199
Skeena River district:						
Chums	....	70	504	....	8,329	5,769
Cohos	11,531	23,376	a 39,835	18,647	16,378	32,190
Pinks	13,473	81,956	97,588	66,045	71,021	107,578
Sockeyes	187,246	131,066	92,498	52,927	130,166	116,553
Springs, red	9,546	15,514	19,332	23,250	11,529	15,069
Springs, white	239	2,428	4,501	3,186	211	204
Total	222,035	254,410	254,258	164,055	237,634	279,161
Rivers Inlet district:						
Chums	....	288	3,845	....	5,023	5,387
Cohos	2,075	6,287	11,010	3,660	7,789	7,115
Pinks	19	5,411	8,809	2,097	5,784	2,964
Sockeyes	126,921	88,763	112,884	61,745	89,890	130,350
Springs, red	383	317	681	594	566	1,022
Springs, white	....	....	468	....	....	....
Total	129,398	101,066	137,697	68,096	109,052	146,838
Nass River district:						
Chums	351	5,189	3,245	2,987	25,569	11,076
Cohos	6,285	7,842	12,468	3,172	9,276	15,171
Pinks	895	11,467	12,476	20,539	25,333	34,879
Sockeyes	30,810	37,327	36,037	23,574	31,327	39,349
Springs, red	1,228	3,434	5,710	2,999	2,660	3,053
Springs, white	11	325	1,226	152	725	648
Steelheads	140	100	....	....	....	113
Total	39,720	65,684	71,162	53,423	94,890	104,289
Outlying districts:						
Chums	5,834	39,167	37,770	52,758	70,827	41,229
Cohos	26,636	42,457	73,422	32,695	48,119	58,366
Pinks	20,098	64,312	128,296	94,233	112,145	93,376
Sockeyes	87,893	67,866	94,559	149,336	99,830	100,750
Springs, red	7,138	12,458	21,967	7,017	8,668	17,202
Springs, white	301	201	3,524	229	1,484	1,986
Steelheads	....	....	....	....	....	985
Total	147,900	226,461	359,538	336,268	341,073	313,894
TOTAL BY SPECIES.						
Chums	58,362	91,951	58,325	77,965	184,474	82,000
Cohos	74,382	119,702	165,102	69,822	120,201	146,956
Pinks	34,613	305,247	247,743	192,887	220,340	367,352
Sockeyes	565,915	383,509	444,762	972,178	536,096	476,042
Springs, red	19,313	38,751	62,345	37,433	32,908	51,734
Springs, white	9,476	9,705	18,092	3,616	16,420	6,370
Steelheads	140	100	207	....	....	2,927
Grand total	762,201	948,965	996,576	1,353,901	1,111,039	1,133,381

a Includes 207 cases of steelheads.

PICKLING INDUSTRY.

The salmon-pickling industry was so overshadowed by its giant brother, the canning industry, that statistical data, except for Alaska, were found in extremely fragmentary shape, and only that portion is shown relating to Alaska from the time of annexation to 1915.

PACK OF SALTED SALMON IN ALASKA, 1868 TO 1915.

Years.	Salmon.		Salmon bellies.		Dry-salted salmon.	
	Barrels.	Value.	Barrels.	Value.	Pounds.	Value.
1868	2,000	$16,000				
1869	1,700	13,600				
1870	1,800	14,400				
1871	700	6,300				
1872	1,000	9,000				
1873	900	7,200				
1874	1,400	11,200				
1875	1,200	9,600				
1876	1,800	14,400				
1877	1,950	15,700				
1878	2,100	16,800				
1879	3,500	28,000				
1880	3,700	29,600	300	$3,300		
1881	1,760	15,840				
1882	5,890	53,010				
1883	7,251	65,259				
1884	6,106	54,954				
1885	3,230	29,070				
1886	4,861	43,749				
1887	3,978	35,802				
1888	9,500	85,500				
1889	6,457	58,013				
1890	18,039	162,351				
1891	8,913	71,304				
1892	17,374	140,057	53	815		
1893	24,005	120,083				
1894	32,011	176,060				
1895	14,234	85,404				
1896	9,314	65,198	150	1,200		
1897	15,848	110,936	2,846	28,460		
1898	22,370	181,360	580	5,800		
1899	22,382	167,865	235	2,350		
1900	31,852	238,890	2,353	23,530	511,400	$10,228
1901	24,477	171,339	652	3,816		
1902	30,384	212,688	328	2,952		
1903	27,921	223,368	3,667	32,973	300,000	5,500
1904	13,674	89,209	208	1,950	966,812	16,180
1905	19,071	143,811	1,360	11,355	7,280,234	115,643
1906	17,283	126,194	1,838	13,644	1,107,680	16,969
1907	22,307	203,127	2,965	37,422	107,580	1,505
1908	31,472	260,713	7,600	85,994	20,800	416
1909	28,443	183,400	1,070	25,358	71,600	1,038
1910	12,779	111,634	1,626	19,007	22,178	554
1911	8,483	102,477	1,337	15,561	33,285	1,340
1912	34,002	305,928	37	606		
1913	37,881	272,726	451	6,523	21,282	1,235
1914	25,954	247,195	408	5,467	12,200	810
1915	12,068	157,457	571	13,610		
Total	529,294	4,041,445	28,802	313,536	10,388,284	168,033

ALASKA PICKLED-SALMON PACK, 1906 TO 1915, BY SPECIES, QUANTITY,[a] AND VALUE.

Species.	1906		1907		1908		1909		1910	
	Barrels.	Value.	Barrels.	Value.	Barrels.	Value.	Barrels.	Value.	Barrels.	Value.
Whole salmon:										
Coho	539	$5,642	1,665	$16,406	692	$5,648	318	$2,485	160	$1,504
Chum	231	1,550	233	1,521	122	707	35	190	....	....
Humpback	2,446	13,852	4,248	29,374	2,346	17,935	1,557	9,405	330	1,998
King	1,007	8,058	964	10,084	660	6,813	441	3,798	352	3,399
Red	13,061	97,092	15,197	145,142	30,517	262,274	26,508	167,298	11,931	104,649
Total	17,284	126,194	22,307	203,127	34,337	293,377	28,859	183,176	12,773	111,550
Bellies:										
Coho	....	....	191	2,696	229	3,535	255	3,843	126	1,135
Chum	30	150	....	....	117	699	....	....	70	770
Humpback	1,173	13,188	1,800	21,080	2,447	28,140	738	7,438	616	6,135
King	22	185	84	1,002	48	720	35	175	6	128
Red	13	121	890	12,644	1,895	26,236	942	13,902	808	10,839
Total	1,238	13,644	2,965	37,422	4,736	59,330	1,970	25,358	1,626	19,007
Backs, etc.:										
Humpback	....	....	....	....	....	....	56	224	....	....
King	....	....	....	....	....	....	....	....	2	24
Red	....	....	....	....	....	....	....	....	4	60
Total	....	....	....	....	....	....	56	224	6	84
Grand total	18,522	139,838	25,272	240,549	29,073	352,707	30,885	208,758	14,405	130,641

Species.	1911		1912		1913		1914		1915	
	Barrels.	Value.	Barrels.	Value.	Barrels.	Value.	Barrels.	Value.	Barrels.	Value.
Whole salmon:										
Coho	223	$2,149	1,165	$9,565	1,006	$6,452	365	$2,767	1,763	$19,393
Chum	133	666	93	652	100	778	53	293	325	2,925
Humpback	1,122	11,238	4,236	28,304	2,724	18,181	482	2,954	662	5,958
King	600	8,095	225	2,442	135	1,410	269	2,588	377	4,147
Red	6,239	79,578	28,883	264,965	33,916	245,905	24,785	238,593	8,931	125,034
Total	8,317	101,726	34,602	305,928	37,881	272,726	25,954	247,195	12,058	157,457
Bellies:										
Coho	38	489	....	....	54	946	67	982	....	....
Chum	7	77	....	....	67	941	18	180	....	....
Humpback	676	5,122	37	606	324	4,546	229	2,620	133	2,660
King	2	30	....	....	....	....	2	13	....	....
Red	614	9,843	....	....	6	90	92	1,672	438	10,950
Total	1,337	15,561	37	606	451	6,523	408	5,467	571	13,610
Backs, etc.:										
Humpback	150	600	....	....	....	....	....	....	....	....
King	1	15	....	....	....	....	....	....	....	....
Red	15	136	....	....	....	....	....	....	....	....
Total	166	751	....	....	....	....	....	....	....	....
Grand total	9,820	118,038	34,639	306,534	38,332	279,249	26,362	252,662	12,629	171,067

[a] Barrels hold 200 pounds of fish; when of a different size they have been reduced to conform to this weight.

MILD-CURING INDUSTRY.

The beginning of this industry on the Pacific coast is of comparatively recent date, and the following table is complete, with the possible exception of a few tierces, which may not have been reported for the coastal rivers of Oregon:

NUMBER OF TIERCES OF MILD-CURED SALMON PACKED ON THE PACIFIC COAST FROM 1897 TO 1915.[a]

Years.	Alaska.	British Columbia.	Puget Sound, Wash.	Grays Harbor, Wash.	Willapa Harbor, Wash.	Columbia River (both sides).	Coastal rivers, Oreg.	Eel River, Cal.	Sacramento River, Cal.	Monterey Bay, Cal.	Total.
1897	....	....	....	....	....	400	....	....	....	....	400
1898	70	....	....	....	....	700	....	....	....	....	770
1899	130	....	....	375	....	1,250	....	....	....	....	1,755
1900	....	....	....	....	....	1,275	....	....	950	....	2,225
1901	67	....	600	....	....	3,000	....	....	3,100	....	6,767
1902	67	....	425	....	....	4,213	188	....	2,325	504	7,722
1903	8	....	824	....	....	6,725	....	....	3,600	354	11,511
1904	34	....	1,250	....	....	9,088	....	200	4,719	248	15,539
1905	189	1,175	3,000	....	....	9,805	415	....	2,979	310	17,873
1906	1,126	957	....	....	....	8,000	740	175	2,177	510	13,685
1907	1,657	1,993	2,060	20	100	6,070	740	140	4,102	582	17,464
1908	1,378	1,060	....	....	....	4,960	....	....	3,243	252	10,893
1909	2,292	1,560	2,109	75	29	5,540	560	80	5,111	911	18,267
1910	3,357	1,638	2,435	67	....	7,922	1,398	....	5,516	75	22,408
1911	3,104	1,965	2,745	100	30	8,185	1,247	110	2,011	160	19,717
1912	5,245	1,489	3,013	357	40	5,824	3,082	100	3,274	....	22,424
1913	7,443	3,150	3,923	250	50	5,746	2,381	....	4,789	550	28,282
1914	4,091	3,182	1,934	....	....	5,205	457	....	1,829	1,476	18,174
1915	2,966	1,110	2,235	....	....	4,078	333	3	1,630	942	13,306
Total.	33,284	19,288	26,553	1,244	249	97,986	11,541	808	51,355	6,874	249,182

[a] The net weight of fish in a tierce is about 800 pounds. King, chinook, or spring salmon were used almost exclusively. From most places the data are complete from the time of the inception of the industry, but from a few minor places the data are somewhat fragmentary.

YUKON TERRITORY, CANADA.

Some salmon fishing is carried on in that section of the upper Yukon River which lies in Yukon Territory, Dominion of Canada. The species taken are principally king and chum, and these are sold mainly in a fresh condition. The following table shows the quantity taken and the value of same in certain years:

CATCH OF SALMON IN YUKON TERRITORY, CANADA, IN SPECIFIED YEARS.

Years.	Salmon.		Years.	Salmon.	
	Pounds.	Value.		Pounds.	Value.
1903	70,000	$5,600	1912	224,100	$22,410
1909	138,574	17,566	1913	182,000	18,200
1910	169,900	18,689	1914	188,600	18,860
1911	229,000	22,900	1915	157,000	15,700

MARKET PRICES FOR CANNED SALMON.

The manner of fixing the selling price at which the canner is willing to dispose of his canned product varies slightly in certain regions. In May or June, when the spring-packing season has sufficiently advanced so that a line can be gotten on the probable pack of chinook, the highest priced of the pack, the Columbia River canners agree upon a price, this usually being high or low, as the pack is small or large.

Since the Alaska Packers Association was formed, through a combination of a number of canneries operating in the Territory of Alaska, it has packed annually in recent years about one-fourth of the salmon canned. It also owns several canneries on Puget Sound, thus being quite a factor in that region also.

In the early days of the association the custom grew up amongst the smaller packers of Alaska and Puget Sound of waiting until the association fixed the prices on its own pack, when the others would generally fall into line with the same prices for their packs. This custom is still in vogue. At no time has it ever been compulsory on the part of any packer to adopt the same prices as the association. In fact, it has sometimes been the case that, while the small packer publicly quoted the association's opening prices, yet in secret he was shading it by 2½ to 5 cents per dozen on certain grades. In recent years this has frequently been the case and the big packers, who adhered to the opening prices, have had to sit idly by and watch their small competitors underselling them and getting the bulk of the business until they had finally disposed of their goods, when, necessarily, they would have to drop out of the market until the next season.

Occasionally the other packers do not like a certain quotation of the association and make one more nearly in consonance with their own views. This happened in 1913, when the association quoted 60 cents for chums, while the Puget Sound canners quoted 55 cents for this grade, and in 1915 when the association quoted 65 cents for chums and the Puget Sound interests 70 cents for the same grade, thus showing clearly the independence of the smaller packers.

Owing to a peculiar feature of the salmon marketing business, more depends upon the opening prices than appears on the surface to the uninitiated.

Shortly after the first of the year buyers throughout the world begin to take stock of their salmon supplies and soon thereafter begin placing their "future" orders. These cover the quantity required of each grade, and when the buyer orders through a broker the orders are placed subject to a contract similar to the following:

The undersigned hereby authorizes ——— to book the number of cases of canned salmon specified below; said booking to be filed with packers for delivery from ———

(naming year) pack, subject to buyers' approval of opening prices when named; *the option being granted buyers of confirming the total number* of cases specified below; *confirming a smaller quantity*, or *declining any confirmation.*

——— furthermore agrees that *buyers shall have the option of increasing quantities* listed below, when he names opening prices for his packers, contingent upon his ability to secure at that time an increased allotment from his packers. In event ——— secures an increased allotment from his packers insufficient to meet all increases requested by his patrons, he will distribute such increase as he can secure among the dealers who have filed conditional contracts with him, according to the date order that said contracts have been received in his office.

Under this form of contract the packer is expected to be ready to fulfill the terms of same, except in case of a short pack, when the orders are generally prorated, i. e., all orders are proportionately reduced until they come within the compass of the pack. Should the buyer dislike the opening price he has the privilege of canceling the order. While this latter privilege may not, at first glance, look just to the packer, yet it is doubtful if any buyer would place a "future" order unless he was assured of a chance to cancel his order should he feel that too high a sum was fixed in the opening prices.

Some canneries contract to sell their entire output to one buyer, and the price fixed is usually the opening prices for the year in question. In such cases the buyer and seller are both compelled to abide by the price, no matter how unjust one or the other may consider it.

The association does not announce its opening prices until late in August or early in September, when the greater part of the packing is over with and a good line on the total pack has been obtained, and it speaks well for the discernment of the officials of the association that their judgment as to prices should meet with the general approval as often as it does.

OPENING PRICES FOR A SERIES OF YEARS.

Below are shown the yearly opening prices on the various grades and sizes from 1890 to 1915. The most interesting part of this is the increase shown in the value of high-grade salmon. Columbia River chinook was quoted at $1.05 for 1-pound talls in 1897, and it gradually advances until in 1915 it is quoted at $1.90. Alaska red 1-pound talls in 1897 sold for 90 cents, the lowest during the period in question, advancing, with occasional recessions, until in 1911 it reached high-water mark of $1.60. In 1915 the opening price was $1.50. In 1897 Puget Sound 1-pound tall sockeye sold for 80 cents, 10 cents below Alaska red. In 1898 it sold for 20 cents less than reds. In 1902 it sold for $1 as compared with 95 cents for Alaska red, and from that time on brought a higher price, being quoted at $1.90 in 1915 as compared with $1.50 for Alaska red.

Medium red or coho did not figure in the opening prices until 1908, when Puget Sound coho sold for 5 cents a dozen more than Alaska coho. Very shortly thereafter, however, both were classed together and sold for the same price. This grade has not had the wide fluctuations of the others, due mainly to the generally small pack made annually.

Pink salmon has been the football of the salmon market ever since the pack became of sufficient size to become a feature in it. The size of the pack has been steadily increasing, as the fish became better known, and while the price obtained has been excellent in certain years (in 1911 it sold at $1 per dozen, the highest point reached), usually the price has been low. In 1897 it was quoted at 65 cents. In 1915 the opening price was 75 cents, but as a matter of fact a large part of the pack really sold for 65 cents. The lowest point it reached was in 1903, when it was quoted at 50 cents a dozen.

It is only of recent years that chum salmon has become a factor in the market. Although sold for some time before then, chum salmon appears first in the regular opening prices in 1908, when they were quoted at 70 cents a dozen. In 1913 it was quoted at 55 cents, while the opening price in 1915 was 70 cents on Puget Sound and 65 cents at San Francisco.

The pack of Alaska and Puget Sound kings, or springs, has always been small, and while they have always been quoted at $1 per dozen or better (in 1911 they were quoted at $1.80) they have always been slow sellers. It is extremely improbable that the canned pack will increase much in the future, as this fish is the best for mild curing, and as the mild curers are able to offer better prices for the raw fish than the canneries, they will always get the fish when desired.

OPENING PRICES PER DOZEN CANS SINCE 1890.

1890 TO 1902.

Years and species.	Talls.
1890.	
Columbia River chinook	$1.40
Alaska red	1.20
Alaska pink	.75
1891.	
Columbia River chinook	1.35
Alaska red	1.20
Alaska pink	.75
1892.	
Columbia River chinook	1.35
Alaska red	1.15
Alaska pink	.75
1893.	
Columbia River chinook	1.32½
Alaska red	1.17½
Alaska pink	.65
1894.	
Columbia River chinook	1.35
Alaska red	1.10
Alaska pink	.60
1895.	
Columbia River chinook	$1.32½
Alaska red	1.15
Alaska pink	.80
1896.	
Columbia River chinook	1.25
Alaska red	1.10
Alaska pink	.75
1897.	
Columbia River chinook	1.05
Alaska red	.95
Puget Sound sockeye	.80
Alaska pink	.65
1898.	
Columbia River chinook	1.05
Alaska red	.97½
Puget Sound sockeye	.80
Alaska pink	.65
1899.	
Columbia River chinook	$1.25
Alaska red	1.10
Puget Sound sockeye	1.10
Alaska pink	.67½
1900.	
Columbia River chinook	1.60
Alaska red	1.25
Puget Sound sockeye	1.10
Alaska pink	.75
1901.	
Columbia River chinook	1.50
Alaska red	1.25
Puget Sound sockeye	.95
Alaska pink	.75
1902.	
Columbia River chinook	1.35
Alaska red	1.00
Puget Sound sockeye	1.00
Alaska pink	.65

Opening Prices per Dozen Cans Since 1890—Continued.

1903 TO 1915.

Years and species.	Talls.	Flats.	Halves.
1903.			
Puget Sound sockeye	$1.50	$1.60	$0.90
Columbia River chinook	1.35	1.45	.85
Alaska red	1.30	......	......
Alaska pink	.50	......	......
1904.			
Columbia River chinook	1.45	1.15	.90
Puget Sound sockeye	1.55	1.65	.95
Alaska red	1.30	......	......
Alaska pink	.70	......	......
1905.			
Columbia River chinook	1.45	1.65	.90
Puget Sound sockeye	1.35	1.50	4.00
Alaska red	1.00	......	......
Alaska pink	.70	......	......
1906.			
Columbia River chinook	1.50	1.60	1.00
Puget Sound sockeye	1.45	1.60	1.00
Alaska red	.95	......	......
Alaska pink	.75	......	......
1907.			
Columbia River chinook	1.65	1.75	1.05
Puget Sound sockeye	1.60	1.75	1.10
Alaska red	1.15	......	......
Alaska pink	.80	......	......
1908.			
Columbia River chinook	1.65	1.75	1.05
Puget Sound sockeye	1.60	1.75	1.05
Puget Sound pink	.75	.80	......
Puget Sound coho	1.05	1.15	.75
Alaska red	1.15	......	......
Alaska king	1.05	......	......
Alaska coho	1.00	......	......
Alaska pink	.70	......	......
Alaska chum	.70	......	......
1909.			
Columbia River chinook, fancy	1.65	1.75	1.05
Puget Sound sockeye	1.35	1.50	1.00
Alaska red	1.15	1.35	.85
Alaska king	1.10	......	......
Alaska coho	1.05	1.20	.70
Alaska pink	.60	......	......
Alaska chum	.57½	......	......
1910.			
Columbia River chinook, fancy	$1.75	$1.90	$1.10
Puget Sound sockeye	1.65	1.80	1.10
Alaska red	1.35	1.50	1.00
Alaska king	1.35	......	......
Alaska pink	.80	......	......
Alaska chum	.77½	......	......
Medium red and coho	1.25	1.40	.80
1911.			
Columbia River chinook, fancy	1.95	2.00	1.30
Puget Sound sockeye	1.95	2.00	1.30
Alaska red	1.60	1.75	1.12½
Alaska medium red	1.45	1.65	1.00
Alaska king	1.80	2.00	1.12½
Pink	1.00	1.15	.80
Chum	.95	1.05	.75
1912.			
Chinook	1.95	2.00	1.25
Sockeye	1.95	2.00	1.30
Alaska red	1.40	1.60	1.15
Alaska medium red	1.15	1.25	.80
Alaska king	1.40	1.60	1.15
Pink	.65	.65	.55
Chum	.62½	......	.50
1913.			
Chinook	1.95	2.00	1.25
Sockeye	1.50	1.65	1.05
Alaska red	1.15	1.35	.95
Alaska medium red	.85	1.00	.70
Alaska king	1.00	1.15	.90
Pink	.65	.80	.55
Chum	a .55	.70	.50
1914.			
Chinook	1.95	2.10	1.25
Sockeye	1.95	2.15	1.35
Alaska red	1.45	1.80	1.10
Medium red	1.15	1.35	.82½
Alaska king	1.40	......	1.10
Pink	.90	1.00	.70
Keta, or chum	.85	.95	.65
1915.			
Chinook	1.90	2.00	1.25
Sockeye	1.95	2.15	1.35
Alaska red	1.50	1.85	1.15
Medium red	1.15	1.30	.75
Alaska king	1.25	......	......
Pink	.75	.85	.57½
Keta, or chum	b .70	.80	.52½

a The opening price in San Francisco was 60 cents.
b The opening price in San Francisco was 65 cents.

XI. TRADE WITH OUTLYING POSSESSIONS.

As a result of the war with Spain the United States in 1898 acquired possession of Porto Rico, Guam, and the Philippine Islands, while in the same year Hawaii became a part of this country at its own request, and in 1900 two islands of the Samoan group were acquired by a partition agreement with Great Britain and Germany. The trade with the Philippine Islands is shown to date in the tables of exports and imports to foreign countries, but the trade with the other possessions has been eliminated from these tables and shown separately ever since their annexation to the United States.

HAWAII.

The islands constituting this Territory, owing to their reciprocity treaty with this country for a number of years before annexation, purchased their supplies of salmon from the United States almost exclusively. In recent years the Territory has imported the following quantities of salmon from the mainland:

Years ending June 30—	Canned.		All other, fresh or cured.	Years ending June 30—	Canned.		All other, fresh or cured.
	Pounds.	Value.			Pounds.	Value.	
			Value.				*Value.*
1907	1,126,217	$89,286	$64,232	1912	1,850,567	$194,385	$57,495
1908	965,029	89,025	67,143	1913	1,841,874	173,202	(a)
1909	1,440,410	121,716	73,848	1914	1,418,941	97,532	(a)
1910	1,381,398	113,526	72,194	1915	1,005,848	90,705	(a)
1911	1,231,264	119,872	76,572				

a Not shown separately.

PORTO RICO.

Of recent years the following shipments of domestic salmon have been made to this island:

Years ending June 30—	Canned.		All other, fresh or cured.	Years ending June 30—	Canned.		All other, fresh or cured.
	Pounds.	Value.			Pounds.	Value.	
			Value.				*Value.*
1907	604,627	$53,916	$2,893	1912	710,721	$65,354	$1,208
1908	512,038	48,195	1,428	1913	666,602	66,811	(a)
1909	381,171	34,777	3,810	1914	416,414	41,726	(a)
1910	511,055	43,494	6,243	1915	588,889	56,527	(a)
1911	357,382	30,699	3,868				

a Not shown separately.

PHILIPPINE ISLANDS.

Of recent years the following shipments of domestic salmon have been made to these islands:

Years ending June 30—	Canned.		All other, fresh or cured.	Years ending June 30—	Canned.		All other, fresh or cured.
	Pounds.	Value.			Pounds.	Value.	
			Value.				*Value.*
1909	1,126,470	$74,792	$712	1913	10,122,820	$590,128	(a)
1910	5,425,404	396,604	2,089	1914	5,034,252	266,369	(a)
1911	3,069,118	225,885	3,542	1915	4,159,580	288,548	(a)
1912	5,096,810	422,001	2,437				

a Not shown separately.

ALASKA.

It seems like "carrying coals to Newcastle" to ship canned salmon to Alaska, from which Territory more than half the canned salmon of the world is produced, and yet a small business is done each year in this line, most of the product going to the mining camps and towns somewhat removed from the fishing sections.

The following table shows the shipments of such fish in recent years:

Years ending June 30—	Canned.		All other, fresh or cured.	Years ending June 30—	Canned.		All other, fresh or cured.
	Pounds.	Value.			Pounds.	Value.	
			Value.				*Value.*
1909	67,132	$7,122	$3,966	1912	134,320	$15,022	$4,218
1910	67,658	7,204	3,558	1913	43,346	5,074	(a)
1911	38,265	4,513	1,061	1914	42,945	5,278	(a)

a Not shown separately.

GUAM.

Since annexation, this country and Japan have been competing for the trade of this island, which, in earlier years, Japan controlled quite largely. During the last two years shown in the statement, however, the United States has secured the advantage. The following table shows the extent of the trade, which is made up almost entirely of salted or pickled salmon, only 900 pounds of fresh salmon, valued at $92, having been shipped by this country to Guam in 1908. Since 1909 all the fishery products imported have been lumped under one heading and it has been impossible to distinguish the salmon from the other species.

Years and countries.	Pickled salmon.		Years and countries.	Pickled salmon.	
	Pounds.	Value.		Pounds.	Value.
1905.			1908.		
United States	1,415	$71	United States	7,406	$623
Japan	16,526	1,221	Japan	6,130	465
1907.			1909.		
United States	13,604	1,086	United States	10,779	740
Japan	19,862	1,601	Japan	4,295	344

TUTUILA, SAMOA.

The customs statistics lump the imports of fish under one general heading, thus making it impossible to show separately the imports of salmon.

XII. FOREIGN TRADE IN SALMON.

As we do not consume all of the salmon produced by our fisheries, it is necessary to find a foreign market for the surplus each season, but, as canned salmon has become one of the staples of the world, there is not much difficulty in this respect, especially since our only competitors are Canada, Siberia, and Japan. The two last named have not yet become much of a factor in the canned-salmon market, though they will as their fishing operations are extended. There is more competition in the pickled, fresh, and frozen markets, several European and Asiatic countries being large producers of these goods, as is Canada also, for a considerable proportion of which she is compelled to find an outside market.

EXPORTS OF CANNED SALMON.

From the beginning of the industry a considerable proportion of the salmon canned has been exported, especially of the higher grades. In Europe the chief customer is Great Britain, taking about nine-tenths of all sent to European ports. Great Britain does not, however, consume this quantity, for a considerable part of her importations are reexported. On the North American Continent and adjacent islands the best customers are Mexico, Panama, and the British West Indies, in the order named. In South America, Peru, Argentina, and British Guiana were the leading markets in 1910. In 1908 Chile imported 4,196,060 pounds; in 1909 the importations dropped to 97,993 pounds, but increased in 1910 to 1,556,629 pounds. In Asia, Hongkong and China import canned salmon, although neither buys great quantities. The islands of the Pacific and Indian Oceans are large consumers. British Australasia took 5,474,818 pounds, valued at $551,312, in 1910, and other good customers were the British East Indies and British, French, and German Oceania. In Africa the British and Portuguese possessions are the largest importers.

The movements of these products are naturally often influenced favorably or adversely as the tariffs of the various countries in which they are marketed are raised or lowered.

Some countries maintain excessively high tariffs, among these being Brazil, 30 cents per pound; Colombia, 8½ cents; Mexico, 4 cents; Guatemala, 6½ cents; Paraguay, 7 cents; Uruguay, 6 cents; Austria-Hungary, 8 cents, and Germany, 7 cents. Norway levies 6 cents a pound duty, but this is undoubtedly to protect her own salmon industry.

In but few of the tariff acts is canned salmon distinguished by name, being usually classed as "preserved fish," and as these are usually luxuries in many countries they bear an extra high duty as a result.

In addition to these high duties in some countries, especially in South America, there are various other charges, fees, etc., which materially enhance the value of the goods before they reach the consumer. C. H. Clarke, of the salmon brokerage firm of Kelley-Clarke Co., of Seattle, Wash., prepared and published a statement[a] showing the comparative charges on 100 cases each of red Alaska and pink canned salmon from the time they leave Seattle up to the time they reach the hands of wholesalers in South America. This shows that the f. o. b. Seattle value of the red salmon was $500 and of the pink salmon $280. By the time these goods reached the hands of the Rio de Janeiro wholesalers the red salmon were worth $1,900.07, while the pink salmon were worth $1,677.87. At Montevideo, Uruguay, the red salmon were worth $1,436.01 and the pink salmon $1,213.81. The table is so interesting and instructive that it is reproduced entire herewith.

COMPARATIVE TABLE OF CHARGES ON 100 CASES EACH OF RED ALASKA AND PINK CANNED SALMON UP TO THE TIME THEY REACH HANDS OF WHOLESALERS IN SOUTH AMERICA.

	Argentina (Buenos Aires).		Brazil (Rio de Janeiro).		Chile (Valparaiso).		Ecuador (Guayaquil).	
	Red.	Pink.	Red.	Pink.	Red.	Pink.	Red.	Pink.
F. o. b. Seattle value	$500.00	$280.00	$500.00	$280.00	$500.00	$280.00	$500.00	$280.00
Strapping	5.00	5.00	5.00	5.00	....	....	....	....
Freight	104.75	104.75	114.50	114.50	45.00	45.00	45.00	45.00
Marine insurance, 5 per cent f. p. a	6.10	3.90	6.20	4.00	5.50	3.25	5.50	3.25
C. i. f. value	615.85	393.65	625.70	403.50	550.50	328.25	550.50	328.25
Consular fees in United States	2.00	2.00	3.25	3.25	5.25	4.25	22.35	14.00
Customs duty	519.56	519.56	1,138.78	1,138.78	160.46	160.46	345.37	234.37
Analysis	2.12	2.12	6.47	6.47	....	....	....	....
Storage in customhouse	2.41	2.41	33.90	33.90	5.35	5.35	....	....
Handling in customhouse	7.24	7.24	....	....	2.51	2.51	....	....
Stamps and entry blanks	1.49	1.49	....	....	1.43	1.43	....	....
Statistics	....	....	.10	.10	....	....	....	....
Internal-revenue tax	....	....	7.77	7.77	....	....	....	....
Port tax	....	....	57.20	57.20	....	....	....	....
Customs brokerage	12.74	12.74	....	....	7.15	7.15	....	....
Wharfage, lighterage, cartage	7.64	7.64	26.90	26.90	3.65	3.65	19.30	19.30
Value ex customhouse	1,171.05	948.85	1,900.07	1,677.87	736.30	513.05	937.52	706.92

	Paraguay (Asuncion).		Peru (Callao).		Uruguay (Montevideo).		Venezuela (La Guayra).	
	Red.	Pink.	Red.	Pink.	Red.	Pink.	Red.	Pink.
F. o. b. Seattle value	$500.00	$280.00	$500.00	$280.00	$500.00	$280.00	$500.00	$280.00
Strapping	5.00	5.00	....	....	5.00	5.00	5.00	5.00
Freight	134.75	134.75	37.50	37.50	104.75	104.75	54.60	54.60
Marine insurance, 5 per cent f. p. a	9.60	6.30	5.40	3.20	6.10	3.90	5.60	3.40
C. i. f. value	649.35	426.05	542.90	320.70	615.85	393.65	565.20	343.00
Consular fees in United States	2.00	2.00	5.78	3.45	1.05	1.05	12.85	12.85
Customs duty	308.25	308.25	275.86	275.86	779.30	779.30	238.96	238.06
Analysis	....	....	....	....	....	....	....	....
Storage in customhouse	....	....	....	....	....	....	....	....
Handling in customhouse	....	....	....	....	16.15	16.15	....	....
Stamps and entry blanks	....	....	.58	.58	1.55	1.55	1.35	.97
Statistics	.37	.37	....	....	....	....	....	....
Internal-revenue tax	....	....	....	....	....	....	....	....
Port tax	....	....	....	....	....	....	....	....
Customs brokerage	....	....	4.86	4.86	15.50	15.50	5.00	2.80
Wharfage, lighterage, cartage	6.33	6.33	15.69	15.69	6.61	6.61	12.82	12.82
Value ex customhouse	966.30	743.00	845.64	621.14	1,436.01	1,213.81	836.18	611.40

[a] Pacific Fisherman, vol. 13, no. 5, p. 11, 1915.

The following table shows the fiscal year exports of domestic canned salmon and the countries to which exported for the period from 1900 to 1915, inclusive:

EXPORTS, BY COUNTRIES, OF DOMESTIC CANNED SALMON, 1900 TO 1915.

Countries.	1900		1901		1902	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Europe:						
Austria-Hungary	2,208	$309			250	$25
Azores, and Madeira Islands	48	7	950	$92		
Belgium	31,118	3,186	5,800	600	336	39
Denmark	24,492	2,455	3,168	326	860	92
France	22,544	2,130	61,790	6,565	23,956	1,889
Germany	16,110	1,431	77,921	7,567	10,905	1,068
Italy	120	10	2,496	244		
Malta, Gozo, etc			141	21		
Netherlands	3,048	299	288	30	4,800	400
Portugal	19,776	1,779			336	35
Russia, on Baltic and White Seas					8,400	932
Spain			1,536	151	675	67
Sweden and Norway	1,168	112	720	70	72	8
Switzerland	24	3				
United Kingdom	18,820,453	1,870,004	31,722,863	3,219,196	30,632,961	2,620,729
North America:						
Dominion of Canada—						
Nova Scotia, New Brunswick, etc					10	1
Quebec, Ontario, Manitoba, etc	24,137	2,514	101	10	22,442	2,493
British Columbia	382,811	33,454	1,725,251	223,230	1,866,272	159,682
Newfoundland and Labrador					810	73
Miquelon, Langley, etc	240	20				
Mexico	162,785	14,806	160,425	14,967	387,905	31,041
Central American States—						
British Honduras	16,488	1,604	19,331	2,054	23,467	2,370
Costa Rica	70,458	6,114	69,135	6,768	70,036	5,954
Guatemala	2,666	277	11,301	1,151	15,325	1,324
Honduras	7,193	677	7,681	776	4,924	498
Nicaragua	26,647	2,684	21,543	2,256	17,125	1,635
Salvador	650	60	550	55	1,828	161
Bermuda	59,672	6,158	63,786	7,398	76,456	7,768
West Indies—						
British	259,249	25,651	315,209	33,635	242,999	24,191
Danish	9,085	873	8,612	929	14,526	1,390
Dutch	13,303	1,610	16,591	1,944	13,112	1,506
French	432	45	1,084	127	960	96
Haiti	408	44	595	65	920	88
Dominican Republic	2,764	297	1,899	192	1,531	140
Cuba	8,406	786	20,407	1,883	20,196	1,618
Porto Rico	4,394	890				
South America:						
Argentina	104,367	8,822	127,751	10,916	88,622	7,816
Bolivia			240	37	15,110	1,147
Brazil	637,638	76,152	207,033	23,506	87,800	8,350
Chile	647,328	61,800	645,323	64,059	384,766	28,529
Colombia	92,868	9,075	97,163	9,975	86,046	7,451
Ecuador	50,387	5,631	98,587	10,887	24,937	1,868
Guiana—						
British	168,718	16,197	136,192	14,807	146,502	14,604
Dutch	43,096	8,553	61,334	6,542	92,971	8,718
French	3,240	299	2,248	261	8,316	850
Peru	75,621	7,392	124,823	12,526	313,476	24,444
Uruguay	2,837	285	9,408	933	1,016	104
Venezuela	42,125	3,712	66,911	6,913	42,436	4,026
Asia and Oceania:						
Aden	216	22				
Chinese Empire	40,960	4,255	149,295	15,263	117,043	8,716
China—Russian			20,634	2,058	9,460	772
Hongkong	63,210	6,488	78,960	8,056	551,860	40,261
Japan	11,560	1,200	285,036	28,990	14,578	1,220
Korea			1,105	115	2,208	179
Russia, Asiatic			1,495	145	6,572	521
Turkey in Asia			144	16		
East Indies—						
British	538,180	55,976	312,805	31,528	733,685	56,912
Dutch			3,960	400	161,940	12,093

EXPORTS, BY COUNTRIES, OF DOMESTIC CANNED SALMON, 1900 TO 1915—Continued.

Countries.	1900		1901		1902	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Asia and Oceania—Cont'd.						
British Australasia	2,804,004	$283,110	3,442,085	$343,540	7,131,641	$599,671
British Oceania					151,998	10,555
French Oceania	103,940	10,732	118,355	12,026	142,570	11,365
German Oceania			8,480	874	12,900	997
Guam [a]	480	50				
Hawaii [b]	860,682	84,808				
Philippine Islands	1,160	120	39,316	3,925	718,876	46,712
Tonga, Samoa, and all other	112,380	11,646	73,040	7,168		
Tutuila [c]					21,176	1,451
Africa:						
British Africa	632,012	57,387	816,433	79,063	2,581,088	219,233
Canary Islands			656	66		
French Africa	4,320	421	4,080	415	200	21
Liberia	312	30				
Portuguese Africa	47,812	4,696	35,384	3,459	52,726	4,931
All other Africa					6,200	582
Total	27,082,370	2,693,648	41,289,500	4,230,271	47,173,114	3,991,402
RECAPITULATION.						
Europe	18,941,109	1,881,725	31,877,663	3,234,862	30,683,551	2,625,284
North America	1,051,808	98,064	2,443,561	297,440	2,780,844	242,029
South America	1,868,225	192,918	1,577,013	160,862	1,291,998	107,907
Asia	654,126	67,941	853,434	86,571	1,597,346	120,674
Oceania	3,882,646	390,466	3,681,276	367,533	8,179,161	670,741
Africa	684,456	62,534	856,553	83,003	2,640,214	224,767

Countries.	1903		1904		1905	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Europe:						
Austria-Hungary	400	$25	384	$36		
Azores, and Madeira Islands			48	5	384	$41
Belgium	788	73	480	53	9,760	1,019
Denmark	80	8	100	8		
France	2,400	260	4,800	600	21,995	2,262
Germany	32,268	2,470	18,790	1,747	1,210	122
Italy	1,120	114	5,232	556	5,760	465
Netherlands	1,072	124	4,072	414	3,250	349
Norway [d]	96	10	1,440	150		
Spain	3,108	316	1,400	140	2,700	249
Sweden [d]			70	7	96	10
Switzerland	240	24				
United Kingdom	35,369,196	3,121,774	33,555,080	3,505,102	21,026,108	1,872,992
North America:						
Dominion of Canada					290,850	21,121
Nova Scotia, New Brunswick, etc			49	4		
Quebec, Ontario, Manitoba, etc	43,107	5,171	153,697	9,558		
British Columbia	3,246,082	287,212	1,086,370	95,021		
Newfoundland and Labrador					240	25
Mexico	356,951	26,787	538,949	38,691	493,371	40,597
Central American States—						
British Honduras	24,187	2,316	28,044	2,534	28,959	2,534
Costa Rica	36,806	3,072	68,828	4,668	93,580	8,179
Guatemala	3,527	295	15,732	1,131	20,498	1,583
Honduras	7,455	716	12,428	1,090	14,434	1,221
Nicaragua	20,089	1,771	28,159	2,394	42,103	3,146
Panama [e]			18,466	1,671	112,320	9,211
Salvador	3,360	252	4,304	326	2,296	184
Bermuda	64,264	6,792	36,022	3,778	33,821	3,634

[a] Guam was annexed to the United States in 1898.
[b] Hawaii was annexed to the United States in 1898.
[c] Tutuila was acquired in 1898.
[d] Sweden and Norway separated in 1905.
[e] Panama separated from Colombia in 1903.

EXPORTS, BY COUNTRIES, OF DOMESTIC CANNED SALMON, 1900 TO 1915—Continued.

Countries.	1903		1904		1905	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
North America—Continued.						
West Indies—						
British	418,636	$38,434	409,219	$37,389	366,747	$34,262
Danish	9,647	903	7,442	752	9,474	965
Dutch	22,981	2,480	17,878	1,999	13,051	1,419
French	892	92	984	86	660	64
Haiti	2,496	238	2,115	228	1,611	164
Dominican Republic	3,290	335	7,660	719	4,855	452
Cuba	21,636	1,789	24,677	2,324	36,903	3,373
South America:						
Argentina	72,445	6,808	66,275	6,612	120,586	11,263
Bolivia	384	40	672	80	170	17
Brazil	88,740	8,481	114,033	11,742	188,342	17,908
Chile	1,044,490	59,354	1,218,266	72,205	821,171	56,160
Colombia	149,272	11,194	118,269	10,104	81,239	7,491
Ecuador	45,126	3,115	59,266	4,041	121,894	7,941
Guiana—						
British	172,300	16,829	112,360	11,226	135,424	13,617
Dutch	52,138	4,959	78,464	8,280	45,231	4,797
French	18,752	1,805	11,169	1,307	11,684	1,228
Peru	89,440	7,309	214,982	15,530	151,832	11,369
Uruguay	2,140	185	2,246	225	3,250	325
Venezuela	20,987	1,839	59,857	5,981	28,005	2,825
Asia and Oceania:						
Aden	....	....	....	....	2,520	180
Chinese Empire	166,522	13,602	218,142	18,770	249,386	17,587
China—Russian	53,368	5,111	40,000	3,932	....	....
Hongkong	814,008	56,225	160,367	11,870	518,423	36,635
Japan	13,536	1,015	11,817,343	841,461	2,437,484	162,524
Korea	2,152	179	3,888	292	2,572	186
Russia, Asiatic	48	4	482	41	....	....
Siam	....	....	....	....	384	31
East Indies—						
British	473,740	39,367	636,320	44,669	673,897	55,599
French	....	....	....	....	720	69
Dutch	235,680	19,256	119,216	9,018	109,476	7,893
All other Asia	240	24	10	1	....	....
British Australasia	4,268,652	360,720	3,136,728	290,307	4,075,094	389,518
British Oceania	36,018	2,290	28,670	1,941	42,624	3,645
French Oceania	153,696	12,179	185,848	15,305	133,204	11,414
German Oceania	451,824	26,614	340,464	19,326	324,888	20,651
Philippine Islands	601,324	42,702	206,896	14,970	681,036	42,700
Africa:						
British Africa	1,454,226	127,921	794,758	77,911	1,259,269	121,120
Canary Islands	144	15	....	....	900	90
French Africa	2,220	207	3,200	320	4,800	460
Liberia	384	41	140	14	140	14
Portuguese Africa	107,964	17,043	137,640	13,906	200,826	20,365
Turkey in Africa—Egypt	....	....	388	30	2,448	204
All other Africa	5,200	506	....	....	....	....
Total	50,353,334	4,350,791	55,924,278	5,224,598	35,066,555	3,035,469
RECAPITULATION.						
Europe	35,410,768	3,125,197	33,591,896	3,508,818	21,071,263	1,877,509
North America	4,285,406	378,655	2,446,023	204,363	1,565,773	132,134
South America	1,756,214	121,918	2,055,859	147,333	1,708,828	134,941
Asia	1,759,294	134,783	12,995,768	930,054	3,994,862	280,704
Oceania	5,511,514	444,505	3,898,606	341,849	5,257,446	467,928
Africa	1,630,138	145,733	936,126	92,181	1,468,383	142,253

Countries.	1906		1907		1908	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Europe:						
Austria-Hungary	1,260	$135	1,220	$112	....	....
Azores, and Madeira Islands	....	....	883	89	....	....
Belgium	500	60	....	....	....	....
Denmark	40,200	4,112	....	....	....	....
France	29,980	3,000	....	....	10,575	$961
Germany	4,896	420	9,150	976	45,977	4,572
Italy	4,920	413	10,230	861	....	....
Malta, Gozo, etc.	420	36	....	....	....	....

EXPORTS, BY COUNTRIES, OF DOMESTIC CANNED SALMON, 1900 TO 1915—Continued.

Countries.	1906		1907		1908	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Europe—Continued.						
Netherlands	8,280	$959	11,098	$850	....	....
Norway	40,200	3,981	....	....	17,670	$1,860
Portugal	....	....	....	....	7,577	731
Spain	1,930	193	3,208	303	27,900	2,735
Sweden	10,000	1,050	....	....	10,500	1,000
United Kingdom	31,918,816	2,739,284	7,720,991	788,245	13,200,887	1,193,516
North America:						
Dominion of Canada	236,664	14,814	793,247	65,356	7,320	587
Mexico	699,002	56,747	877,989	73,582	1,068,824	94,278
Central American States—						
British Honduras	43,155	3,639	36,020	3,214	32,632	3,080
Costa Rica	106,879	8,968	148,157	12,260	138,421	12,260
Guatemala	26,925	1,989	31,242	2,535	29,777	2,319
Honduras	15,148	1,319	23,508	2,048	33,955	3,202
Nicaragua	39,949	3,022	41,106	3,335	27,721	2,302
Panama	308,624	25,965	443,687	38,642	487,079	46,883
Salvador	2,880	197	4,092	331	5,854	467
Bermuda	24,679	2,406	29,139	2,711	25,183	2,579
West Indies—						
British	471,814	43,368	515,664	46,510	687,620	64,276
Danish	9,713	1,011	13,336	1,340	15,604	1,658
Dutch	11,643	1,230	24,275	2,428	21,368	2,234
French	200	20	100	9	96	11
Haiti	2,953	291	914	91	864	85
Dominican Republic	11,688	1,137	9,278	891	13,887	1,371
Cuba	57,441	5,823	60,904	5,855	57,970	5,288
South America:						
Argentina	200,206	20,339	262,667	25,801	394,306	30,759
Bolivia	1,720	181	18,951	1,577	11,762	1,217
Brazil	188,278	18,975	150,592	14,880	146,826	14,055
Chile	4,462,147	154,396	4,168,876	286,229	4,196,060	295,194
Colombia	51,987	4,667	41,964	3,850	51,786	4,880
Ecuador	80,876	5,855	203,930	15,599	174,920	12,486
Guiana—						
British	120,016	12,391	116,120	12,202	140,514	16,014
Dutch	65,654	6,246	66,530	6,494	59,390	6,053
French	12,650	1,305	17,950	1,829	23,218	2,599
Peru	269,858	20,342	551,160	40,431	316,701	22,229
Uruguay	10,436	1,075	16,124	1,546	17,934	1,693
Venezuela	35,775	3,280	44,826	4,336	37,583	3,564
Asia and Oceania:						
Aden	480	50	....	....	....	....
Chinese Empire	32,189	2,321	59,110	4,386	23,126	2,154
Hongkong	105,581	7,652	122,482	9,959	144,624	13,367
Japan	9,051	713	22,881	1,775	2,472	269
Korea	1,632	128	1,500	129	1,156	126
Russia, Asiatic	1,440	102	770	84	582	65
Siam	....	....	1,440	90	3,264	282
Turkey in Asia	750	90	....	....	290	30
East Indies—						
British	477,234	38,263	1,043,618	75,001	702,169	59,254
French	16,262	1,162	....	....	720	75
Dutch	134,796	9,692	167,590	13,940	126,168	11,286
British Australasia	5,230,076	426,814	5,451,378	462,648	3,654,756	330,029
British Oceania	11,952	923	40,080	2,958	14,660	1,278
French Oceania	125,998	10,274	137,472	11,494	185,608	15,732
German Oceania	214,920	14,503	156,939	11,267	105,696	8,345
Philippine Islands	757,400	56,743	933,288	63,838	1,171,834	84,533
Africa:						
British Africa	1,029,787	87,881	504,848	47,748	454,892	43,883
Canary Islands	782	76	144	17	....	....
French Africa	144	14	....	....	48	6
German Africa	....	....	600	60	....	....
Liberia	....	....	....	....	5,079	482
Portuguese Africa	161,178	16,001	104,837	10,307	83,640	8,325
Turkey in Africa—Egypt	2,400	200	....	....	....	....
Total	45,944,414	3,847,943	25,218,105	2,183,049	28,226,045	2,438,518
RECAPITULATION.						
Europe	32,061,402	2,753,643	7,756,780	791,436	13,321,086	1,205,375
North America	2,069,357	171,946	3,052,658	261,138	2,654,175	242,879
South America	3,499,603	249,052	5,659,690	414,774	5,571,000	410,743
Asia	779,415	60,173	1,419,391	105,364	1,004,571	86,908
Oceania	6,340,346	509,257	6,719,157	552,205	5,131,554	439,917
Africa	1,194,291	103,872	610,429	58,132	543,659	52,696

EXPORTS, BY COUNTRIES, OF DOMESTIC CANNED SALMON, 1900 TO 1915—Continued.

Countries.	1909		1910	
	Pounds.	Value.	Pounds.	Value.
Europe:				
Azores, and Madeira Islands	....	....	100	$12
Denmark	192	$18	....	....
France	....	....	1,878	223
Germany	17,096	1,757	424	51
Italy	5,148	500	....	....
Netherlands	11,612	1,017	9,744	1,020
Russia on Baltic and White Seas	2,050	205	11,580	1,210
Spain	3,160	311	5,100	506
Sweden	20,000	1,940	....	....
United Kingdom	22,969,218	2,201,446	44,737,072	4,709,160
North America:				
Dominion of Canada	229,934	21,773	99,022	7,570
Mexico	756,052	58,124	697,217	50,782
Central American States—				
British Honduras	35,195	3,261	28,310	2,606
Costa Rica	118,266	9,828	157,946	12,237
Guatemala	13,957	1,117	16,821	1,361
Honduras	14,112	1,179	16,240	1,361
Nicaragua	21,534	1,656	28,116	2,066
Panama	528,228	50,940	482,717	45,404
Salvador	9,184	754	5,498	423
Bermuda	23,774	2,461	26,484	2,383
West Indies—				
British	358,114	36,644	548,561	53,939
Danish	14,848	1,568	14,655	1,512
Dutch	16,621	1,883	9,838	1,160
French	564	69	196	18
Haiti	2,184	203	2,038	185
Dominican Republic	13,258	1,306	22,120	2,058
Cuba	53,580	5,277	68,737	6,486
South America:				
Argentina	259,192	17,030	229,461	15,690
Bolivia	6,184	647	33,502	2,941
Brazil	176,150	17,109	267,354	28,241
Chile	97,993	6,918	1,556,629	92,259
Colombia	58,518	5,767	114,274	9,494
Ecuador	139,868	10,952	272,411	16,487
Guiana—				
British	255,039	25,981	222,398	22,133
Dutch	100,259	9,906	57,509	6,297
French	22,816	2,164	17,724	1,784
Peru	295,885	22,640	367,676	24,817
Uruguay	15,140	1,330	11,730	1,167
Venezuela	34,618	3,058	43,144	4,887
Asia and Oceania:				
Chinese Empire	53,448	4,887	28,522	2,688
China—British leased territory	....	....	3,120	345
Hongkong	103,448	9,707	121,558	12,234
Japan	15,078	1,245	3,716	352
Korea	2,652	266	2,016	220
Russia, Asiatic	5,380	894	....	....
Siam	14,880	1,025	1,008	93
East Indies—				
British	989,592	85,094	1,246,751	101,619
French	528	56	....	....
Dutch	201,696	16,908	189,604	15,920
All other Asia	....	....	480	45
British Australasia	5,704,960	590,094	5,474,818	551,312
British Oceania	109,936	7,437	66,826	5,160
French Oceania	162,336	14,570	241,200	22,589
German Oceania	279,792	18,311	360,576	22,554
Philippine Islands	1,126,470	74,792	5,425,404	396,604
Africa:				
British Africa	484,196	48,220	357,051	37,707
Canary Islands	510	51	....	....
German Africa	350	36	910	92
Portuguese Africa	162,314	14,604	151,470	14,674
Turkey in Africa—Egypt	....	....	1,440	120
Total	36,117,109	3,416,436	63,860,696	6,314,258
RECAPITULATION.				
Europe	23,022,476	2,207,194	44,765,898	4,712,182
North America	2,209,405	198,043	2,224,516	191,551
South America	1,461,662	123,502	3,193,812	226,197
Asia	1,386,702	119,582	1,596,775	133,516
Oceania	7,383,494	705,204	11,568,824	998,219
Africa	647,370	62,911	510,871	52,593

EXPORTS, BY COUNTRIES, OF DOMESTIC CANNED SALMON, 1900 TO 1915—Continued.

Countries.	1911		1912		1913	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Europe:						
Belgium			48,000	$4,000	13,000	$940
Denmark			134,871	13,484	186,996	17,485
Finland	12,000	$1,170			2,400	250
France			480	58	33,120	2,710
Germany	1,340	163	193,341	16,160	41,929	3,688
Gibraltar					2,400	250
Italy					720	75
Malta, Gozo, etc					9,600	732
Netherlands			240	35	9,456	1,005
Norway					250	26
Portugal			400	46		
Russia in Europe			1,700	175		
Spain	10,000	802	2,085	216	1,300	134
Sweden			96	10		
United Kingdom—						
England	22,110,988	2,406,573	10,148,107	2,148,328	25,076,343	2,674,626
Scotland			16,400	1,470	30,640	3,333
North America:						
Bermuda	19,348	2,242	32,648	3,549	58,392	5,633
British Honduras	45,396	4,478	25,980	2,873	27,153	2,768
Canada	53,828	4,470	353,309	33,159	992,053	105,813
Central American States—						
Costa Rica	152,101	14,215	205,304	19,989	100,964	7,627
Guatemala	23,696	2,417	38,925	4,056	53,991	4,162
Honduras	22,321	2,194	37,818	4,194	34,213	3,146
Nicaragua	61,096	6,173	70,702	6,981	128,597	9,185
Panama	318,672	30,866	386,612	43,371	587,909	48,959
Salvador	7,764	847	9,803	1,154	17,136	1,373
Mexico	663,681	59,405	1,454,580	126,613	1,427,853	102,853
West Indies—						
British—						
Barbados	48,261	5,028	84,207	8,884	32,303	3,542
Jamaica	94,259	9,987	266,972	29,207	288,243	26,107
Trinidad and Tobago	189,193	19,114	202,657	22,876	169,123	17,743
Other British	136,207	14,272	45,805	5,360	51,239	5,865
Cuba	78,814	7,817	109,953	11,462	160,933	13,281
Danish	14,180	1,414	8,661	1,020	6,716	742
Dutch	18,928	2,136	22,429	2,513	27,464	2,811
French	1,257	118	904	97	270	28
Haiti	3,058	358	10,818	1,213	12,765	1,210
Dominican Republic	27,890	3,086	43,089	4,161	94,393	7,975
South America:						
Argentina	217,994	18,828	986,832	89,468	110,404	9,984
Bolivia	32,908	3,500	102,574	9,460	43,648	2,329
Brazil	317,809	35,171	151,717	17,348	219,492	22,820
Chile	1,491,089	121,833	3,986,595	345,295	2,318,720	143,574
Colombia	100,311	10,467	191,535	18,600	173,760	13,018
Ecuador	228,948	18,018	294,280	26,498	293,175	17,787
Guiana—						
British	118,034	13,935	152,479	16,868	214,349	22,438
Dutch	85,909	8,827	135,514	15,143	69,223	6,578
French	15,976	1,604	18,820	2,235	21,178	1,605
Paraguay			648	72		
Peru	295,235	24,170	580,285	51,855	513,311	34,129
Uruguay	12,940	1,294	18,897	2,292	8,633	883
Venezuela	89,774	9,796	127,264	14,243	148,878	17,222
Asia:						
Aden					240	21
China	22,188	2,867	33,504	4,340	83,568	6,760
China, leased territory—						
Japanese					192	22
Chosen	1,536	208	1,488	223	13,200	1,011
East Indies—						
British—						
British India	107,376	10,423	171,690	17,177	550,694	38,069
Straits Settlements	1,077,096	104,931	787,020	67,317	1,635,282	116,365
Other British	43,104	4,447	73,632	7,180	143,865	8,962
Dutch	171,840	17,937	253,026	24,813	356,448	31,084
French	96	8				
Hongkong	61,650	7,362	144,552	17,115	767,810	49,360
Japan	3,072	347	235,114	21,667	2,256	289
Russia in Asia			1,440	144		
Siam	960	147	960	143	39,360	2,208
Turkey in Asia	364	44			632	58

EXPORTS, BY COUNTRIES, OF DOMESTIC CANNED SALMON, 1900 TO 1915—Continued.

Countries.	1911		1912		1913	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Oceania:						
British—						
Australia and Tasmania	5,812,096	$687,854	5,494,218	$765,678	6,331,184	$764,379
New Zealand	137,088	13,791	79,924	9,569	194,836	20,377
Other British	172,092	14,137	33,830	4,035	53,006	4,036
French	241,112	28,225	231,980	31,184	335,800	34,790
German	268,118	22,048	283,753	22,682	381,744	27,560
Philippine Islands	3,069,118	225,885	5,096,810	422,001	10,122,820	590,128
Africa:						
British Africa—						
West	....	....	200	25	9,400	1,020
South	213,538	23,488	630,653	64,562	376,977	31,170
Egypt	....	....	7,392	861	20,936	1,808
German Africa	1,710	293	2,700	290	2,830	305
Liberia	100	12	146	15	....	....
Portuguese Africa	48,490	4,611	145,738	13,409	52,460	5,029
Spanish Africa	26,850	2,229	650	76	800	85
Total	38,600,799	4,037,142	43,423,756	4,620,563	55,290,966	5,103,340
RECAPITULATION.						
Europe	22,134,328	2,408,708	19,545,720	2,183,982	25,408,154	2,705,254
North America	1,979,950	190,637	3,411,176	332,692	4,271,710	370,823
South America	3,006,927	266,903	6,756,440	609,383	4,134,771	292,367
Asia	1,489,282	148,721	1,702,426	160,119	3,593,538	254,209
Oceania	9,699,624	991,540	11,220,515	1,255,149	17,419,390	1,441,270
Africa	290,688	30,633	787,479	79,238	463,403	39,417

Countries.	1914		1915	
	Pounds.	Value.	Pounds.	Value.
Europe:				
Belgium	45,590	$3,024	99,688	$8,036
Denmark	75,693	6,110	858,123	80,918
France	14,400	1,443	14,775	1,388
Germany	85,738	4,870	....	....
Gibraltar	5,100	541	1,200	120
Greece	....	....	30	3
Italy	6,720	644	3,864	360
Malta, Gozo, etc	2,400	300	....	....
Netherlands	11,000	1,100	493,350	51,031
Norway	3,300	320	56,530	7,341
Portugal	....	....	700	68
Spain	3,795	365	34,080	3,670
Sweden	7,200	700	....	....
Turkey in Europe	1,500	150	600	57
United Kingdom—				
England	62,318,612	5,982,247	62,053,818	6,944,736
Scotland	274,080	23,906	144,000	13,000
Ireland	7,200	450	....	....
North America:				
Bermuda	43,346	3,986	62,493	5,936
British Honduras	31,486	3,430	28,392	3,071
Canada	3,632,465	314,917	2,118,808	168,487
Central American States—				
Costa Rica	149,848	10,247	54,846	4,960
Guatemala	46,171	3,744	17,183	1,656
Honduras	57,387	5,821	40,645	4,330
Nicaragua	50,497	3,880	20,656	1,940
Panama	367,678	31,350	397,172	41,269
Salvador	13,806	1,050	8,474	797
Mexico	754,172	53,665	636,649	53,816
Miquelon, Langley, etc	....	....	48	4
Newfoundland and Labrador	....	....	980	98
West Indies—				
British—				
Barbados	77,836	6,013	41,375	3,591
Jamaica	188,856	17,805	84,950	7,520
Trinidad and Tobago	175,590	16,171	201,665	21,681
Other British	73,274	7,158	68,507	7,795
Cuba	306,749	21,917	408,874	31,934
Danish	13,259	1,273	9,934	886
Dutch	34,511	3,181	28,855	2,809
French	894	95	1,773	162
Haiti	2,670	260	1,478	110
Dominican Republic	77,120	5,682	94,489	7,232

EXPORTS, BY COUNTRIES, OF DOMESTIC CANNED SALMON, 1900 TO 1915—Continued.

Countries.	1914		1915	
	Pounds.	Value.	Pounds.	Value.
South America:				
Argentina	51,444	$4,472	185,826	$16,860
Bolivia	26,904	1,634	22,080	1,710
Brazil	80,129	7,211	28,799	2,883
Chile	2,123,237	134,678	326,579	22,734
Colombia	183,508	12,760	94,659	8,187
Ecuador	277,488	15,280	207,104	15,458
Guiana—				
British	132,455	13,444	110,516	11,752
Dutch	97,859	8,153	57,134	5,486
French	7,266	665	18,434	1,647
Peru	301,374	19,091	79,642	6,591
Uruguay	4,660	351	3,922	379
Venezuela	186,074	15,936	167,267	14,096
Asia:				
Aden	552	28	....	....
China	45,504	3,980	66,673	6,779
China, leased territory—				
British	1,920	200	....	....
Chosen	2,928	266	816	102
East Indies—				
British—				
British India	327,817	21,168	301,654	26,639
Straits Settlements	1,541,408	90,292	266,172	20,949
Other British	135,840	9,141	132,380	10,488
Dutch	331,776	22,408	309,154	26,815
French	624	43	2,400	220
Hongkong	480,036	32,109	47,472	4,587
Japan	2,614	274	5,000	518
Russia in Asia	144	13	470	56
Siam	480	60	3,552	502
Turkey in Asia	4,352	420	50	7
Oceania:				
British—				
Australia and Tasmania	5,961,723	666,703	7,367,824	957,058
New Zealand	95,136	9,289	118,032	13,780
Other British	73,984	5,168	36,050	3,524
French	389,424	37,218	223,008	24,139
German	534,484	33,247	295,920	22,327
Philippine Islands	5,034,252	266,369	4,059,580	288,548
Africa:				
British Africa—				
West	....	....	109,728	10,749
South	295,607	24,561	598,223	55,079
Canary Islands	....	....	542	66
Egypt	15,024	1,059	38,800	3,160
German Africa	2,860	306	....	....
Italian Africa	2,400	230	....	....
Liberia	....	....	4,820	412
Portuguese Africa	36,650	3,238	65,530	6,859
Spanish Africa	1,000	113	1,300	125
Total	87,750,920	7,999,293	83,446,116	9,072,083
RECAPITULATION.				
Europe	62,862,328	6,026,170	63,760,758	7,110,728
North America	6,907,615	511,545	4,328,246	370,444
South America	3,472,438	233,675	1,301,962	107,783
Asia	2,875,995	180,402	1,135,793	97,662
Oceania	12,089,003	1,017,994	12,100,414	1,309,376
Africa	353,541	29,507	818,943	76,450

The table following shows for the past 16 years the customs districts from which the canned salmon was exported. Up to 1910 about two-thirds of the total exports have gone from the port of San Francisco, while about one-fifth of the total passed through the port of Puget Sound, Wash. In 1910, however, the exports from Puget Sound exceeded those from San Francisco. The only other port through which any considerable quantity is shipped is New York

City. It is usual now to load the salmon on steamers and sailing vessels at San Francisco and the Puget Sound cities to go direct to Europe.

EXPORTS, BY CUSTOMS DISTRICTS, OF CANNED SALMON, 1900 TO 1915.

Customs districts from which exported.	1900		1901		1902	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Atlantic ports:						
Baltimore, Md	648	$65	334,580	$33,053	324	$34
Bangor, Me	...	...	...	...	10	1
Boston and Charlestown, Mass	222,770	20,488	192,676	27,372	172,110	20,224
New York, N. Y	3,485,326	340,538	7,960,104	847,294	4,365,074	407,000
Philadelphia, Pa	110,500	9,100	77,000	9,050	...	...
Savannah, Ga	1,012	81	582	72	480	60
St. Johns, Fla	...	...	...	...	75	7
Norfolk and Portsmouth, Va	...	...	269,380	30,888	...	...
Charleston, S. C	400	30	...	...	...	...
Gulf ports:						
Key West, Fla	...	...	400	43	...	...
Mobile, Ala	10,536	958	7,340	816	11,032	1,055
New Orleans, La	28,332	2,472	47,685	4,567	39,084	3,910
Mexican border ports:						
Arizona	6,253	706	18,104	1,869	23,879	2,350
Brazos de Santiago, Tex	168	21	816	115	300	29
Paso del Norte, Tex	23,843	2,134	1,220	98	164,167	13,119
Pacific ports:						
Alaska	289	38	4,859	291	3,636	558
Hawaii	...	...	...	...	48	4
Puget Sound, Wash	1,477,232	144,059	2,271,306	282,441	9,864,259	872,912
San Diego, Cal	3,094	220	3,574	293	6,202	487
San Francisco, Cal	21,611,030	2,164,904	30,014,055	2,983,982	32,327,572	2,654,020
Willamette, Oreg	76,800	5,320	43,318	3,517	155,500	11,250
Northern border and Lake ports:						
Detroit, Mich	...	...	26,200	2,700	...	...
Minnesota, Minn	...	...	101	10	...	...
Vermont, Vt	120	12	...	...	...	...
Duluth, Minn	24,000	2,500	16,200	1,800	39,312	4,368
Memphremagog, Vt	17	2	...	...	50	5
Total	27,082,370	2,693,648	41,289,500	4,230,271	47,173,114	3,991,402
RECAPITULATION.						
Atlantic ports	3,820,656	370,302	8,834,322	947,729	4,538,073	427,335
Gulf ports	38,868	3,430	55,425	5,426	50,116	4,965
Mexican border ports	30,264	2,861	20,140	2,082	188,346	15,498
Pacific ports	23,168,445	2,314,541	32,337,112	3,270,524	42,357,217	3,539,231
Northern border and Lake ports	24,137	2,514	42,501	4,510	39,362	4,373

Customs districts from which exported.	1903		1904		1905	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Atlantic ports:						
Baltimore, Md	840	$92	490	$50	576	$62
Bangor, Me	...	...	121	9	294	26
Boston and Charlestown, Mass	104,750	12,266	2,400	215	...	...
New York, N. Y	5,627,654	599,393	2,129,523	214,016	2,683,775	266,599
Philadelphia, Pa	540	54	587	42	8,858	576
Providence, R. I	685	63	...	...	...	...
Gulf ports:						
Key West, Fla	...	...	1,500	125	460	23
Mobile, Ala	9,012	824	9,203	811	7,102	561
New Orleans, La	44,404	4,261	61,909	5,503	89,999	7,841
Tampa, Fla	...	...	180	16	...	...
Mexican border ports:						
Arizona	26,988	2,803	7,568	745	20,845	1,878
Brazos de Santiago, Tex	...	...	96	7	...	...
Paso del Norte, Tex	103,375	8,938	347,218	23,401	262,014	20,687
Saluria, Tex	...	...	366	30	6,580	583

EXPORTS, BY CUSTOMS DISTRICTS, OF CANNED SALMON, 1900 TO 1915—Continued.

Customs districts from which exported.	1903		1904		1905	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Pacific ports:						
Alaska			153,600	$9,550	4,848	$557
Hawaii			48	7	148	15
Puget Sound, Wash	16,527,456	$1,549,319	19,766,003	1,655,666	4,444,562	326,485
San Diego, Cal	5,897	421	5,678	422	3,594	259
San Francisco, Cal	27,448,182	2,138,019	33,212,614	3,303,292	27,498,325	2,406,422
Willamette, Oreg	409,444	29,142	224,549	10,628	5,775	531
Oregon, Oreg	400	25				
Northern border and Lake ports:						
Detroit, Mich			580	58		
North and South Dakota			20	2		
Superior, Mich					28,800	2,364
Vermont, Vt	74	7	25	3		
Duluth, Minn	43,033	5,164				
Total	50,353,334	4,350,791	55,924,278	5,224,508	35,066,555	3,035,469
RECAPITULATION.						
Atlantic ports	5,734,469	611,868	2,133,121	214,332	2,693,503	267,263
Gulf ports	54,016	5,085	72,792	6,455	97,561	8,425
Mexican border ports	130,363	11,741	355,248	24,183	289,439	23,148
Pacific ports	44,391,379	3,716,926	53,362,492	4,979,565	31,957,252	2,734,269
Northern border and Lake ports	43,107	5,171	625	63	28,800	2,364

Customs districts from which exported.	1906		1907		1908	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Atlantic ports:						
Baltimore, Md	196	$21	156	$28	301	$37
New York, N. Y	3,275,875	318,128	2,313,335	227,646	2,332,392	226,850
Philadelphia, Pa	1,400	159	722	67	720	71
Portland and Falmouth, Me	100	13				
St. Johns, Fla			322	38	1,250	155
Gulf ports:						
Galveston, Tex	60	8	40,213	3,216	292	23
Key West, Fla	890	94	312	25	190	18
Mobile, Ala	38,267	3,031	11,675	992	10,823	1,051
New Orleans, La	88,014	7,775	112,850	10,217	194,711	18,144
Sabine, Tex					104	9
Tampa, Fla	24	2				
Mexican border ports:						
Arizona	45,883	4,128	34,479	3,268	43,035	3,856
Corpus Christi, Tex					30,930	2,775
Paso del Norte, Tex	387,568	30,336	513,202	42,548	626,837	56,147
Saluria, Tex	21,962	1,666	22,662	1,960	22,887	2,341
Pacific ports:						
Alaska			305,294	33,315	790	99
Hawaii					144	14
Los Angeles, Cal	840	53				
Puget Sound, Wash	17,286,930	1,499,819	9,340,000	845,982	6,351,440	528,558
San Diego, Cal	4,228	331	8,456	661	6,994	567
San Francisco, Cal	24,613,868	1,969,214	12,502,876	1,012,199	18,601,705	1,597,735
Willamette, Oreg	540	55	3,723	241	100	22
Northern border and Lake ports:						
Huron, Mich	177,734	13,107	7,000	570		
Minnesota, Minn			48	5		
Oswegatchie, N. Y			780	71	400	46
Vermont, Vt	35	3				
Total	45,944,414	3,847,943	25,218,105	2,183,049	28,226,045	2,438,518
RECAPITULATION.						
Atlantic ports	3,277,571	318,321	2,314,535	227,779	2,334,663	227,113
Gulf ports	127,255	10,910	165,050	14,450	206,120	19,245
Mexican border ports	455,413	36,130	570,343	47,776	723,689	65,119
Pacific ports	41,906,406	3,469,472	22,160,349	1,892,398	24,961,173	2,126,995
Northern border and Lake ports	177,769	13,110	7,828	646	400	46

EXPORTS, BY CUSTOMS DISTRICTS, OF CANNED SALMON, 1900 TO 1915—Continued.

Customs districts from which exported.	1909		1910	
	Pounds.	Value.	Pounds.	Value.
Atlantic ports:				
Baltimore, Md	192	$22	36	$3
Bangor, Me	216	25	...	...
Boston and Charlestown, Mass	162,024	16,837	3,000	280
New York, N. Y	3,848,870	390,266	2,999,480	305,732
Philadelphia, Pa	405	44	700	89
Norfolk and Portsmouth, Va	32,100	2,739	...	...
Perth Amboy, N. J	...	...	214	18
Gulf ports:				
Galveston, Tex	876	88	155	12
Key West, Fla	40	4	340	27
Mobile, Ala	13,565	1,247	14,018	1,322
New Orleans, La	92,537	7,615	103,980	8,187
Tampa, Fla	...	...	66	6
Mexican border ports:				
Arizona	27,735	2,733	54,425	4,612
Brazos de Santiago, Tex	138	13	641	64
Corpus Christi, Tex	26,220	2,450	27,366	2,414
Paso del Norte, Tex	150,636	14,850	125,169	11,560
Saluria, Tex	14,399	1,528	47,117	2,853
Pacific ports:				
Alaska	66,020	6,263	...	...
Los Angeles, Cal	13,370	934	9,229	820
Puget Sound, Wash	7,858,552	716,370	32,406,617	3,331,174
San Diego, Cal	5,546	460	6,355	583
San Francisco, Cal	23,761,656	2,247,957	28,027,911	2,641,608
Willamette, Oreg	...	...	78	11
Northern border and Lake ports:				
Detroit, Mich	42,000	8,990	...	...
North and South Dakota	12	1	...	...
Duluth, Minn	...	...	33,200	2,800
Montana and Idaho	...	...	600	83
Total	36,117,109	3,416,436	63,860,696	6,314,258
RECAPITULATION.				
Atlantic ports	4,043,807	409,933	3,003,430	306,122
Gulf ports	107,018	8,954	118,559	9,554
Mexican border ports	219,128	21,574	254,717	21,503
Pacific ports	31,705,144	2,971,984	60,450,190	5,974,196
Northern border and Lake ports	42,012	3,991	33,800	2,883

Customs districts from which exported.	1911		1912	
	Pounds.	Value.	Pounds.	Value.
Atlantic ports:				
Baltimore, Md	63	$10	13	$4
Bangor, Me	96	11	...	...
Boston and Charlestown, Mass	...	...	24	5
Jacksonville, Fla	...	...	48	8
New York, N. Y	1,563,285	166,819	2,505,950	257,647
Perth Amboy, N. J	440	42	690	97
Philadelphia, Pa	601	89	264	31
Gulf ports:				
Galveston, Tex	48	4	...	...
Key West, Fla	232	28	...	...
Mobile, Ala	19,512	1,873	5,313	515
New Orleans, La	139,567	13,284	103,732	11,514
Mexican border ports:				
Arizona	21,915	2,180	23,631	2,052
Brazos de Santiago, Tex	554	48	...	...
Corpus Christi, Tex	32,863	3,232	64,114	6,962
Paso del Norte, Tex	131,258	12,438	275,768	25,297
Saluria, Tex	26,636	2,495	51,746	4,144
Pacific ports:				
Alaska	...	...	351,552	32,958
Hawaii	24	4	24	5
Los Angeles, Cal	3,148	308	...	...
Portland, Oreg	1,730	133	1,093,200	109,295
Puget Sound, Wash	10,622,314	1,043,813	19,337,626	1,866,541
San Diego, Cal	9,055	820	17,047	1,585
San Francisco, Cal	26,027,458	2,789,506	19,591,609	2,301,732

EXPORTS, BY CUSTOMS DISTRICTS, OF CANNED SALMON, 1900 TO 1915—Continued.

Customs districts from which exported.	1911		1912	
	Pounds.	Value.	Pounds.	Value.
Northern border and Lake ports:				
Superior, Mich.	....	....	1,405	$171
Total	38,600,799	$4,037,142	43,423,756	4,620,563
RECAPITULATION.				
Atlantic ports	1,564,485	166,971	2,506,989	257,792
Gulf ports	159,359	15,194	109,045	12,029
Mexican border ports	213,226	20,393	415,259	38,455
Pacific ports	36,663,729	3,834,584	40,391,058	4,312,116
Northern border and Lake ports	....	....	1,405	171

Customs districts from which exported.	1913		1914		1915	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
New York	1,935,881	$189,959	2,404,220	$207,924	5,316,456	$512,549
New Orleans	....	....	182,717	19,787	261,709	28,682
El Paso	....	....	120,140	9,045	176,390	12,348
San Francisco	31,687,774	3,277,841	38,844,912	3,600,636	35,321,058	4,209,914
Oregon	624,000	83,000	124,512	9,391	671,452	64,517
Washington	19,827,745	1,434,451	45,876,703	4,138,449	41,064,868	4,183,410
All other districts	1,215,566	118,089	197,716	14,061	634,183	60,663
Total	55,290,966	5,103,340	87,750,920	7,999,293	83,446,116	9,072,083

EXPORTS OF FRESH AND CURED SALMON.

The following table shows, by countries, the value of the exports of fresh and cured salmon for the period 1900 to 1914, inclusive. As with the canned salmon, the greater part of these exports go to European countries, Germany taking by far the largest quantity. A small portion of this is salmon caught in eastern waters.

EXPORTS, BY COUNTRIES RECEIVING, OF DOMESTIC PICKLED, FRESH, ETC., SALMON, 1900 TO 1914.

Exported to—	1900	1901	1902	1903	1904	1905
Europe:						
Azores, and Madeira Islands	$3	....	....	....	$123	$85
Belgium	....	$1,062	$88	....	4,750	....
Denmark	378	15,285	16,904	$653	2,315	22,952
France	180	300	....	....	57	....
Germany	300,291	320,369	470,657	741,634	1,061,944	1,666,787
Greece	....	....	....	....	....	158
Italy	....	....	....	....	....	100
Malta, Gozo, etc	475	55	280	28	....	....
Netherlands	50	184	3,023	4,127	3,105	300
Norway	....	....	....	12,765	12,295	7,896
Russia in Europe	300	....	....	....	....	2,574
Spain	....	....	....	....	....	56
Sweden	7	5,595	5,685	....	1,838	17,776
United Kingdom	38,959	1,528	....	990	8,523	29,355
North America:						
Bermuda	88	14	11	21	....	246
British Honduras	7	9	....	22	120	94
Dominion of Canada—						
Nova Scotia, New Brunswick, etc.	....	....	....	....	418	3
Quebec, Ontario, Manitoba, etc	1,516	2,555	1,051	6,083	3,572	7,499
British Columbia	80,652	53,922	125,916	53,592	25,913	10,299

EXPORTS, BY COUNTRIES RECEIVING, OF DOMESTIC PICKLED, FRESH, ETC., SALMON, 1900 TO 1915—Continued.

Exported to—	1900	1901	1902	1903	1904	1905
North America—Continued.						
Central American States—						
Costa Rica	$220	$703	$218	$178	$340	$192
Guatemala			27	11	1	208
Honduras		5		1	2	26
Nicaragua	53	26	40	78	40	75
Panama					167	315
Salvador		22		7		
Mexico	1,330	664	1,925	1,397	1,266	1,136
West Indies—						
British	943	939	2,348	5,150	3,867	4,999
Cuba	429	376	273	114	194	162
Danish	12	31	38	84	13	67
Dutch	195	167	293	177	197	238
French	126	122	315	199	273	100
Haiti	181	191	164	54	11	124
Porto Rico	1,214					
Dominican Republic	998	670	85	57	14	26
South America:						
Argentina					143	1,641
Bolivia			1,200			
Brazil	172	38	419	385	227	1,160
Chile	142			70	164	
Colombia	416	223	657	441	17	
Ecuador			65			15
Guiana—						
British	30	82	30	262	60	161
Dutch	400	226	286	11	766	176
French	420	290	134	434	251	65
Peru	26		27	62	194	112
Venezuela	96	42	245	25		108
Asia:						
Chinese Empire		400	25	9	54	201
China—Russian				15		
East Indies—						
British		121	71	30	115	135
Dutch					275	
Hongkong	507		519	1,840	462	4,797
Japan	2,807	14,516	25,228	3,499	476	25,037
Russia—Asiatic	10					
Oceania:						
British Australasia	39,867	618	33,785	31,503	25,208	21,595
All other British Oceania			346	29	27	22
French Oceania	1,958	1,729	1,325	1,877	1,838	2,290
German Oceania			13	948	977	861
Guam	57	3,420				
Hawaii	58,870					
Philippine Islands			384	478	13	308
Tonga, Samoa, and all other	636	215				
Tutuila			10			
Africa:						
British Africa—						
West			304			
South	170	24	21	12	859	114
French Africa	85					
Liberia					5	
Total	535,276	426,738	694,435	869,352	1,163,489	1,832,655
RECAPITULATION.						
Europe	340,643	344,368	496,637	760,197	1,094,950	1,748,039
North America	87,964	60,416	132,704	67,225	36,408	25,809
South America	1,702	901	3,063	1,690	1,822	3,438
Asia	3,324	15,037	25,843	5,393	1,382	30,170
Oceania	101,388	5,982	35,863	34,835	28,063	25,085
Africa	255	24	325	12	864	114

EXPORTS, BY COUNTRIES RECEIVING, OF DOMESTIC PICKLED, FRESH, ETC., SALMON, 1900 TO 1915—Continued.

Exported to—	1906	1907	1908	1909	1910
Europe:					
Azores, and Madeira Islands		$95			
Belgium	$114			$410	
Denmark	36,623	108,269	$90,015	81,195	$83,580
France		150		250	415
Germany	1,670,366	1,601,166	1,422,846	1,038,530	1,223,595
Italy	137				
Netherlands	793	264	2,947		
Norway	9,303	11,390	22,104	22,917	45,885
Portugal		1,650			
Russia in Europe		140		14,735	5,260
Spain		55		289	
Sweden	32,554	23,469	21,540	23,670	42,725
United Kingdom	26,196	48,237	28,083	43,952	66,555
North America:					
Bermuda	173	20	23	68	630
British Honduras	14		1,036		
Dominion of Canada—Nova Scotia, New Brunswick, etc	32,925	18,785	16,964	21,973	23,559
Central American States—					
Costa Rica	46	213	189	217	197
Guatemala	40		902	18	62
Honduras		92	2,451		
Nicaragua	39	27	1,317	31	11
Panama	380	2,211	1,878	175	775
Mexico	1,231	528	460	199	555
West Indies—					
British	1,646	208	975	4,890	3,067
Cuba	128	371	104	121	97
Danish	30	108	39	165	42
Dutch	94	93		49	78
French		16	19	14	19
Haiti	97	277	678	335	283
Dominican Republic	100	255	228	128	313
South America:					
Argentina	85	500			
Brazil	308			120	3,029
Chile	15	20	56		
Colombia	105	67	90	22	167
Ecuador		391		290	
Guiana—					
British	218	5	48	76	823
Dutch	287	133	130	271	217
French	57	36	75	21	695
Peru	1,317	1,163	118	555	
Venezuela	208	36			311
Uruguay				10	
Asia:					
Chinese Empire	3,391	293	170	41	89
East Indies—					
British	63		66	18	60
Dutch					41
Hongkong	1,339	687	13	809	10
Japan	88,068	18,395	3,592	2,772	90
Korea		3			8
Russia—Asiatic		6	121		
Turkey in Asia					55
Oceania:					
British Australasia	15,169	23,186	26,591	25,466	22,826
All other British Oceania	21		11		89
French Oceania	2,154	2,136	1,792	1,528	1,886
German Oceania	749	1,112	373	1,229	1,189
Philippine Islands	821	12,287		712	2,089
Africa:					
British Africa—South	20				1,268
Liberia	40				
Portuguese Africa			198		
Spanish Africa				289	
Total	1,927,464	1,878,743	1,648,044	1,288,560	1,532,640
RECAPITULATION.					
Europe	1,776,086	1,794,885	1,587,535	1,225,948	1,408,015
North America	36,943	23,204	27,263	28,383	29,688
South America	2,600	2,351	517	1,365	5,242
Asia	92,861	19,384	3,962	3,640	348
Oceania	18,914	38,721	28,767	28,935	28,079
Africa	60	198		289	1,268

EXPORTS, BY COUNTRIES RECEIVING, OF DOMESTIC PICKLED, FRESH, ETC., SALMON, 1900 TO 1915—Continued.

Exported to—	1911	1912	1913	1914	1915
Europe:					
Austria-Hungary	...	...	...	$75	...
Belgium	...	...	$730	...	$5
Denmark	$65,472	$72,661	53,494	84,727	717,157
Finland	16,515	15,608	12,582	18,395	2,840
France	150	4,427	400	3,061	498
Germany	1,320,055	1,358,545	1,857,500	1,837,624	109,399
Greece	...	...	...	...	300
Italy	...	...	...	...	10,000
Netherlands	1,267	...	2,100	7,550	...
Norway	14,437	27,953	23,516	38,886	415,090
Russia in Europe	...	130	...	...	...
Sweden	33,382	49,699	44,635	34,312	43,460
United Kingdom—England	59,906	58,950	60,152	49,869	76,374
North America:					
Bermuda	94	332	...	324	138
British Honduras	307	...	...	276	...
Canada	20,539	17,457	31,562	82,742	15,458
Central American States—					
Costa Rica	98	91	227	127	84
Guatemala	111	12	7	18	90
Honduras	179	...	...	...	...
Nicaragua	347	13	10	2	9
Panama	198	167	1,009	395	1,544
Salvador	...	28	...	23	41
Mexico	21	319	450	584	250
Miquelon, Langley, etc	...	...	...	...	16
Newfoundland and Labrador	...	...	...	...	17
West Indies—					
British—					
Barbados	956	...	250	...	520
Jamaica	7	...	3	41	176
Trinidad and Tobago	135	...	45	253	576
Other British	41	110	...	...	17
Cuba	778	138	457	233	637
Danish	...	...	123	47	16
Dutch	34	81	...	86	136
French	...	124	49	...	...
Haiti	731	800	16	385	154
Dominican Republic	304	678	533	551	507
South America:					
Bolivia	...	...	30	...	...
Brazil	225	80	173	...	95
Chile	2	...	14	258	...
Colombia	71	43	3,162	...	27
Ecuador	...	...	...	109	15
Guiana—					
British	28	...	...	470	...
Dutch	...	...	...	78	140
French	...	...	16	...	7
Peru	24	...	14	...	290
Venezuela	34	19	...	18	44
Asia:					
China	299	21	39	122	8
China, leased terr.—Japanese	...	...	...	...	820
Chosen	8	45	25	26	8
East Indies—British—					
British India	...	31	522	28	...
Other British	7	...	...	...	...
Hongkong	1,330	...	779	1,960	9
Japan	2,289	10	33	292	370
Russia in Asia	...	...	...	...	50
Turkey in Asia	...	...	...	...	102
Oceania:					
British—					
Australia and Tasmania	23,838	14,682	17,972	26,559	25,271
New Zealand	1,101	128	2,795	364	201
Other British	335	67	49	74	117
French	1,834	2,241	1,222	1,425	1,012
German	1,684	2,020	1,727	727	494
Philippine Islands	3,542	2,437	1,934	2,181	325
Africa:					
British Africa—					
South	...	4	1,210	...	...
East	424	...	...	...	...
Egypt	...	...	...	32	...
French Africa	...	...	1,000	...	...
Total	1,573,139	1,630,151	2,122,566	2,195,309	1,424,859

EXPORTS, BY COUNTRIES RECEIVING, OF DOMESTIC PICKLED, FRESH, ETC., SALMON, 1900 TO 1915—Continued.

Exported to—	1911	1912	1913	1914	1915
RECAPITULATION.					
Europe	$1,511,184	$1,587,973	$2,055,109	$2,074,499	$1,375,123
North America	24,880	20,350	34,741	86,087	20,336
South America	384	142	3,409	933	618
Asia	3,933	107	1,398	2,428	1,362
Oceania	32,334	21,575	25,699	31,330	27,420
Africa	424	4	2,210	32	....

The exports of domestic fresh and cured salmon from 1900 to 1915, inclusive, are shown below, by customs districts. The greater part of the shipments pass through the New York City customs district:

EXPORTS, BY CUSTOMS DISTRICTS, OF DOMESTIC PICKLED, FRESH, ETC., SALMON, 1900 TO 1915.

Customs districts from which exported.	1900	1901	1902	1903	1904	1905
Atlantic ports:						
Baltimore, Md	....	....	$158	....	....	$8
Bangor, Me	....	....	....	....	....	3
Belfast, Me	$12	$17	12	$19	$7	....
Boston and Charlestown, Mass	16	....	34	52	418	....
New York, N. Y	346,853	330,805	503,219	766,128	1,102,542	1,757,742
Philadelphia, Pa	10	....	....	1,151	7	....
Portland and Falmouth, Me	11	68	16	47	60	79
Savannah, Ga	22	....	....	....	....	....
Gulf ports:						
Mobile, Ala	....	....	....	30	8	96
New Orleans, La	....	5	143	....	116	63
Mexican border ports:						
Arizona	18	85	416	115	....	14
Brazos de Santiago, Tex	....	....	....	19	4	....
Corpus Christi, Tex	414	13	....	30	208	....
Paso del Norte, Tex	760	67	13	....	80	206
Saluria, Tex	....	370	1,428	1,063	868	777
Pacific ports:						
Alaska	2,377	12,422	293	4,375	1,003	1,184
Oregon, Oreg	....	17,500	....	....	....	....
Puget Sound, Wash	80,493	55,727	150,906	58,278	29,212	36,145
San Diego, Cal	108	19	20	34	73	4
San Francisco, Cal	102,666	7,030	36,958	36,331	25,851	27,939
Willamette, Oreg	....	....	....	....	28	1,500
Northern border and Lake ports:						
Champlain, N. Y	234	1,464	449	1,542	1,183	2,142
Detroit, Mich	....	742	24	....	1,393	4,445
Genesee, N. Y	....	....	....	....	26	....
Huron, Mich	456	121	225	55	....	....
Memphremagog, Vt	....	....	6	7	24	....
Montana and Idaho	2	6	....	....	....	6
North and South Dakota	523	162	95	36	378	247
Superior, Mich	....	....	....	....	....	33
Vermont, Vt	301	115	20	40	....	22
Total	535,276	426,738	694,435	869,352	1,163,489	1,832,655
RECAPITULATION.						
Atlantic Ports	346,924	330,890	503,439	767,397	1,103,034	1,757,832
Gulf ports	....	5	143	30	124	159
Mexican border ports	1,192	535	1,857	1,227	1,160	997
Pacific ports	185,644	92,698	188,177	99,018	56,167	66,772
Northern border and Lake ports	1,516	2,610	819	1,680	3,004	6,895

EXPORTS, BY CUSTOMS DISTRICTS, OF DOMESTIC PICKLED, FRESH, ETC., SALMON, 1900 TO 1915—Continued.

Customs districts from which exported.	1906	1907	1908	1909	1910	1911	1912
Atlantic ports:							
Baltimore, Md	$11			$31		$36	$77
Bangor, Me			$7	58			2
Belfast, Me	15	$8		11	$12		
New York, N. Y	1,781,330	1,786,105	1,590,757	1,230,436	1,479,625	1,514,563	1,586,221
Philadelphia, Pa	105						
Portland and Falmouth, Me	15	11,298	14	6	19		
Perth Amboy, N. J							19
Gulf ports:							
Mobile, Ala	14		128			201	
New Orleans, La		276	7,098	49	74	1,341	
Mexican border ports:							
Arizona	700	134	13	25		14	6
Brazos de Santiago, Tex					5		
Corpus Christi, Tex						4	140
Paso del Norte, Tex	8	290	154				
Saluria, Tex	80				197		56
Pacific ports:							
Alaska	44,436	451	803	1,091	212	4,517	2,532
Portland, Oreg						1,330	
Puget Sound, Wash	63,626	44,492	14,370	11,677	22,666	10,349	11,191
San Diego, Cal	44		28	4	12	3	
San Francisco, Cal	31,500	28,984	29,112	37,305	27,628	29,968	19,467
Willamette, Oreg				743	3		
Hawaii				14			
Northern border and Lake ports:							
Buffalo Creek, N. Y				3,069			1,030
Cape Vincent, N. Y		92					
Champlain, N. Y	992	4,333	1,359	2,079	598	9,616	3,928
Detroit, Mich	3,954	1,972	1,667			12	
Duluth, Minn					68		108
Huron, Mich	428		284	891		247	
Memphremagog, Vt					20		
Minnesota, Minn	40	52	798	59		301	21
Montana and Idaho	69	92	45	154	82	65	
Niagara, N. Y						426	799
North and South Dakota	36	3	20			10	
Superior, Mich							4,427
Vermont, Vt	61	161	1,387	858	1,419	136	127
Total	1,927,464	1,878,743	1,648,044	1,288,560	1,532,640	1,573,139	1,630,151
RECAPITULATION.							
Atlantic ports	1,781,476	1,797,411	1,590,778	1,230,542	1,479,656	1,514,599	1,586,319
Gulf ports	14	276	7,226	49	74	1,542	
Mexican border ports	788	424	167	25	202	18	202
Pacific ports	139,606	73,927	44,313	50,834	50,521	46,167	33,190
Northern border and Lake ports	5,580	6,705	5,560	7,110	2,187	10,813	10,440

Customs districts from which exported.	1913	1914	1915	Customs districts from which exported.	1913	1914	1915
New York	$2,000,068	$2,067,306	$1,377,840	All other districts	$8,119	$21,418	$9,592
Alaska	20,995	16,932	6,630	Total	2,122,566	2,195,309	1,424,859
Puget Sound	7,354	59,713	2,020				
San Francisco	26,030	29,880	28,777				

IMPORTS OF FRESH SALMON.

For some years it has been the custom of the canneries on Puget Sound, when fish were scarce on the American side and abundant on the Canadian side, to import fresh salmon to fill out the domestic supply, and the Canadian canneries would do the same when the conditions were reversed. In 1904 the Canadian Government prohibited the export of fresh sockeye salmon to Puget Sound for packing purposes, and in 1910 an effort was made to have Congress retaliate by enacting a similar law for this side of the line, but the bill failed of passage.

The table below shows the yearly imports of fresh salmon from British Columbia:

IMPORTS OF FRESH SALMON FROM BRITISH COLUMBIA, CANADA, FOR A SERIES OF YEARS.[a]

Years.	Pounds.	Value.	Years.	Pounds.	Value.	Years.	Pounds.	Value.
1890	4,660	$241	1897	93,454	$2,681	1904	40,610	$1,025
1891	4,950	170	1898	11,580	278	1905	1,015	35
1892	6,288	301	1899	58,002	4,101	1906	3,457,738	64,408
1893	64,811	3,639	1900	19,404	855	1907	113,224	4,131
1894	3,872	219	1901	27,072	2,050	1908	8,880	795
1895	14,000	1,403	1902	22,353	739	1909	41,073	2,346
1896	11,799	419	1903	6,860	343	1910	198,251	10,116

[a] After 1909 all imports of fresh salmon are listed under "Fish, fresh."

IMPORTS OF CURED SALMON.

Below are shown the imports into this country of foreign-cured salmon, the product of the Pacific salmon fisheries, from 1886 to 1909, inclusive.

IMPORTS OF FOREIGN PICKLED PACIFIC SALMON, 1886 TO 1909.[a]

Years.	British Columbia.		Japan.		Hongkong.		Russia, Asiatic.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
1886	5,600	$224							5,600	$224
1887	200	4							200	4
1888	86,000	4,031							86,000	4,031
1889	18,200	860							18,200	860
1890	600	36							600	36
1891	200	5							200	5
1892										
1893	5,478	291							5,478	291
1894	149,410	17,592			1,200	$29	11,875	$298	162,485	17,910
1895	6,550	250			600	13			7,150	263
1896	6,530	474							6,530	474
1897	6,890	156							6,890	156
1898	4,145	188			30	2	9,870	266	14,045	456
1899	15,875	1,554							[b] 16,032	[b] 1,560
1900	162,558	11,061	600	$41					163,158	11,102
1901	165,243	11,225							165,243	11,225
1902	175,411	13,794	606	28					176,017	13,822
1903	161,549	11,756	360	18					161,909	11,774
1904	282,210	23,319	1,400	52					283,610	23,371
1905	282,027	25,584	3,015	133					285,042	25,717
1906	35,475	1,730	5,510	175					40,985	1,905
1907	6,393	322	680	31					7,073	353
1908	13,230	631	4,185	174					17,415	805
1909	30,710	1,523	3,537	148					34,247	1,617
1910	111,645	5,505								

[a] After 1909 all imports of salmon, pickled or salted, are included under "All other cured or preserved."
[b] Includes 157 pounds, valued at $6, from China.

FIG. 1.—UNITED STATES SALMON HATCHERY, YES BAY, ALASKA.

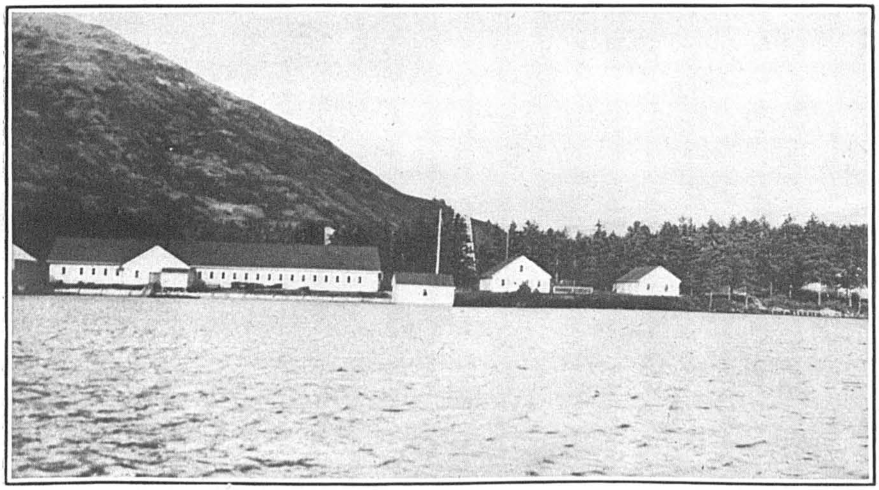
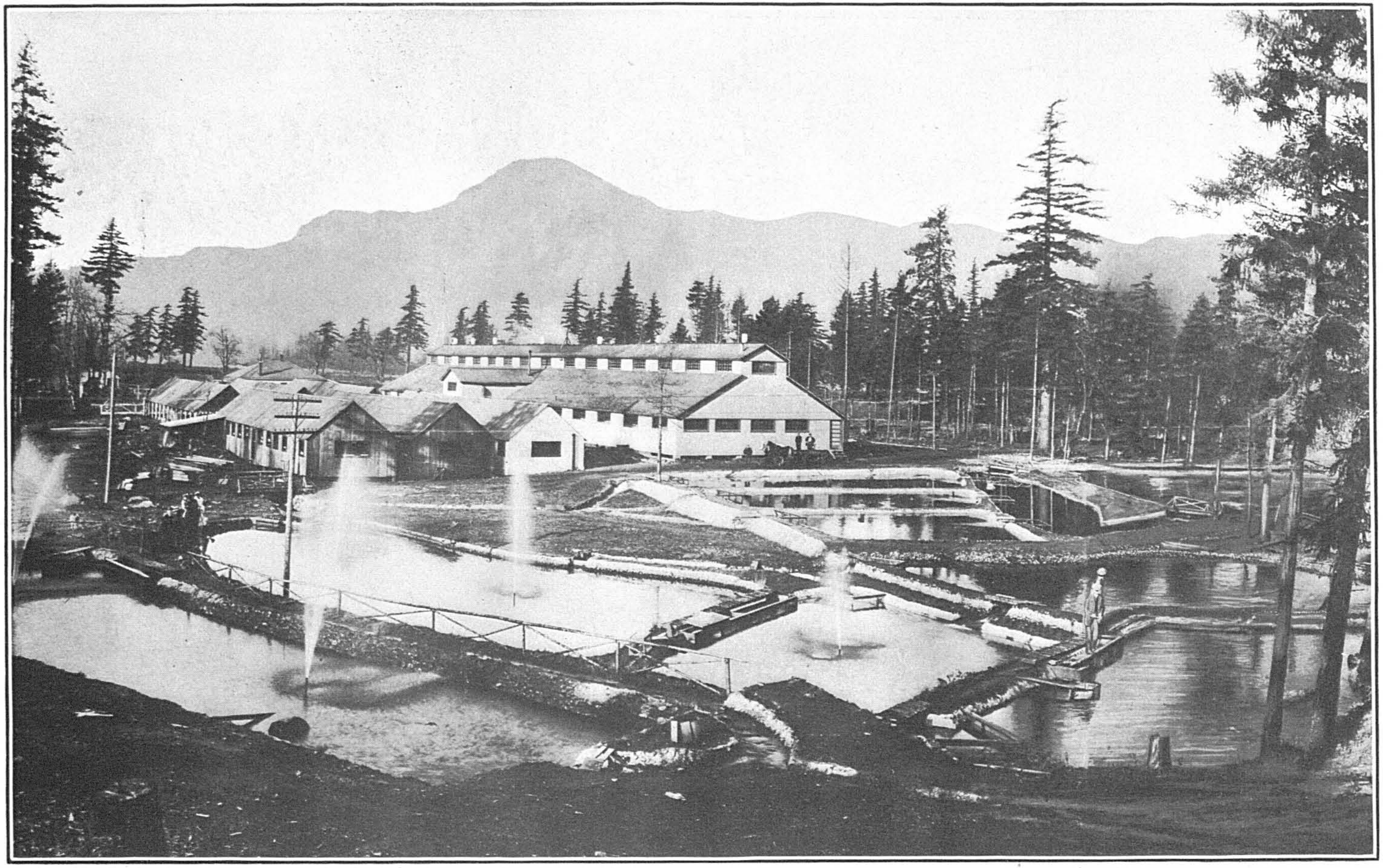


FIG. 2.—UNITED STATES SALMON HATCHERY, AFOGNAK, ALASKA.



BONNEVILLE SALMON HATCHERY OF THE OREGON FISH AND GAME COMMISSION, SHOWING REARING PONDS.

XIII. SALMON CULTURE.

The artificial culture of salmon on the Pacific coast has developed into a large and constantly expanding industry. The United States Bureau of Fisheries operates a number of large and well-equipped hatcheries, while the State governments of California, Oregon, and Washington, the Dominion of Canada, and the Province of British Columbia, and certain private companies have built and maintain a large number of hatcheries, some of these being among the largest in the world.

OBTAINING THE SPAWNING FISH.

The eggs used for artificial propagation are obtained from salmon taken on their way upstream to the natural spawning grounds. In order to arrest the ascent of the fish a rack is usually built across the stream. Where this is not feasible a trap is sometimes constructed for the purpose of catching the fish. Sometimes the racks have slat traps attached in which some fish are caught.

A number of methods have been employed for taking the fish as they are grouped below the rack and seeking for an opening, but the most practicable has been found to be by means of drag or haul seines swept across the area just below the rack. When the pocket or bunt is brought close to shore the workmen pick out the ripe fish and turn the others back to remain until they reach this stage. The ripe fish are placed in pens or live boxes made for this purpose, the males and females being kept separate. These live boxes are usually on the under side of a floating platform, and are accessible through hinged covers set in the plank flooring. Projecting beyond this platform is usually another, upon which the actual work of stripping the fish and caring for the pans is performed.

At a few places where the fish are caught before they have reached the ripe stage, notably Karluk, the fish are placed in a pound or corral and held until they become ripe. This method is resorted to only in case of necessity.

The surest sign of ripeness in a female is the separation of the eggs in the ovaries, but the experienced spawn taker can, from the general appearance of the fish, usually tell whether she is ripe or not, according to Bower.[a]

[a] Fish culture in Alaska. By Ward T. Bower. Alaska fisheries and fur industries, 1911. United States Bureau of Fisheries, document no. 766, p. 70.

An interesting experiment was conducted at the Afognak station last season [1910] to determine the degree of ripeness producing the best quality of eggs. The loss on the lot taken from females which were dead ripe—eggs flowing very freely—was less than 1 per cent, while with another lot, where the females were ordinarily ripe upon testing in the usual manner, the loss was about 5 per cent. This shows the need of caution in having fish fully ripe before stripping if the highest degree of efficiency is to be expected.

TAKING THE EGGS.

As the eggs of the females confined in pens are likely to be injured within the fish, stripping is usually done every day.

When ready for spawn taking one man lifts a female from the live box by means of a small dip net, while another man lifts out a male in the same manner. They are held suspended in the net until their violent struggles are over, when it is easy to handle them.

For many years, and even yet at many hatcheries, the method of taking salmon spawn has been by pressing the eggs out by steady downward pressure on the belly of the fish. The milt from the male is obtained in the same way.

Where the force is large and the fish rather small the quickest way is for one to hold the fish in one hand and press out the eggs or milt with the other. When the fish are large, or the working force is small, a strait-jacket is used. This is a sort of trough made about the average length of the salmon and hollowed out to fit its general shape. A permanent cleat is set across the lower end, while at the upper end is a strip with a buckle. The fish is slid into the trough, the tail going below the cleat, where it is securely held, and the head buckled in at the upper end with the strap. In this condition the fish is unable to do any harm by its struggles and the eggs can be pressed out at leisure.

A more modern method in use at many hatcheries, which has been well described by Mr. Bower,[a] is as follows:

The long-followed process of taking Pacific salmon eggs by hand expression has been superseded in the last few years by the method of incision, a method discovered and developed by the late Cloudsley Rutter in connection with his study of the life history of the salmon of the Sacramento River. This consists simply of making a cut in the abdominal walls from the throat or near the pectoral fins to the vent, the fish just previously having been killed by a blow on the back of the head. When making the cut the knife is either shielded by a guard or is so held between the thumb and forefinger as to allow not more than half an inch of the blade to project, thus precluding the possibility of injuring any of the eggs. Immediately following the incision the eggs flow in a mass into the spawning pan beneath. The operator's fingers are inserted into the abdominal cavity gently to assist in removing any eggs that may be enfolded in the organs or that may merely adhere to the walls of the cavity. Fertilization is accomplished in the usual manner.

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[a] Fish culture in Alaska. By Ward T. Bower. Alaska fisheries and fur industries, 1911. United States Bureau of Fisheries, document no. 766, p. 80, 81.

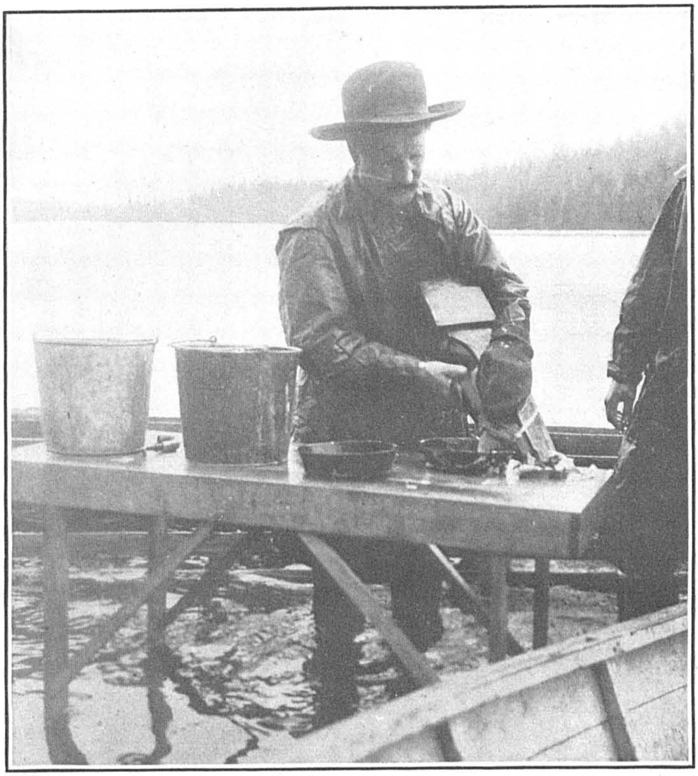

FIG. 1.—STRIPPING SALMON WITH AID OF STRAIT JACKET.

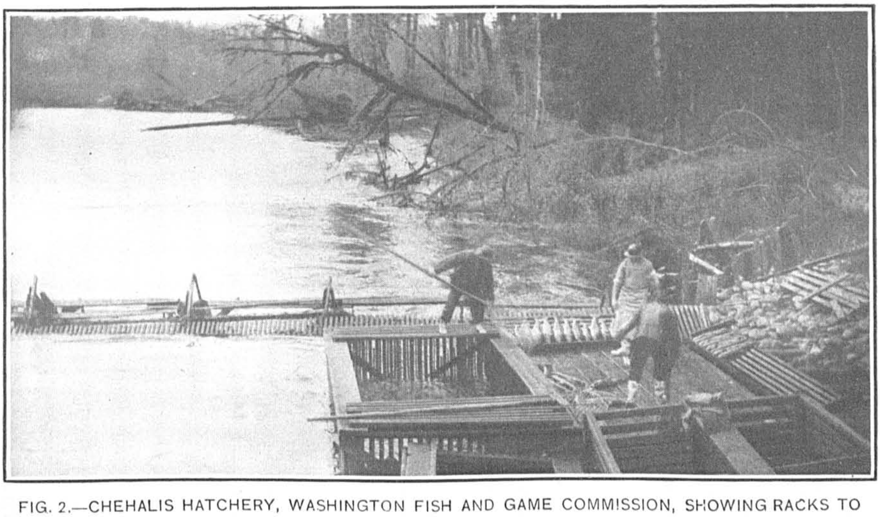

FIG. 2.—CHEHALIS HATCHERY, WASHINGTON FISH AND GAME COMMISSION, SHOWING RACKS TO PREVENT SALMON FROM GOING UPSTREAM AND PEN FOR HOLDING SPAWNING FISH.

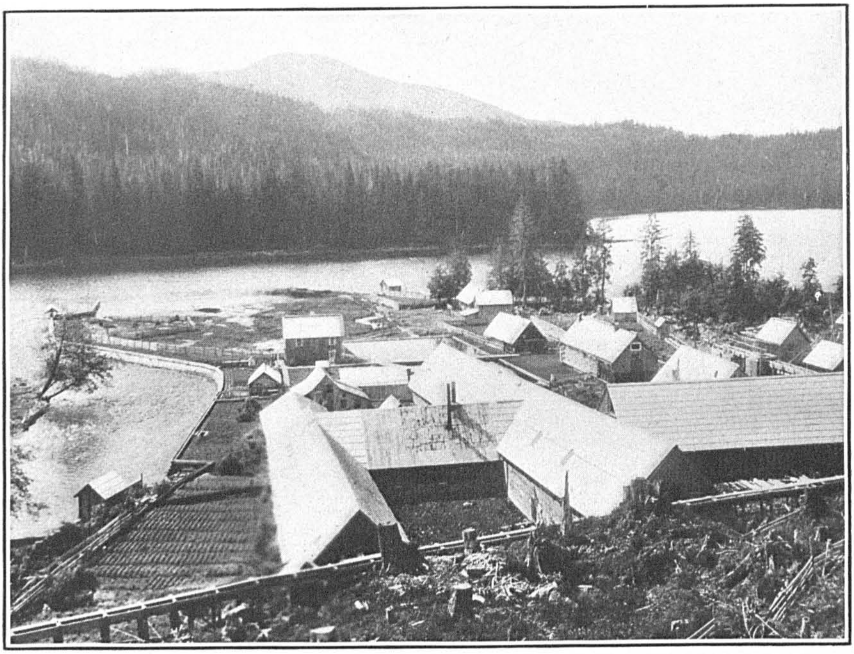

FIG. 1.—FORTMANN HATCHERY, NAHA STREAM, ALASKA, THE LARGEST HATCHERY IN THE WORLD.

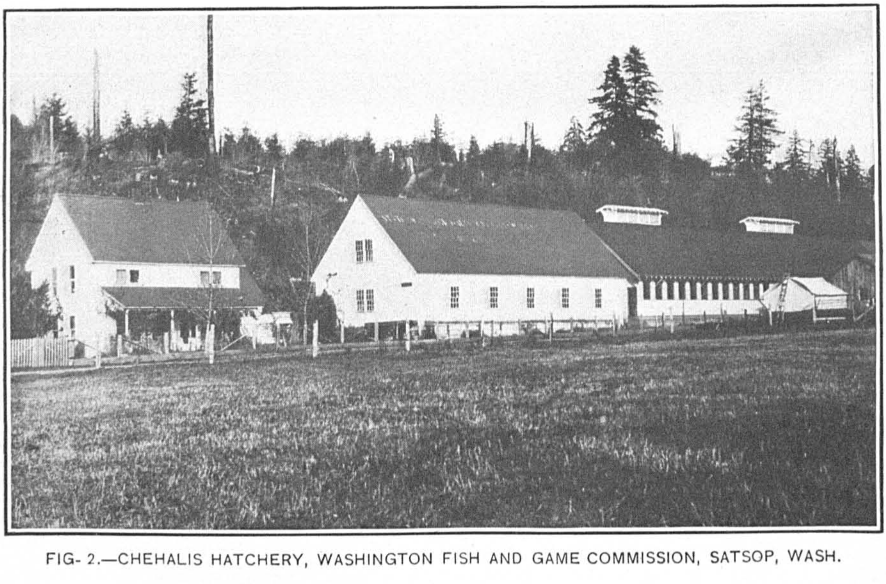

FIG- 2.—CHEHALIS HATCHERY, WASHINGTON FISH AND GAME COMMISSION, SATSOP, WASH.

Care must be exercised not to tear loose from the ovaries any eggs that do not come freely when the organs are moved from side to side by the fingers. Eggs thus torn loose are immature, and if taken it becomes necessary to eliminate them subsequently in the hatchery. It is preferable also to have the fish either in a vertical position or with the head considerably higher than the tail, that gravity may assist the flow of eggs.

It was at first thought necessary—and the practice still obtains at some stations—to bleed the fish either by cutting off the head or tail before making the incision. Experimentation, however, has conclusively demonstrated that no advantage results from this procedure, as the few drops of blood that may occasionally fall into a pan of eggs result in no harm. The extra labor involved in bleeding may therefore be dispensed with entirely.

When taken by the method of incision the eggs are of greatly improved quality; there is no straining or rupture of good eggs as is inevitably the result when heavy hand pressure is exerted; no unripe eggs are torn from the ovaries; and at the same time there is no waste of good eggs left enfolded in the organs, as is certain to be the case in stripping by hand. The improvement in quality is from 5 to 10 per cent and the saving in labor, too, is of noteworthy consideration.

The taking of Pacific salmon eggs by incision marks so distinct an advance in fish culture that it is no longer permissible to continue the obsolete method of stripping by hand.

FERTILIZING THE EGGS.[a]

In impregnating the eggs the main object is to bring the milt and the eggs together as quickly as possible after they have left the fish. By some persons a little water is considered desirable to give greater activity to the milt, but if left more than a minute in the water there is a decided loss of fertilizing power. The eggs do not suffer so quickly from immersion in water. The absorbing property which they possess when they first leave the parent fish, and which attracts to the micropyle the spermatozoa, lasts several minutes, but it is not prudent to leave the eggs in the water a moment longer than is necessary before adding the milt.

The addition of the water is not essential to a good impregnation; in some instances better results are secured without the use of water and, after all, if the main object is secured, of bringing the milt and the eggs together with the slightest possible delay after they leave the fish, it makes very little difference whether water is used or not. The milt retains its fertilizing power several days when kept from air and water, and impregnation can be effected between fishes widely separated by merely forwarding the milt properly sealed. At Baird impregnation by the dry method, which has always been followed there, has resulted in the fertilization of about 90 per cent of the eggs so treated.

The Russian or dry method of impregnating eggs consists simply in taking both the eggs and the milt in a moist pan. It may be urged as an objection to this method that the eggs will be injured by striking against the pan, but it is a fact that although the same eggs would be destroyed by the concussion a week later, or even 24 hours later, they do not suffer in the least from it at the moment of extrusion from the fish.

It was at one time considered an important question whether the eggs or milt should be taken first, but with the dry method it makes no difference, as, either way, both eggs and milt remain operative long enough for all practical purposes of impregnation.

Various methods of treating the eggs in the pan after impregnation has taken place have been tried. Some operators leave the eggs in the pans as first taken with the milt for two or three minutes and then add water, after which they are left to stand in the pan until they separate, when they are washed clean, taken to the hatching

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[a] A manual of fish culture, based on the methods of the United States Commission of Fish and Fisheries, revised edition, p. 10-12.

house, and placed in the troughs. Others pour the contents of the several pans—eggs, milt, and all—into a large can after the eggs become impregnated, and when the eggs separate the contents of the can are poured into the hatching troughs, trusting to the current in the troughs to wash the milt from the eggs. At Baird, water is poured on the eggs a few moments after they become impregnated, after which they are left perfectly quiet until they separate, which, in water of the temperature of the McCloud River in September, 52° to 53°, takes about an hour. The pans, in the meanwhile, are put in a trough filled with river water to keep them from becoming too warm. After the eggs separate they are carefully washed and are carried in buckets to the hatching house, where they are measured and placed in the hatching trays.

Mr. Bower[a] has the following to say as to the loss by concussion and the proper method of preventing same:

Coincident with the absorptive period in salmon eggs is an adhesive stage varying with the temperature from one to two hours, when the eggs are exceedingly sensitive. This is the so-called period of water hardening. Under no circumstances should the eggs be handled during this stage, nor should they be subjected to the slightest concussion. Repeated tests have demonstrated conclusively that even allowing the buckets containing the eggs to stand on the same platform where spawning operations are being carried on results in considerable loss.

To guard against this, the buckets should either stand on the bottom of the stream or else on a platform in every way independent of and having absolutely no connection with the main platform. To some this may seem like a small and irrelevant consideration, but strict observance is certain to reduce the loss by at least 2 or 3 per cent. During the process of water hardening the buckets should be partly submerged to properly regulate the temperature.

Due caution must be observed not to move the eggs until water hardening is complete. After a little experience the operator can readily tell, upon carefully inserting the hand and finding the eggs free and hard and no longer soft and velvety, even toward the bottom of the bucket, that they may be moved to the hatchery without fear of loss.

HATCHING APPARATUS AND METHODS.[b]

The hatching apparatus generally employed on this coast is pretty much of the same pattern and is described as follows:[c]

The hatching apparatus generally employed on the Pacific coast in salmon propagation consists of a combination of troughs and baskets. The troughs in common use are the so-called "Williamson troughs," which are 16 feet long, 12, or 16 inches wide, and 6½ inches deep. The troughs are arranged in pairs, and usually two or three pairs are placed end to end on different levels. The fall of water in each trough is 1½ inches. The troughs are divided by double partitions of wood or metal into compartments just enough longer than the baskets to enable the latter to be raised and lowered and to be tilted slightly. The essential feature of these troughs is that at the lower end of each compartment a partition, extending entirely across the trough, reaches from the bottom almost to the top, and another similar partition at the upper end of the compartment reaches from the top almost to the bottom of the trough, each set of partitions being about an inch apart. The water is consequently forced to flow under the upper partition and over the lower partition, and to do this it must

[a] Fish culture in Alaska, by Ward T. Bower. Alaska Fisheries and Fur Industries, 1911. United States Bureau of Fisheries, document no. 766, p. 81, 82.

[b] At some of the Alaska hatcheries quite large baskets, some holding as many as 103,000 red-salmon eggs are used.

[c] Manual of fish culture, based on the methods of the United States Commission of Fish and Fisheries, revised edition, p. 12, 13.

necessarily ascend through the tray of eggs. The troughs are provided with canvas covers stretched upon light frames and made sunlight proof by saturation with asphaltum varnish, and their interiors are thickly coated with asphaltum.

The egg receptacles are wire trays or baskets about 12 inches wide, 24 inches long, and deep enough to project an inch or two above the water, which is 5 or 6 inches deep in the troughs in which they are placed. Into each of these baskets 2 gallons of salmon eggs, equivalent to about 30,000, are poured at a time. The eggs suffer no injury whatever from being packed together in this manner, the water being supplied in a way that forces it through the eggs, partially supporting and circulating through them. The meshes are too small to permit the eggs to pass through, although the fry are able to do so.

The advantages of this apparatus and method are:

(1) The top of the tray or basket is out of the water and always entirely dry; consequently, in handling it, the hands are kept dry.

(2) By tilting one end of the tray up and down a little or by lifting it entirely and settling it gently back again in its place the bad eggs will be forced to the top; thus a feather is not required in picking over the eggs and the injuries very often inflicted with it are avoided.

(3) The top of the tray being above water, the eggs can never run over the top nor escape in any way, which is a great advantage over the shallow form of tray.

(4) There is economy of space; 30,000 to 40,000 eggs can be placed in each basket, provided a sufficient quantity of water is available. Two troughs 16 feet long and 1 foot wide will by this method carry about 500,000 salmon eggs. The deep trays may be filled at least half full of eggs, and thus 10 times as many eggs can be hatched in the same space and with the same supply of water as by the old method. A good but gentle circulation is continually maintained through the eggs.

(5) The deep-tray system is admirably adapted to getting rid of mud that has collected on the eggs, for all sediment accumulating about them can be easily removed by gently moving the tray up and down a few times in the water; but if the deposit of mud on the troughs becomes so excessive as to be unmanageable, a false bottom of wire cloth or perforated zinc can be placed in the troughs at a suitable distance above their real bottom, leaving a space of about 1 or 1½ inches between the wire cloth and the trough bottom. By this means the mud that comes into the trough will sift down into the space below the wire cloth entirely out of the way of the fish, the movements of the fish themselves helping very much to produce this result. Should the accumulation of mud in the space below the false bottom of the trough become too great, it can easily be sluiced out in various ways.

When quinnat salmon eggs are simply to be matured for shipment, hatching trays with one-fourth or one-fifth inch square mesh will answer the purpose, but when the eggs are to be hatched in them, every alternate strand of wire running lengthwise, or, better still, every second and third thread, should be left out in order to form an oblong mesh through which the newly-hatched fry, after separating themselves from the unhatched eggs, can escape from the hatching trays into the trough below.

At Baird eggs kept in water averaging about 54° F. hatch in 35 days. The allowance of 5 days' difference in the time of hatching for each degree of change in the water temperature is approximately correct.

For the first few days the eggs of the quinnat salmon are very hardy, and at this time they should be thoroughly picked over and the dead ones removed as far as possible before the delicate stage during the formation of the spinal column comes on, so that during that critical period they may be left in perfect quiet. As soon as the spinal column and the head show plainly, the eggs are hardy enough to ship, but when there is time enough it is better to wait a day or two until the eye-spot is distinctly visible, after which time the eggs will stand handling and may be safely shipped if properly packed.

HANDLING EGGS IN HATCHERY.[a]

At some of the Bureau's stations where salmon eggs are handled it was the custom until a few years ago to "bury" the eggs or leave them undisturbed (aside from picking once the day after spawning) for two or three weeks after putting them in the baskets. The result was that they were in some instances literally buried under and in such a mass of mud and sediment that many eggs were killed. Discontinuance of the practice resulted in a very appreciable improvement.

When the water is so turbid as to cause a heavy deposit of sediment, it is better to go over the eggs occasionally, even through the critical stages of development, or until the line of the fish is well formed. Of course the eggs must be handled with utmost caution at all times, but owing to their extreme sensitiveness during the two or three days following the closing of the blastopore and until a perceptible curve shows in the tail, they should be left entirely untouched. It soon becomes easy to determine the stage of an egg's development by holding it up to the light between the thumb and forefinger. In the absence of cautious and skilled operatives and unless the water is roily for an extended period, it is undoubtedly better to let the eggs remain undisturbed until the curvature of the tail is visible to the unaided eye. The accumulation of a moderate coating of sediment which readily washes off is not injurious. In a few instances it has become necessary to handle the eggs during the tender stage to arrest the spread of fungus, but where the water supply is reasonably well adapted to fish-cultural purposes such a course is rarely if ever necessary.

REMOVAL OF DEAD EGGS BY THE USE OF SALT SOLUTION.

Among the most noteworthy advances in fish-cultural methods during the last few years has been the use of salt as an aid in the removal of dead eggs. The development of this process has extended over a period of several years, but it is more during the last year or so through the efforts of L. E. Baldridge, of the Yes Bay station, that it has reached a high degree of efficiency.

Compared with the time-honored process of picking by hand, there are marked advantages in using the salt solution, and chief among these is the great saving of labor. It is estimated that if the eggs happen to be of not more than mediocre quality it would take at least 20 pickers to remove as many dead eggs as could 2 men using the salt solution. Moreover, the operation is much more thoroughly performed in the latter process than is possible in picking by hand.

Another advantage of using the solution is that it is possible thoroughly to clean the eggs. This greatly reduces any loss through contamination and infection resulting from the decomposition and fungous growths which inevitably follow the long-continued presence of dead eggs that in the hand-picking method frequently escape attention. Even when utmost care is taken to pick out all dead eggs, fungoused masses will occasionally appear. This condition is rarely observed when the salt solution has been used, and it undoubtedly means that in the aggregate many eggs are saved. Still another point in favor of the solution, it is generally believed, is that it acts as a tonic or stimulant to the good eggs while at the same time as a deterrent to the growth of fungus. Again, in picking by hand there is apt to be loss by movement of the eggs during delicate stages of development; and the oft-repeated insertion of egg tweezers, which are bound to touch other eggs, undoubtedly at times results in injury.

Recent experience has demonstrated that the solution may be applied effectively to eggs freshly taken as well as those in more advanced stages of development.

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[a] Fish culture in Alaska. By Ward T. Bower. Alaskan fisheries and fur industries, 1911. United States Bureau of Fisheries, document no. 766, p. 81, 82.

The principle of the salt bath is simply that the specific gravity of the good eggs is greater than that of the bad eggs, hence upon being placed in the salt solution the good eggs sink and the bad remain afloat and are easily removed. It is vitally essential to the success of the undertaking that the solution be of the proper strength, and it is for this reason that the beginner is apt to become discouraged. If the solution is too weak all the eggs, both good and bad, will sink, while if it is too strong all will remain afloat. The margin of the proper density is so narrow that in the operation it is necessary every few minutes to strengthen the solution by adding more salt or brine, otherwise the small amount of fresh water which adheres to a basket of eggs as it is lifted from the hatching trough into the solution will affect unfavorably the results when treating succeeding baskets. Experience and careful observation, however, will soon make it possible for the operator accurately to judge when to add a bit of the stock solution. It is a convenience, of course, to have a salinometer at hand when preparing the solution. It is commonly the practice as an aid in preparing the solution to test it occasionally with a few eggs.

Highly successful results in using the solution with red salmon eggs have been attained at the Yes Bay station, and a detailed description is accordingly given of the methods pursued at that place.

The chief item of equipment consists of a water-tight wooden tank 4 feet long, 2½ feet wide, and 10 inches deep for holding the solution in which the eggs are immersed. Before each basket is immersed it is necessary that the surface of the solution be perfectly quiet, for any ripple or current will tend to disturb the buoyant effect of the solution upon the eggs. Therefore it was found of great convenience last winter to use a floating frame made of half-inch material 6 inches wide fastened together vertically and at right angles, thus forming open squares about 6 inches either way. After each basket of eggs is lifted from the salt bath this frame is placed in the solution to stop all motion of the water, being pushed down until it is almost submerged and held firmly against the side of the tank for a few seconds. Upon being carefully withdrawn the solution is quiet and the next basket of eggs may be immersed without further delay.

Another piece of equipment is a feather fan with which gently to push the floating dead eggs away from over the submerged basket into which the good eggs have settled. Unless the dead eggs are quickly moved they too will sink. A feather fan made by fastening eagle feathers to a thin strip 8 inches long by 1½ inches wide works much more satisfactorily for this purpose than a wing. An ordinary hand scaff net about 12 by 14 inches in size for removing dead eggs from the tank, a dipper, and a bucket complete the outfit. Wood and metal surfaces in all equipment should be well coated with asphaltum or some similar preparation.

At Yes Bay as soon as five or ten million eggs are far enough advanced to stand light concussion the baskets are lifted out of the troughs and the eggs are stirred thoroughly with the hand, which causes practically all of the unfertile or empty eggs to turn white. As soon as the line of the fish shows plainly when held up to the light and there is a distinct curvature to the tail, the eggs are sufficiently well advanced in development to stand stirring. After this process the baskets are returned to the troughs and allowed to remain three days, for when first turned the unfertile eggs are about as heavy as the good eggs and consequently would sink if the salt solution were applied at once.

On the fourth day after stirring, everything being in readiness, five or six baskets are removed from a trough and set on top to drain. After a few moments a basket is grasped at each end and is lowered into the tank containing the solution until the liquid comes through the eggs. A light shake is then given to level up the eggs in the basket. Next, slowly and very gently, the basket is lowered until the brine comes almost to its rim and is held perfectly still for a moment. All the eggs in the basket will rise, but soon the good eggs will begin to sink, and presently, if it is a basket of poor eggs, the surface will be completely covered with bad eggs. Now, without the slightest jar, the basket is lowered far enough below the surface to permit an egg to float over the rim. The bad eggs will immediately start toward the edges of the tank. After a few seconds the basket is gently lowered until it rests upon the bottom. The remaining dead eggs are then brushed away from over the basket by means of quick, short, and light strokes of the feather fan; long, sweeping strokes are to be carefully avoided. One end of the basket is then gently raised until it is above the surface of the brine and the basket is drawn toward the end of the tank and out from under the floating dead eggs. At the same time the fan is used with the other hand to aid in moving any of these floating eggs to one side. The fan is then dropped and the lower end of the basket is grasped and the whole is quickly raised out of the solution. The basket is set at an angle on the tank for a moment to drain and is then carried to the hatching trough. The attendant lifts out another basket to drain along with the four or five others originally removed and returns to the tank of brine with the basket that has been draining the longest.

While this is being done the other operator skims the dead eggs off the surface of the brine and places the frame described above in the tank for a moment to stop all motion of the solution. After five or six baskets have been treated, any eggs that have settled to the bottom of the tank are removed, as they absorb and weaken the brine. It is necessary, as earlier mentioned, to add a little fresh brine after handling each basket. The eggs should be as clean as possible, as the solution will not be effective when it contains much sediment. A 1-inch hole with plug in one corner of the tank is convenient for drawing off any deposit of this character. Should failure occur in treating a basket of eggs, as, for example, if by sudden jar they are all caused to sink, or if the brine is too weak or too strong, the basket must be put back in the hatching trough, as it will not respond to treatment again the same day.

At Yes Bay last winter a large portion of the 72,000,000 eggs were thoroughly cleaned up at one handling. Two men ran as many as 10,000,000 eggs through the salt bath in a single day. It is customary on the day after treating the eggs to have them gone over so that if any dead eggs remain they may be picked out by hand. This, however, requires very little time, as but few dead eggs are found. No alarm need be felt if the eggs seem to shrink as a result of the immersion, for they will soon resume their normal size upon being replaced in fresh water.

The use of the salt solution has been extended lately to the handling of lake trout eggs in Michigan and Minnesota, and there appears to be no reason why it is not equally well adapted to the eggs of other salmonoids. Certainly its many advantages commend further experimentation in this direction.

The eggs of the salmon hatch very gradually at first, only a small proportion coming out the first day, but the number increases daily until the climax is reached, when large numbers of young burst their shells in a single day. As at this time the vast number of discarded shells are apt to clog up the guard screens at the outlets of the troughs, great care and vigilance is necessary to prevent this by thoroughly cleansing them frequently.

The hatched fish easily slip through the oblong mesh in the bottom of the trays into the space below. They should be assisted in doing this by gently raising and lowering the tray at intervals, care being taken not to raise them out of the water.

After they are all hatched out and in the bottom of the troughs, about the only danger to guard against is that of suffocation. They frequently crowd together in heaps and dig down under one another until some of them die for want of running water, which is less than an inch away from them. The best remedy in such a case is to thin them out.

John Pease Babcock, Assistant to the Commissioner of Fisheries of the Province of British Columbia, in 1910 advanced a novel suggestion that freshly fertilized eggs buried under sand and gravel immediately after would produce strong healthy fry at less cost than under existing hatching methods, and that fry so produced are stronger and more capable of resisting the attacks of their active enemies.

The short, but interesting, account of his experiments is reproduced entire.

In writing of the propagation of salmon and trout, some authorities state that considerable loss is occasioned in natural propagation by many of the eggs becoming embedded in sand and gravel; that all the eggs so embedded are lost.

Observation and experiment in the propagation of Pacific salmon and trout for a considerable period lead me to advance the theory that in natural propagation only those eggs which become embedded beneath several inches of sand and gravel produce alevins which live to attain the fry stage; and that those eggs which are not covered by several inches of sand and gravel are either consumed by active aquatic enemies or destroyed by vegetable molds, commonly termed "fungus."

My experiments have demonstrated that the burial of freshly fertilized eggs of the *nerka* and other Pacific salmon does not smother them; that eggs so treated not only live but hatch; and that if they are covered to a sufficient depth the alevins produced survive and possess the instinct and power to work their way gradually to the surface; that if buried beneath 5 or 6 inches of sand and gravel such eggs will hatch, and the young will work their way up through the sand and gravel to the surface, and that by the time they emerge, have absorbed their sacs and are then exempt from the attacks of vegetable molds.

Eggs buried under 1 or 2 inches of sand and gravel produce alevins that work their way up to the surface before the sac is absorbed, and upon reaching the surface are subject to attack by vegetable molds, and a very large percentage are thus destroyed, as well as by the more developed forms of aquatic life.

Eggs buried to a depth of 3 inches produce alevins that work their way to the surface so gradually that by the time they reach the surface their sacs are so nearly absorbed that many, but not all, resist the effects of fungus. Alevins from eggs buried beneath less than 4 inches of sand are liable to reach the surface while the sac is so thinly covered that few, if any, survive the effects of fungous growth.

The spawning beds of Pacific coast streams from California to Alaska (to which my observations have been confined), where the salmon spawn in numbers are, during and after the spawning period, covered with more or less vegetable molds. These molds are particularly common in the beds of streams where great numbers of salmon have spawned and died. Every experienced fish culturist knows that most waters carry great numbers of spores of fungi, and how difficult it is to prevent eggs and alevins from being attacked and injured by their growth. I believe that in natural propagation fungous growths destroy more salmon eggs and alevins than all other causes combined. The vegetable molds of Pacific streams are not active beneath the surface of the beds of streams. Salmon eggs cast therein, if even thinly covered with sand, are not injured by them. These molds do not affect the fry that have nearly or entirely absorbed their sacs, but they are deadly if permitted to attach themselves to either the eggs or the alevins.

My experiments along this line lead me to express the opinion that by the burial of freshly fertilized salmon eggs under 6 or 7 inches of sand and gravel strong healthy fry can be produced at less cost than under existing hatching methods, and that fry so produced are stronger and more capable of resisting the attacks of their active enemies.

I trust that this short statement of my experiments in the burial of salmon eggs may be deemed of sufficient economic importance to stimulate fish culturists generally in experimenting along similar lines. Those who do will perhaps experience some difficulty at first in the covering of a large number of eggs. Experimenters will find that after preparing suitable beds of sand and small gravel the eggs can be evenly laid and held until covered, if the surface of the bed is first thickly indented with cells a little deeper than the eggs. This can be readily accomplished by stamping the bed with a board covered with projections or pegs of suitable size.

My experiments suggest that in the near future most of the buildings and hatching apparatus now used in the propagation of salmon and trout will be dispensed with; that after the eggs have been expressed and fertilized, instead of being placed in wire baskets in hatcheries, they will be buried beneath the sand and gravel of the beds of natural or prepared streams, and that with the exception of watchmen to protect them, little or no other labor will be required.[a]

FEEDING AND PLANTING THE FRY.

For some time the fry remain at the bottom of the trough, but when the yolk sac is nearly absorbed they rise from the bottom and begin swimming. As a rule the fry are planted about the time the yolk sac is absorbed, thus obviating the necessity for feeding them. Some experts advise planting young red salmon when the umbilical sac is about two-thirds absorbed, which is the time when the fish begin to swim up freely. With the temperatures prevailing at the Alaska hatcheries, this means that the fry must be held at least four or five weeks after hatching.

PACKING EGGS FOR SHIPMENT.

In packing salmon eggs for shipment it is the custom at the Bureau of Fisheries's hatcheries to use a packing box made of one-half inch pine, 2 feet square and 1 foot deep.[b]

At the bottom is placed a thick layer of moss, then a layer of mosquito netting, then a layer of eggs, then mosquito netting again, then successive layers of moss, netting, eggs, netting, and so on to the middle of the box. Here a firm wooden partition is fastened in and the packing renewed above in the same manner as below. The cover is then laid on the top, and when two boxes are ready they are placed in a wooden crate, made large enough to allow a space of 3 inches on all sides of the boxes. This space is filled with hay to protect the eggs against changes of temperature, and, the cover being put on the eggs, they are ready to ship. In the middle of the crate an open space about 4 inches in depth is left, between the two boxes of eggs, for ice. As soon as the crates arrive at the railway station this space, as well as the top of the crate, is filled in with ice. Recent experiments show that salmon eggs can be packed and safely transported to considerable distances when they are first taken.

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[a] Some experiments in the burial of salmon eggs—suggesting a new method of hatching salmon and trout. By John Pease Babcock. Trans. Am. Fish. Soc., 1910, p. 393-395. Washington, 1911.

[b] A manual of fish culture, based on the methods of the United States Commission of Fish and Fisheries. Revised edition, p. 14.

REARING SALMON FRY.

For many years it was the custom to plant the fry as soon as they had absorbed the yolk sac, a period of about 30 days. A few thousands were sometimes raised to the fingerling, yearling, or adult stage, more as a curiosity than anything else. No particular difficulty was experienced in raising these fish, but the expense entailed in feeding them for a prolonged period, and the impossibility of doing so unless large ponds were constructed at great expense for the purpose of holding them during the feeding period, prevented the general adoption of the rearing system.

For some years certain fish culturists had contended that the planting of fry just after they had absorbed the umbilical sac was an economic mistake, claiming that at this age they were weak and comparatively sluggish in their movements, and would fall easy prey to their numerous fish, bird, and other enemies. The late Robert D. Hume, who built and operated a hatchery on the lower Rogue River, also one on the upper Rogue River, which the United States Bureau of Fisheries operated for some years, was one of the first to take up the rearing of salmon fry on any scale.

In time these objections bore weight, and a few years ago the construction of ponds in which fry could be held and fed until they had reached a size which would insure them at least an even chance for their lives was undertaken all along the coast except in British Columbia, with the result that to-day there is pond capacity for about one-half of the total capacity of the various hatcheries.

Most of the nursery ponds have been constructed near the hatcheries and usually comprise oblong trenches dug in the earth and walled with cement and stone.

In Oregon the State authorities found that the best results in pond rearing were obtained by using creek or natural ponds, which were made by placing dams across the small streams in the vicinity of the hatcheries. When first taken from the hatching troughs the fry are placed in the artificial ponds until the danger from spring freshets in the small streams is over, when the fry are transferred to the natural ponds, where the continual flow of fresh water, and the logs, rocks, etc., which provide shade and shelter, afford more natural conditions, and in which the natural food of the fry supplements the artificial food provided by man.

The young fry show when they are ready to feed by darting to one side or the other when small particles of food are dropped in the water and float past them. For the first few weeks they should be fed regularly and as often as six times a day, and the earlier in the day the feeding begins and the later it continues at night the better. Two hours after feeding they will be found to be ravenously hungry, and as they grow much faster for frequent feeding great care should be taken to see that they are well fed. If not fed sufficiently they will bite at one another and cause more or less mortality among themselves.

A big advantage in connection with the use of natural ponds is the comparatively small expense involved in providing for them as compared with the large expense involved in the construction of cement ponds.

FOOD.

In feeding salmon fry almost every conceivable food has been utilized. By universal consent liver is conceded to be the best food for the fry, as it can be ground finer than other foods and the blood which it contains is highly nutritious. At many places, however, it is impossible to secure liver, while its cost when available is generally prohibitive.

The food used is generally that most available and which experience has shown that the fry like and upon which they thrive.

In Oregon [a] it has been found that the extremely young fry thrived on a mixture of ground dried salmon and mush (composed of middlings and other wheat products). Milk curds from near-by creameries also proved satisfactory. The older fish are fed on ground smelt, lamprey eels, spent salmon, both dried and salted, and offal from the canneries, some loose and some packed in 1-gallon cans.

SALMON HATCHERIES ON THE PACIFIC COAST.

Below is shown a list of the salmon and steelhead-trout hatcheries operated on the Pacific coast during the year 1915:

Hatcheries.	Collecting stations.
U. S. BUREAU OF FISHERIES.	
Alaska:	
Afognak	Eagle Lake. Uganik Lake.
Yes Bay	Ketchikan Creek.
California:	
Baird	
Battle Creek	
Hornbrook	
Mill Creek	
Oregon:	
Clackamas	Eagle Creek.
Applegate	Eagle and Tanner Creeks.
Illinois River	
Lower Rogue River	
Rogue River	
Willamette River	
U. S. BUREAU OF FISHERIES—continued.	
Washington:	
Baker Lake	
Birdsview	
Darrington	
Day Creek	
Duckabush	
Illabott	
Quilcene	
Sultan	
Big White Salmon	
Little White Salmon	
STATE OF CALIFORNIA.	
Sisson	
Brookdale	
Price Creek	
Ukiah	Snow Mountain.

[a] Rearing and feeding salmon fry in Oregon. By R. E. Clanton. Trans. Pac. Fish. Soc., 1914, p. 91-94. Seattle, 1915.

Hatcheries.	Collecting stations.	Hatcheries.	Collecting stations.
STATE OF OREGON.		STATE OF WASHINGTON—con.	
Wallowa River	Upper Sandy River.	Wind River	
McKenzie River	Lower Sandy River.	Chehalis	
Salmon River		Humptulips	
Bonneville		Willapa	
Santiam River (eyeing station).		Cold Creek (Clarke County)	
Klaskanine		DOMINION OF CANADA.	
Willamette River (eyeing station).		Granite Creek	
Eagle Creek		Pemberton	
Snake River (Idaho)		Harrison Lake	
Tillamook		Stuart Lake	
Yaquina		Skeena River	
Siuslaw		Babine Lake	
Umpqua		Rivers Inlet	
South Coos		Fraser River	
Coquille		Anderson Lake	
Alsea		Kennedy Lake	
Rogue River		Cowichan Lake	
STATE OF WASHINGTON.		PROVINCE OF BRITISH COLUMBIA.	
Dungeness		Seton Lake	
Elwha		BRITISH COLUMBIA PACKERS ASSOCIATION.	
Green River		Nimpkish Lake	
Green River (eyeing station)		ALASKA (PRIVATE HATCHERIES).	
Nooksak		Alaska Packers Association:	
Nooksak River, north fork		Fortmann.	
Nooksak River, south fork		Karluk.	
Pilchuck		Northwestern Fisheries Co.:	
Samish		Quadra.	
Skagit River		Hetta.	
Skokomish		North Pacific Trading & Packing Co.:	
Snohomish		Klawak.	
Startup			
Stillaguamish			
Chinook			
Kalama			
Lewis River			
Pateros-Methow			
Wenatchee			
Tilton River			

GENERAL STATISTICS.

Distribution of fry, etc.—In the following table is shown by years and species the distribution in Pacific coast waters of fry, fingerlings, yearlings, and adults from 1873, when the first hatchery began operation, to 1915, inclusive. The figures on fingerlings, yearlings, and adults are not as complete as could be wished, this being due to certain of the State fish commissions not separating them from the fry in the published results.

The table shows the enormous total of 6,291,011,445 fry and 26,290,421 fingerlings, yearlings, and adults as having been deposited in local waters since the inception of the work on this coast. Of these nearly one-half were sockeye, or red salmon, followed by chinook, or spring, coho, or silver, chum, steelhead trout, and humpback salmon in the order named.

This table does not show the large number of eggs, fry, etc., shipped from the coast hatcheries to other sections of the country and to various foreign countries. These appear in the tables shown under the various States, Provinces, and Territories.

DISTRIBUTION OF SALMON FRY, ETC., IN THE PACIFIC COASTAL STREAMS OF NORTH AMERICA, IN SPECIFIED YEARS.

Years.	Chinook, king, or spring.		Coho, or silver.		Chum, fry.	Humpback, or pink, fry.
	Fry.	Fingerlings, yearlings, and adults.	Fry.	Fingerlings, yearlings, and adults.		
1873	520,000					
1874	850,000					
1875	2,250,000					
1876	2,000,000					
1877	2,550,000					
1878	2,582,620					
1879	5,376,500					
1880	4,059,290					
1881	4,974,790					
1882	3,991,750					
1884	600,000					
1886	150,000					
1887	200,000					
1888	2,590,000					
1889	8,168,000					
1890	5,250,475					
1891	9,269,000					
1892	4,299,000	25,000				
1893	10,825,950					
1894	8,427,900		280,000			
1895	6,458,000		910,000	560,000		
1896	25,581,033	807,150				
1897	31,146,095		298,137			
1898	73,684,076					
1899	56,773,351		189,000			
1900	33,974,064		13,925,104		10,301,760	
1901	36,563,138	1,668	20,047,935		16,478,280	
1902	73,852,120		41,436,123		9,937,390	
1903	75,558,389		34,460,291		10,012,390	
1904	161,530,963		23,894,026			521,797
1905	143,714,117		30,743,492			
1906	167,745,494	122,980	47,356,449	300	3,268,800	969,990
1907	124,578,390		44,426,380		6,120,000	4,224,255
1908	135,447,179	2,165,797	54,108,557		4,342,350	31,920,662
1909	88,188,707	16,949	50,648,674		7,805,000	10,000
1910	97,361,532	225	45,863,952		8,607,500	2,251,340
1911	80,570,265	11,700	52,869,759		13,435,750	460,150
1912	101,810,515	1,405,860	66,087,446	116,300	4,684,950	34,205,460
1913	112,008,886		79,313,839		35,792,440	1,888
1914	133,271,477	2,571,711	67,682,576		16,623,984	39,685,814
1915	149,666,221	9,875,745	92,926,831		63,088,372	7,867,484
Total	1,988,419,287	17,004,785	767,468,571	676,600	210,498,966	122,118,840

DISTRIBUTION OF SALMON FRY, ETC., IN THE PACIFIC COASTAL STREAMS OF NORTH AMERICA, IN SPECIFIED YEARS—Continued.

Years.	Sockeye, red, or blueback.		Steelhead trout.		Total.	
	Fry.	Fingerlings, yearlings, and adults.	Fry.	Fingerlings, yearlings, and adults.	Fry.	Fingerlings, yearlings, and adults.
1873	....	....	....	....	520,000	....
1874	....	....	....	....	850,000	....
1875	....	....	....	....	2,250,000	....
1876	....	....	....	....	2,000,000	....
1877	....	....	....	....	2,550,000	....
1878	....	....	....	....	2,582,620	....
1879	....	....	....	....	5,376,500	....
1880	....	....	....	....	4,059,290	....
1881	....	....	....	....	4,974,790	....
1882	....	....	....	....	3,991,750	....
1884	....	....	....	....	600,000	....
1885	1,800,000	....	....	....	1,800,000	....
1886	2,625,000	....	....	....	2,775,000	....
1887	4,414,000	....	....	....	4,614,000	....
1888	5,807,000	....	....	....	8,397,000	....
1889	4,419,000	....	....	....	12,587,000	....
1890	6,640,000	....	....	....	11,890,475	....
1891	3,603,800	....	....	....	12,872,800	....
1892	6,000,000	....	....	....	10,299,000	25,000
1893	6,274,000	....	....	....	17,099,950	....
1894	8,504,000	....	353,500	....	17,565,400	....
1895	11,681,000	....	....	....	19,049,000	560,000
1896	15,868,000	....	107,808	....	41,556,841	807,150
1897	18,374,440	....	262,000	....	50,080,672	....
1898	20,916,000	....	650,000	....	95,250,076	....
1899	15,761,000	....	8,625	....	72,731,976	....
1900	29,590,000	....	2,061,560	....	89,852,488	....
1901	19,901,253	....	1,709,326	....	94,699,932	1,668
1902	72,679,000	....	3,243,948	....	201,148,581	....
1903	89,398,789	....	4,509,641	37,033	213,939,500	37,033
1904	70,710,200	....	4,207,020	....	260,864,906	....
1905	119,963,200	....	3,805,675	....	298,226,484	....
1906	232,037,442	....	6,725,965	24,383	458,104,140	147,063
1907	228,018,450	....	5,629,493	....	412,996,968	....
1908	230,528,455	....	5,837,671	....	462,184,874	2,165,797
1909	239,251,146	....	8,193,778	....	394,097,305	16,949
1910	396,215,795	....	11,368,446	....	561,668,565	225
1911	257,463,497	....	14,995,717	....	419,795,138	11,700
1912	324,325,768	....	12,710,382	177,790	543,824,521	1,699,950
1913	242,146,069	....	16,654,906	....	485,918,028	....
1914	261,365,781	....	11,719,558	....	530,349,190	2,571,711
1915	198,910,010	8,369,830	22,912,900	....	535,401,818	18,245,575
Total	3,145,192,093	8,369,830	137,698,819	239,206	6,371,396,578	26,290,421

Output of Bureau of Fisheries hatcheries.—The table below shows by years and species the combined output of the various hatcheries of the United States Bureau of Fisheries on this coast. The greater part of the egg output was to various State hatcheries on the Pacific coast, more particularly those belonging to the State of California. The total figures show that since the Bureau began operations on this coast it has distributed 966,240,303 eggs, 603,076,619 fry, and 31,176,283 fingerlings, yearlings, and adults.

OUTPUT OF PACIFIC COAST SALMON HATCHERIES OWNED BY THE UNITED STATES BUREAU OF FISHERIES, 1872 TO 1915.

Year ending June 30—	Chinook, king, or spring.			Coho, or silver.		
	Eggs.	Fry.	Fingerlings, yearlings, and adults.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
1872	30,000					
1873	1,400,000					
1874	4,155,000	850,000				
1875	6,250,000	1,750,000				
1876	5,065,000	1,500,000				
1877	4,983,000	2,000,000				
1878	7,810,000	2,500,000				
1879	4,250,000	2,300,000				
1880	3,800,000	2,000,000				
1881	4,300,000	3,100,000				
1882		3,991,750				
1883		776,125				
1889 [a]	3,450,000	6,000,000				
1890	2,554,000	2,860,475				
1891	3,688,000	5,678,525				
1892	2,902,000	1,647,900				
1893	3,530,000	5,290,100				
1894	7,500,000	651,500			280,000	
1895	3,699,000	500,000			690,000	560,000
1896	2,798,500	3,547,850	557,150			
1897	18,232,590	9,828,095			298,137	
1898	30,605,000	39,950,698				
1899	32,618,000	9,366,366				
1900	7,411,000	14,287,264			146,824	
1901	11,615,036	7,987,107	1,668		302,041	
1902	19,446,410	29,340,308			424,530	
1903	16,160,177	23,845,956	250	680,800	81,812	
1904	75,217,354	35,006,988			3,984,645	
1905	96,055,765	21,620,292		107,000	9,321,513	
1906	116,648,145	20,797,543	123,118	239,180	6,445,574	300
1907	78,587,705	17,567,092		760,000	3,636,952	
1908	68,520,550	24,998,185	2,165,797	296,000	13,420,714	57,932
1909	38,859,265	20,177,286	16,949	272,000	9,470,925	
1910	38,306,709	15,682,064	225	275,000	10,888,025	
1911	37,314,514	16,659,684	211,700	2,391,900	6,210,296	
1912	36,837,550	31,040,893	1,405,860	52,000	12,955,824	
1913	58,296,873	33,419,423		202,000	13,952,963	
1914	31,032,645	48,895,607	5,582,796	95,840	24,619,456	27,258
1915	25,751,005	53,612,056	9,604,985	111,200	24,018,355	267,662
Total	908,680,793	521,027,132	19,670,498	5,482,920	141,148,586	913,152

Year ending June 30—	Chum, fry.	Humpback, or pink.		Sockeye, red, or blueback.		
		Eggs.	Fry.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
1900					10,683,000	
1901					3,834,453	
1902					3,371,000	
1903					3,731,789	
1904			176,597		3,855,000	
1905					7,819,281	10,000
1906		2,000	969,990	880,000	9,923,680	9,500
1907					58,835,055	
1908		502,000	6,764,762	75,000	69,883,305	
1909			10,000	100,000	93,408,496	
1910			1,731,740		146,081,595	
1911	911,650	100,000	460,150		100,490,900	
1912	2,495,000	3,271,740	2,566,325	2,000,000	91,422,273	
1913	19,479,000		1,880	2,000,000	78,724,900	
1914	8,672,735	13,260,000	[b] 37,652,777	6,020,000	53,071,574	120,000
1915	35,504,707	14,500,000	[c] 7,272,980	155,000	46,282,691	8,416,405
Total	67,063,092	31,635,740	57,607,201	11,230,000	781,418,992	8,555,905

[a] Operations suspended from 1884 to 1888, both inclusive.
[b] Includes 4,355 fingerlings, adults, and yearlings.
[c] Includes 119,480 fingerlings, adults, and yearlings.

OUTPUT OF PACIFIC COAST SALMON HATCHERIES OWNED BY THE UNITED STATES BUREAU OF FISHERIES, 1872 TO 1915—Continued.

Year ending June 30—	Steelhead trout.			Total.		
	Eggs.	Fry.	Fingerlings, yearlings, and adults.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
1872	....	....	....	30,000	....	....
1873	....	....	....	1,400,000	....	....
1874	....	....	....	4,155,000	850,000	....
1875	....	....	....	6,250,000	1,750,000	....
1876	....	....	....	5,065,000	1,500,000	....
1877	....	....	....	4,983,000	2,000,000	....
1878	....	....	....	7,810,000	2,500,000	....
1879	....	....	....	4,250,000	2,300,000	....
1880	....	....	....	3,800,000	2,000,000	....
1881	....	....	....	4,300,000	3,100,000	....
1882	....	....	....	....	3,991,750	....
1883	....	....	....	....	776,125	....
1889 [a]	....	....	....	3,450,000	6,000,000	....
1890	....	....	....	2,554,000	2,860,475	....
1891	....	....	....	3,688,000	5,678,525	....
1892	....	....	....	2,902,000	1,647,900	....
1893	....	....	....	3,530,000	5,290,100	....
1894	75,000	308,500	....	7,575,000	1,240,000	....
1895	....	852,500	332,000	3,699,000	2,042,500	892,000
1896	175,000	107,808	....	2,973,500	3,655,658	557,150
1897	50,000	257,000	....	18,282,590	10,383,232	....
1898	60,000	650,000	....	30,665,000	40,600,698	....
1899	159,000	12,125	....	32,777,000	9,378,491	....
1900	415,000	125,000	....	7,826,000	25,242,088	....
1901	246,000	65,850	25,000	11,861,036	12,189,451	26,668
1902	481,000	130,250	....	19,927,410	33,266,088	....
1903	480,000	702,700	285,848	17,320,977	28,362,257	286,098
1904	225,000	93,205	11,090	75,442,354	43,116,435	11,090
1905	464,400	537,205	....	96,627,165	39,298,291	10,000
1906	358,000	1,834,485	40,383	117,127,325	39,971,272	173,301
1907	250,000	1,190,305	....	79,597,705	81,229,404	....
1908	487,725	1,089,596	....	69,881,275	116,156,562	2,223,729
1909	483,725	1,670,371	....	39,714,990	124,737,078	16,949
1910	300,000	3,511,226	....	38,881,709	177,894,650	225
1911	660,000	3,826,439	....	40,466,414	128,559,119	211,700
1912	905,000	4,289,415	294,090	43,066,290	144,769,730	1,699,950
1913	1,330,000	4,272,225	....	61,828,873	149,850,391	....
1914	729,000	4,022,438	....	51,137,485	176,934,587	5,730,054
1915	877,000	5,262,973	1,048,317	41,394,205	171,953,762	19,337,369
Total	9,210,850	34,811,616	2,036,728	966,240,303	603,076,619	31,176,283

[a] Operations suspended from 1884 to 1888, both inclusive.

ACCLIMATIZING PACIFIC SALMON IN EASTERN WATERS.

For many years efforts have been made by the United States Bureau of Fisheries and various State fish commissions to introduce Pacific coast salmon in eastern waters. In the early history of fish culture chinook fry were planted in almost every imaginable stream along the Atlantic seaboard, in various streams in the Mississippi Valley, and also in tributaries of the Great Lakes. In most cases, owing to the unsuitability of the water, the experiment was doomed to failure from the start. In the case of a few streams where results might have been obtained, the plantings were at long intervals and the fish were too small to protect themselves, while no effort was made by the State authorities to protect them.

The most successful results with plants of chinook salmon have been obtained in Lake Sunapee, N. H., where it is now a not uncommon thing for anglers to catch chinooks with rod and reel.

In 1912 about 10,000 chinook fingerlings from Columbia River eggs furnished by the United States Bureau of Fisheries were planted by the Massachusetts Fish Commission in Lake Quinsigamond, and during July, 1914, about 20 months after they were hatched, over 600 salmon, according to a member of the commission, were caught, ranging from 1½ to 5 pounds each.

The most successful effort in this line was initiated by the United States Bureau of Fisheries in the fall of 1913, when it transferred from its hatcheries on the Pacific coast to those in Maine 13,240,000 humpback-salmon eggs. These were followed by a second shipment of 7,022,000 eggs in the fall of 1914, and of a third shipment of about 7,000,000 eggs in the fall of 1915. These eggs were hatched out and the fry planted in various selected New England streams where the conditions seemed favorable.

Early in August, 1915, a female humpback salmon 22½ inches long and weighing 4 pounds, 3 ounces, was taken at the Bangor waterworks in the Penobscot River. Shortly after a male fish of about the same size was taken in this river at Orland dam. A little later agents of the Bureau captured 20 alive near Bangor, and about 3,000 eggs were obtained and fertilized.

In Dennys River, in Maine, during the period between August 15 and September 24, local fishermen caught a number.

CALIFORNIA.

HISTORY.

The first fish-cultural station on the Pacific coast was located on McCloud River, a stream of the Sierra Nevada Mountains emptying into Pit River, a tributary to the Sacramento, 323 miles nearly due north of San Francisco. The site on the west bank of the river, about 3 miles above the mouth, was chosen after investigation of a number of places on the Sacramento, by Livingston Stone, one of America's pioneer fish culturists, and the station was named Baird, in honor of the then Commissioner of Fisheries, Prof. Spencer F. Baird. Although the season had nearly passed when the station was sufficiently advanced to handle eggs, 50,000 eggs were secured, and while 20,000 were lost, owing to the excessive heat, the remaining 30,000 were shipped east, all of which were eventually lost but 7,000 fry, which were planted in the Susquehanna River, in Pennsylvania.

The main object of the hatchery the first few years was to secure eggs to ship to the East for the purpose of introducing Pacific salmon in the waters in that section. The Commission early made an agreement with the State of California, however, under which the latter at first paid part of the expense, and the Commission hatched and planted a portion of the take in the McCloud River. Later, part of the eggs were turned over to the State, which hatched and planted the salmon in local waters.

In 1881 the station buildings were washed away in a freshet, but were immediately rebuilt. From 1884 to 1887, both inclusive, all operations were suspended.

In 1889 a hatchery was established at Fort Gaston, on the Army reservation in the Hoopa Indian Reservation in Humboldt County, but it was not put into operation until 1890. As the reservation was abolished on July 1, 1892, the Commission took complete charge of the plant, and in 1893 established a tributary station on Redwood Creek. The same year Korbel station was established about one-half mile above Korbel, on Mad River, in Humboldt County. Owing to the lack of money this station was closed in the fiscal year 1896, but was reopened during the fiscal year 1897.

That same year the Commission erected, on ground owned by the State, a hatchery at Battle Creek in Tehama County and also took charge of and operated the hatchery erected at this place by the State fish commission the previous year. Under the terms of an agreement the Commission was to deliver to the State as many eyed spawn as the latter could hatch at Sisson, its own station.

Owing to their inaccessibility the Fort Gaston hatchery and its substations were abandoned in 1898. The same year an experimental station was established at Olema, Bear Valley, in Marin County, whence eggs were transferred from Baird station, hatched out here, and planted in Olema Creek in order to see if they could not be domesticated here, where they had not been found previously.

During the fiscal year 1902 a substation was established on Mill Creek, a stream which has its source in the foothills of the Sierra Mountains, in the northeastern part of Tehama County, and empties into the Sacramento River from the east about a mile above the town of Tehama. The eggs are retained here until eyed and then shipped to other hatcheries.

As stated above, the State aided the work of the United States Fish Commission in a financial way and also by hatching and distributing the eggs turned over to its care. In 1885 the State Legislature passed a bill authorizing the establishment of a hatchery of its own, and the same year such a station was built upon Hat Creek about 2½ miles above its junction with Pitt River, a tributary of the Sacramento River. As the work of the first few seasons developed that the location was unsuitable, the hatchery was removed in 1888 to Sisson, in Siskiyou County. The work of this hatchery was to handle the eggs turned over to it by the United States Fish Commission.

In 1895 another hatchery was built by the State near the mouth of Battle Creek, a tributary of the Sacramento River. In 1896 and 1897 this hatchery was operated jointly by the State and the United States Fish Commission while awaiting the appropriation of money by the Commission to purchase it from the State.

In the fall of 1897 a hatchery was established by the State at Grizzly Bluff, on Price Creek, a tributary of Eel River, in Humboldt County, and in 1902 this hatchery made the first plant in the State of steelhead trout fry.

Santa Cruz County has had a hatchery at Brookdale for a number of years. In 1911 it was leased to the State and operated by the latter during the seasons of 1911 and 1912. In 1913 the State gave up the lease and entered into a contract to purchase the eggs produced from this hatchery. The price agreed upon was that the State Commission was to pay $1.50 per thousand for the eyed steelhead eggs, up to the number of 2,000,000, and $1 per thousand for all eggs up to 3,000,000, provided that the eggs were collected and eyed by a skilled fish culturist and would pass inspection before they were accepted.

A hatchery was established by the United States Bureau of Fisheries at Hornbrook, on Klamath River, in 1913. At first this hatchery was devoted to rainbow trout work, but later the collection and distribution of silver and chinook salmon was taken up.

During the fall of 1911 the State established an experimental station at Sacramento in order to carry on a series of experiments to determine whether the eggs of the quinnat salmon could be successfully hatched and the fry reared near the city of Sacramento. Of the fish hatched at this station 50,000 were marked.

Nearly all of the fry that were liberated in the Sacramento River were floated in a screen cage by boat into the middle of the stream and there released. N. B. Scofield took 500 in a floating box down the river, where they were held and fed for several weeks in brackish and salt water. They were apparently not affected by the changes in the salinity of the water.

Experiments were carried on until the summer of 1913, when they were abandoned due to the killing of the embryos by the mineral substances in the water used at the station.

During the fiscal year 1912 the Mill Creek hatchery of the United States Bureau of Fisheries was operated by the California Commission.

Some years ago the town of Ukiah, Mendocino County, established a hatchery 1 mile from the town, and on Russian River. For some years it was operated as a trout station, but eventually became an important steelhead hatchery. It was not operated in 1913. In 1914 the State Fish Commission collected steelhead eggs at the Eel River dam of the Snow Mountain Water & Power Co., and having secured permission from the town of Ukiah, hatched them out in its hatchery.

As the Hornbrook hatchery on Klamath River was on private property, the United States Bureau of Fisheries in 1915 removed the buildings from the old location on the south side to property owned by the Government on the north side of the river.

In 1915 new hatchery buildings were erected at the Mill Creek hatchery.

OUTPUT.

The following tables show separately the quantity of eggs, fry, etc., distributed by the United States Fish Commission and the State since the inception of the work. The large quantity of eggs shown by the Commission represents largely the eggs supplied to the State, which hatched and distributed them, and eggs sent to other States and to foreign countries.

OUTPUT OF HATCHERIES OWNED BY THE UNITED STATES BUREAU OF FISHERIES.

Years ending June 30 [a]—	Chinook.		Silver.		Steelhead trout.		Total.	
	Eggs.	Fry.	Eggs.	Fry.	Eggs.	Fry.	Eggs.	Fry.
1872...	30,000	....	....	....	....	....	30,000	....
1873...	1,400,000	....	....	....	....	....	1,400,000	....
1874...	4,155,000	850,000	....	....	....	....	4,155,000	850,000
1875...	6,250,000	1,750,000	....	....	....	....	6,250,000	1,750,000
1876...	5,065,000	1,500,000	....	....	....	....	5,065,000	1,500,000
1877...	4,983,000	2,000,000	....	....	....	....	4,983,000	2,000,000
1878...	7,810,000	2,500,000	....	....	....	....	7,810,000	2,500,000
1879...	4,250,000	2,300,000	....	....	....	....	4,250,000	2,300,000
1880...	3,800,000	2,000,000	....	....	....	....	3,800,000	2,000,000
1881...	4,300,000	3,100,000	....	....	....	....	4,300,000	3,100,000
1882...	....	3,991,750	....	....	....	....	....	3,991,750
1883...	....	776,125	....	....	....	....	....	776,125
1889 [b].	3,450,000	1,500,000	....	....	....	....	3,450,000	1,500,000
1890...	1,554,000	84,000	....	....	....	....	1,554,000	84,000
1891...	2,988,000	777,000	....	....	....	....	2,988,000	777,000
1892...	2,902,000	315,500	....	....	....	....	2,902,000	315,500
1893...	3,530,000	1,190,100	....	....	....	....	3,530,000	1,190,100
1894...	7,500,000	438,500	....	280,000	75,000	308,500	7,575,000	1,027,000
1895...	3,676,000	500,000	....	[c] 1,250,000	....	[d] 1,184,500	3,676,000	2,934,500
1896...	6,170,800	715,700	....	....	175,000	107,808	6,345,800	823,508
1897...	18,232,590	3,056,701	....	298,137	50,000	257,000	18,282,590	3,611,838
1898...	30,605,000	15,643,300	....	....	60,000	650,000	30,665,000	16,293,300
1899...	27,665,000	3,275,110	....	....	....	....	27,665,000	3,275,110
1900...	2,925,000	3,533,950	....	....	....	....	2,925,000	3,533,950
1901...	3,934,036	889,570	....	....	....	....	3,934,036	889,570
1902...	17,580,410	2,115,560	....	....	....	....	17,580,410	2,115,560
1903...	11,275,777	1,618,066	....	....	....	....	11,275,777	1,618,066
1904...	64,598,354	2,350,130	....	....	....	....	64,598,354	2,350,130
1905...	96,025,765	7,561,380	....	....	....	....	96,025,765	7,561,380
1906...	107,905,945	[e] 3,496,405	....	....	....	....	107,905,945	3,496,405
1907...	73,376,315	2,512,250	....	....	....	....	73,376,315	2,512,250
1908...	64,990,550	4,780,855	....	....	....	....	64,990,550	4,780,855
1909...	32,278,265	3,590,078	....	....	....	....	32,278,265	3,590,078
1910...	30,539,467	2,286,257	....	....	....	....	30,539,467	2,286,257
1911...	33,364,514	3,666,061	2,289,900	....	....	....	35,654,414	3,666,061
1912...	20,697,550	7,243,325	....	....	....	....	20,697,550	7,243,325
1913...	17,092,873	2,195,100	100,000	17,320	....	....	17,192,873	2,212,420
1914...	25,373,645	[f] 9,448,340	95,840	2,536,460	....	....	25,469,485	11,984,800
1915...	20,716,005	[g] 13,101,539	....	[h] 1,197,902	....	....	20,716,005	14,299,441
Total..	772,990,861	118,652,652	2,485,740	5,579,819	360,000	2,507,808	775,836,601	126,740,279

[a] The calendar year was used up to 1889.
[b] The hatchery was closed from 1884 to 1888.
[c] Includes 560,000 fingerlings, yearlings, or adults.
[d] Includes 332,000 fingerlings, yearlings, or adults.
[e] Includes 138 fingerlings, yearlings, or adults.
[f] Includes 3,849,991 fingerlings.
[g] Includes 8,086,139 fingerlings.
[h] Includes 226,162 fingerlings.

OUTPUT OF HATCHERIES OWNED BY THE STATE OF CALIFORNIA.

Years.	Chinook.		Silver fry.	Steelhead fry.	Total.	
	Eggs.	Fry.[a]			Eggs.	Fry.
1873		520,000				520,000
1874		850,000				850,000
1875	[b] 250,000	2,250,000			250,000	2,250,000
1876		2,000,000				2,000,000
1877		2,200,000				2,200,000
1878		2,500,000				2,500,000
1879		2,300,000				2,300,000
1880		2,225,000				2,225,000
1881		2,420,000				2,420,000
1882		3,991,750				3,991,750
1884		600,000				600,000
1886		150,000				150,000
1887		200,000				200,000
1888		1,290,000				1,290,000
1889		2,168,000				2,168,000
1890		1,320,000				1,320,000
1891		2,798,000				2,798,000
1892		2,651,000				2,651,000
1893		3,941,650				3,941,650
1894		7,776,400				7,776,400
1895		3,435,000				3,435,000
1896		15,283,183				15,283,183
1897		18,123,000				18,123,000
1898		31,476,388				31,476,388
1899		21,234,000				21,234,000
1900		2,536,000				2,536,000
1901		3,239,000				3,239,000
1902		16,852,040		301,000		17,153,040
1903		20,040,487		120,000		20,160,487
1904		63,632,000		90,000		63,722,000
1905		87,000,000		108,000		87,108,000
1906		105,815,920		243,000		106,058,920
1907		71,267,000		352,000		71,619,000
1908		60,619,000		170,000		60,789,000
1909		28,000,000		517,000		28,517,000
1910		28,469,745		637,800		29,107,545
1911		29,657,263	2,060,910	1,858,100		33,576,273
1912		18,909,445		2,177,958		21,087,403
1913		16,277,227	25,000	1,983,500		18,285,727
1914		25,290,615	12,500	3,171,083		28,474,198
1915		33,313,150	1,417,000	8,582,500		43,312,650
Total	250,000	744,622,263	3,515,410	20,311,941	250,000	768,449,614

[a] The greater part of the output of chinook fry was from eggs supplied by the United States Bureau of Fisheries hatcheries in California.
[b] All were lost.

DISTRIBUTION.

The following table shows, by streams and species, the distribution in California of the eggs, fry, etc., from the hatcheries of the United States Fish Commission and the State. This far from represents the work of the hatcheries, as large quantities of eggs were sent to other States and foreign countries.

DISTRIBUTION OF SALMON EGGS, FRY, ETC., IN THE WATERS OF CALIFORNIA.

Years.	Klamath River and tributaries.				Redwood Creek and tributaries.			
	Chinook.		Silver.		Chinook fry.	Silver.		Steel-head fry.
	Fry.	Year-lings.	Fry.	Adults and year-lings.		Fry.	Adults and year-lings.	
1890	90,000							
1891	30,000				25,000			
1892	147,600	25,000			142,500			
1893	487,200				170,000			
1895			300,000	160,000		140,000	400,000	
1896					65,700			107,808
1897					280,250	124,750		202,000
1898	16,000				1,260,000			650,000
1903	40,000							
1911			2,060,910					
1913			17,320					
1914	a 2,255,100		2,548,960					
1915	5,820,000		1,098,000					
Total	8,885,900	25,000	6,025,190	160,000	1,943,450	264,750	400,000	959,808

a Includes 100,000 planted in Smith River.

DISTRIBUTION OF SALMON EGGS, FRY, ETC., IN THE WATERS OF CALIFORNIA—Con.

Years.	Mad River and North Fork.			Eel River.		Russian River.	Skaggs Springs.	Marin County creeks.
	Chinook fry.	Silver fry.	Steel-head fry.	Chinook fry.	Steel-head fry.	Chinook fry.		
1881						15,000	15,000	
1894		280,000	308,500					
1895		470,000						
1897	145,365	173,387	60,000					635,000
1898				7,857,388				1,970,000
1899				8,202,000				900,000
1900				885,000				
1902				2,069,500	301,000			
1903				5,257,947	120,000			
1904				5,200,000	90,000			
1905				8,100,000				
1906				9,265,920	243,000			
1907				7,570,000	352,000	25,000		25,000
1908				6,154,000				
1909				5,500,000	340,000			
1910				5,969,745	334,800			
1911								
1912	100,000			3,103,660				
1913	100,000			1,386,500				
1914	225,000			3,723,000				
1915	350,000			2,618,150				
Total	820,365	923,387	368,500	82,862,810	1,789,800	40,000	15,000	3,530,000

DISTRIBUTION OF SALMON EGGS, FRY, ETC., IN THE WATERS OF CALIFORNIA—Con.

Years.	Sacramento River and tributaries.					San Francisco Bay streams	San Gregorio River.	Pescadero Creek.	Monterey Bay and tributaries.
	Chinook.			Silver fry.	Steelhead fry.	Chinook fry.			
	Eggs.	Fry.	Yearlings, fingerlings, and adults.						
1873	20,000	520,000							
1874		850,000							
1875	a 250,000	2,000,000							
1876		2,000,000							
1877		2,200,000							
1878		2,500,000							
1879		2,300,000							
1880		2,225,000							
1881		2,300,500				20,000	15,000	15,000	30,000
1882	80,300	3,991,750							
1884		600,000							
1886		150,000							
1887		200,000							
1888		1,290,000							
1889		3,668,000							
1890		1,404,000							
1891		3,520,000							
1892		2,676,500							
1893		4,474,750							
1894		8,214,900			45,000				
1895		3,935,000							
1896		15,683,183	250,000						
1897		19,264,086							
1898		33,998,300							
1899	85,200	16,307,110							
1900		5,184,950							
1901		4,128,570							
1902		16,898,100							
1903		16,359,606							
1904		60,782,130							
1905		94,561,380			108,000				
1906		100,038,552							900,000
1907		66,209,250			135,000				1,200,000
1908		59,245,855			170,000				800,000
1909		26,090,000			168,000				
1910		24,786,257			303,000				
1911		33,323,324							
1912		22,949,110							
1913		16,691,167				294,660			
1914		24,637,864	838,906						
1915		28,705,000	9,053,635	1,194,762					
Total	435,500	736,864,194	10,142,541	1,194,762	929,000	314,660	15,000	15,000	2,930,000

a All were lost.

DISTRIBUTION OF SALMON EGGS, FRY, ETC., IN THE WATERS OF CALIFORNIA—Con.

Years.	Monterey Bay and tributaries.		Truckee River.	Total.					
				Chinook.			Silver.		
	Silver fry.	Steelhead fry.	Chinook fry.	Eggs.	Fry.	Yearlings, fingerlings, and adults.[a]	Fry.	Adults and yearlings.	Steelhead fry.[b]
1873				20,000	520,000				
1874					850,000				
1875			250,000	250,000	2,250,000				
1876					2,000,000				
1877					2,200,000				
1878					2,500,000				
1879					2,300,000				
1880					2,225,000				
1881			10,000		2,420,500				
1882				80,300	3,991,750				
1884					600,000				
1886					150,000				
1887					200,000				
1888					1,290,000				
1889					3,668,000				
1890					1,494,000				
1891					3,575,000				
1892					2,966,600	25,000			
1893					5,131,950				
1894					8,214,900		280,000		353,500
1895					3,935,000		910,000	560,000	
1896					15,748,883	250,000			107,808
1897					20,324,701		298,137		262,000
1898					45,101,688				650,000
1899				85,200	25,409,110				
1900					6,069,950				
1901					4,128,570				
1902					18,967,600				301,000
1903					21,657,553				120,000
1904					65,982,130				90,000
1905					102,661,380				108,000
1906					110,204,472				243,000
1907	80,000				75,029,250		80,000		487,000
1908	80,000				66,199,855		80,000		170,000
1909	42,000	1,200			31,590,000		42,000		518,200
1910					30,756,002				637,800
1911					33,323,324		2,060,910		1,858,100
1912					26,152,770				2,177,958
1913	25,000				18,472,327		42,320		1,983,500
1914					30,840,964	838,906	2,548,960		3,171,083
1915	71,000				[c] 37,543,150	9,053,635	2,363,762		8,582,500
Total	298,000	1,200	260,000	435,500	[c] 838,646,379	10,167,541	8,706,089	560,000	21,821,449

[a] Of recent years it has been impossible to show the total number of yearlings, fingerlings, and adults planted, as the State reports do not distinguish them from the fry. Those shown in 1914-15 were reared by the United States Bureau of Fisheries.

[b] After 1911 the practice of showing waters in which steelheads were planted was abandoned as the number of streams was becoming unwieldy.

[c] Includes 25,000 chinook fry placed in Santa Inez River and 25,000 placed in Ventura River in 1915.

OREGON.

HATCHERIES ON COASTAL STREAMS.

Rogue River.—In 1877 R. D. Hume, who had been packing salmon on this river for some years, erected a hatchery at Ellensburg. In 1888 the Oregon Legislature appropriated a sum of money for the enlargement and support of this hatchery, Mr. Hume to retain complete control. As the location is on tidewater, it is necessary to catch the parent fish and hold them until they are ready to spawn, and in order to do this Mr. Hume had an excavation 32 by 62 feet and 11 feet deep made in the bank of the river. This was lined with concrete 1 foot thick, which, when filled with water, made a pond 30 by 60 feet and 10 feet deep. Over the entire pond he constructed a building which could be closed up so as virtually to exclude the light. It is supposed that retaining the fish in a dark place aids in keeping them in good physical condition until ready to spawn. After the death of Mr. Hume in 1908 this hatchery was taken over and operated by the State.

In 1897 Mr. Hume built and equipped a hatchery on the upper Rogue River at the mouth of Elk Creek, about 26 miles from the town of Central Point, in Jackson County, and, in pursuance of an understanding with the United States Fish Commission, the latter operated then and still continues to operate this plant.

In 1900 the Government established an auxiliary station for the collection of steelhead trout eggs on Elk Creek, about 10 miles above the main station. In 1905 a substation was operated at Grants Pass, while during the fiscal year 1908 and in subsequent years substations were operated at Findley Eddy, on the Rogue River, Illinois River, and Applegate Creek, tributaries of the Rogue.

Many of the eggs gathered at the upper Rogue River stations were shipped to Mr. Hume's hatchery, on the lower river, and there hatched out and planted.

Coquille River.—The State formerly had a hatchery on this river, but it was abandoned during the winter of 1902–3. In the winter of 1904–5 a substation was established on one of the tributaries of the Coquille River, about 6 miles from the South Coos River hatchery, and was used in hatching eggs brought to it from the latter place. A station was built on the north fork of the Coquille River in 1910.

Coos River.—A hatchery was built by the State in 1900 on the South Coos River, about 20 miles from the town of Marshfield.

Umpqua River.—In 1900 the State built a hatchery on the north fork of the Umpqua River, near the town of Glide and about 24 miles east of Roseburg. In 1901 a station was established farther up the north fork, at the mouth of Steamboat Creek. After working here two years the station was moved a couple of miles farther up the stream. In 1907 work was resumed at the original station near Glide, as winter freshets had seriously damaged the upper station. A permanent station was built in 1910.

Siuslaw River.—In 1893 the State erected a hatchery on Knowles Creek, a tributary of the Siuslaw River, about 20 miles above the mouth of the river. It was turned over to the United States Fish Commission to operate, but no fish came up to the hatchery because the fishermen lower down stretched their nets entirely across the river.

In 1897 and 1898 the United States Fish Commission operated a hatchery owned by a Mr. McGuire and located close to Mapleton about 2 miles below the head of tidewater.

In 1902 the State established an experimental station at the Bailey place, near Meadow post office. In 1907 a permanent station was established by the State on Land Creek fork of the Siuslaw River.

Alsea River.—In 1902 the State established a station on the Willis Vidito place, near the town of Alsea. In 1907 an experimental station was established on this river at the mouth of Rock Creek, about 14 miles above the head of tidewater. In 1910 an experimental station was established between Alsea and tidewater.

Yaquina River.—In 1902 the State established a hatching station on the Big Elk River, a tributary of Yaquina River, about 3 miles above its confluence with the main river. This station was made permanent the next year.

Tillamook Bay.—In 1902 the State established a station on Wilson River, a tributary of Tillamook Bay, and about 8 miles above tidewater. In 1906 the station was removed to the Trask River, a tributary of Tillamook Bay.

DISTRIBUTION.

The following table shows the distribution of fry in the coastal streams of the State by the Government and the State:

DISTRIBUTION OF SALMON FRY, ETC., IN THE COASTAL STREAMS OF OREGON.

Year ending June 30—	Tillamook Bay and tributaries.			Yaquina River.			Alsea River.	
	Chinook fry.	Silverside fry.	Steelhead fry.	Chinook fry.	Silverside fry.	Steelhead fry.	Chinook fry.	Silverside fry.
1898	19,994	....	....	....	....	....	....	....
1901	....	....	....	213,500	....	....	....	....
1903	251,875	....	....	557,700	....	....	67,750	....
1904	799,300	....	....	3,144,380	985,220	....	....	....
1905	....	....	....	1,407,470	3,009,075	780,500	1,000,000	1,000,000
1906	....	....	....	816,608	4,178,000	1,033,150	806,938	1,785,351
1907	312,700	2,648,000	....	1,919,508	1,955,793	376,245	....	....
1908	2,124,000	1,629,000	....	2,193,043	909,855	....	199,700	812,300
1909	....	4,896,000	569,690	485,500	1,006,309	....	....	....
1910	624,800	3,506,990	2,309,770	324,038	28,815	....	....	....
1911	1,818,245	1,080,000	1,196,000	582,785	2,637,550	621,015	495,950	30,300
1912	646,300	1,578,131	761,000	148,992	1,554,602	7,145	287,645	997,455
1913	1,747,530	422,886	848,229	727,567	3,288,650	....	87,935	424,925
1914	487,692	1,112,392	660,588	....	....	....	....	....
1915	2,833,428	....	213 900	....	....	....	....	....
Total	11,665,869	16,873,399	6,559,177	12,521,091	19,553,869	2,818,055	2,945,918	5,050,331

Year ending June 30—	Siuslaw River.			Umpqua River.		Coos Bay and tributaries.		
	Chinook fry.	Silverside fry.	Steelhead fry.	Chinook fry.	Steelhead fry.	Chinook fry.	Silverside fry.	Steelhead fry.
1897	180,000	....	....	....	....	....	....	....
1898	440,275	....	....	....	....	....	....	....
1899	2,700,000	....	....	....	....	....	....	....
1901	213,500	....	....	730,000	....	235,000	....	....
1902	112,000	214,800	....	1,136,000	....	2,416,350	....	....
1903	389,239	....	....	1,596,213	....	....	....	....
1904	822,567	....	....	1,399,860	....	4,079,274	....	....
1905	435,162	311,900	....	2,654,925	....	3,877,172	....	....
1906	1,826,531	1,296,732	397,355	4,903,700	....	2,744,000	....	....
1907	608,949	1,030,486	....	4,685,900	....	4,014,400	....	....
1908	729,130	1,127,293	....	2,378,853	....	3,000,000	....	....
1909	191,267	1,092,540	98,243	4,093,848	....	2,084,500	1,032,000	222,000
1910	273,352	25,289	....	5,686,273	....	1,683,738	....	....
1911	594,702	20,693	227,580	2,541,236	293,996	2,374,200	....	....
1912	715,758	504,429	72,097	1,053,516	....	1,767,170	2,317,370	....
1913	255,028	627,312	106,717	903,704	181,085	1,281,120	962,528	....
1914	1,062,546	476,273	17,735	1,882,985	80,000	1,331,217	2,973,390	....
1915	1,472,410	....	257,850	1,333,171	....	1,212,805	1,551,645	192,625
Total	13,022,416	6,727,747	1,177,577	36,980,184	555,081	32,100,946	8,836,933	414,625

DISTRIBUTION OF SALMON FRY, ETC., IN THE COASTAL STREAMS OF OREGON—Con.

Year ending June 30—	Coquille River.		Rogue River and tributaries.			
			Chinook.			
	Chinook fry.	Silverside fry.	Fry.	Yearlings, finger-lings, and adults.	Silverside fry.	Steelhead fry.
1877	....	....	50,000	....	....	....
1898	....	....	1,910,045	....	....	....
1900	....	....	2,156,945	....	....	....
1901	235,000	....	2,967,058	....	128,000	65,850
1902	....	....	4,750,763	....	424,530	20,250
1903	3,084,577	....	3,480,300	....	680,800	....
1904	1,000,000	....	9,023,428	....	....	8,073
1905	2,210,000	....	4,758,653	....	1,250,432	531,000
1906	2,978,700	....	47,500	75,000	....	12,625
1907	2,840,000	....	5,880,290	....	1,375,000	105,300
1908	2,450,000	226,600	6,597,027	170,051	158,000	937,680
1909	....	1,185,800	771,710	....	643,000	878,847
1910	....	....	1,430,292	....	....	89,850
1911	500,000	980,770	1,364,248	....	501,081	2,592,665
1912	196,855	1,672,850	9,574,340	....	2,355,885	[a] 1,313,890
1913	496,680	962,528	4,169,150	....	3,198,346	2,795,075
1914	491,580	1,331,910	3,752,483	....	[b] 7,832,000	1,376,308
1915	495,333	1,365,815	4,747,623	9,309	2,336,359	[c] 3,908,699
Total	16,978,725	7,726,273	67,431,855	254,360	20,883,433	11,980,637

Year ending June 30—	Total.				Grand total, all species.
	Chinook.				
	Fry.	Yearlings, finger-lings, and adults.	Silverside fry.	Steelhead fry.	
1877	50,000	....	....	....	50,000
1897	180,000	....	....	....	180,000
1898	2,370,314	....	....	....	2,370,314
1899	2,700,000	....	....	....	2,700,000
1900	2,156,945	....	....	....	2,156,945
1901	4,594,058	....	128,000	65,850	4,787,908
1902	8,415,113	....	639,330	20,250	9,074,693
1903	9,427,654	....	680,800	....	10,108,454
1904	20,268,809	....	985,220	8,073	21,262,102
1905	16,343,382	....	5,571,407	1,311,500	23,226,289
1906	14,123,977	75,000	7,260,083	1,443,130	22,902,190
1907	20,261,747	....	7,009,279	481,545	27,752,571
1908	19,671,753	170,051	4,863,048	937,680	25,642,532
1909	7,626,825	....	9,855,649	1,768,780	19,251,254
1910	10,022,493	....	3,561,094	2,399,620	15,983,207
1911	10,071,364	....	5,250,394	4,931,256	20,253,014
1912	14,390,576	....	10,980,722	2,154,132	27,525,430
1913	9,668,714	....	10,300,012	3,931,106	23,899,832
1914	8,905,303	....	13,725,965	2,134,631	24,765,899
1915	12,094,772	9,309	5,253,819	4,573,074	21,930,974
Total	193,343,799	254,360	86,064,822	26,160,627	305,823,608

[a] Includes 177,790 fingerlings, yearlings, and adults.
[b] Includes 860,903 fingerlings, yearlings, and adults.
[c] Includes 27,258 fingerlings.

The following tables show the total output of the hatcheries in Oregon owned by the United States Bureau of Fisheries and the State of Oregon:

OUTPUT OF HATCHERIES OWNED BY THE UNITED STATES BUREAU OF FISHERIES.

Year ending June 30—	Chinook.			Silverside.		
	Eggs.	Fry.	Fingerlings, yearlings, and adults.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
1889		4,500,000				
1890	1,000,000	2,776,475				
1891	700,000	4,901,525				
1892		1,332,400				
1893		4,100,000				
1894		213,000				
1895	23,000					
1896		a 2,832,150	b 557,150			
1897		4,922,634				
1898		16,915,512				
1899	27,000	4,300,200				
1900	1,800,000	4,126,367			146,824	
1901	1,100,000	1,669,857	1,668		128,000	
1902	1,866,000	11,587,061			424,530	
1903	4,884,400	5,453,860	250	680,800		
1904	3,113,000	15,270,675				
1905	30,000	9,822,636			1,250 432	
1906	28,200	2,454,371	122,980			300
1907	1,661,390	8,542,104				
1908	2,045,000	7,844,827	627,856		158,000	57,932
1909	3,531,000	5,021,655	2,763		1,799,915	
1910	3,953,992	4,220,197	225			
1911	600,000	5,686,168	200,000		1,659,681	
1912	8,000,000	12,837,840	750,765		2,355,885	
1913	21,491,000	11,291,023			3,198,346	
1914	1,075,000	12,156,818	602,300		8,441,642	27,258
1915	37,000	10,434,517	531,351	76,200	2,373,559	
Total	56,965,982	175,213,872	3,397,308	757,000	21,936,814	85,490

Year ending June 30—	Steelhead trout.			Total.		
	Eggs.	Fry.	Fingerlings, yearlings, and adults.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
1889					4,500,000	
1890				1,000,000	2,776,475	
1891				700,000	4,901,525	
1892					1,332,400	
1893					4,100,000	
1894					213,000	
1895				23,000		
1896					2,832,150	557,150
1897					4,922,634	
1898					16,915,512	
1899	159,000	12,125		186,000	4,312,325	
1900	415,000	99,000		2,215,000	4,372,191	
1901	246,000	65,850	25,000	1,346,000	1,863,707	26,668
1902	481.000	20,250		2,347,000	12,031,841	
1903	400,000	262,700	62,033	5,965,200	5,716,560	62,283
1904		23,205	11,090	3,113,000	15,293,880	11,090
1905	50,000	534,000		80,000	11,607,068	
1906	10,000	1,294,485	40,383	38,200	3,748,856	163,663
1907	50,000	105,300		1,711,390	8,647,404	
1908	263,725	952,680		2,308,725	8,955,507	685,788
1909	51,468	1,374,308		3,582,468	8,195,878	2,763
1910		2,074,188		3,953,992	6,294,385	225
1911		2,914,789		600,000	10,260,638	200,000
1912		2,005,100	294,090	8,000,000	17,198,825	1.044,855
1913		2,795,075		27,491,000	17,284,444	
1914		2,230,008		1,075,000	22,828,468	629,558
1915	752,000	3,254,275	910,652	865,200	16,062,351	1,442,003
Total	2,878,193	20,017,338	1,343,248	60,601,175	217,168,024	4,826,046

a All but 17,000 of these were from eggs received from the California stations.
b All raised from eggs received from the California stations.

OUTPUT OF HATCHERIES OWNED BY THE STATE OF OREGON.

Years.	Chinook fry.	Silverside fry.	Steelhead trout fry.	Sockeye fry.	Total.
1877	50,000				50,000
1878	79,620				79,620
1879	1,876,500				1,876,500
1880	1,834,290				1,834,290
1881	2,554,290				2,554,290
1888	1,300,000				1,300,000
1889	4,500,000				4,500,000
1890	990,000				990,000
1891	a 792,000				792,000
1895	2,500,000				2,500,000
1896	2,500,000				2,500,000
1899	2,700,000				2,700,000
1900	2,500,000		200,000		2,700,000
1901	7,562,000		245,000		7,807,000
1902	11,220,550	7,957,000	256,327		19,433,877
1903	18,502,072	3,288,600	300,850		22,091,522
1904	b 48,730,791	3,974,185	143,849		52,848,825
1905	16,393,249	5,509,085	1,495,735		23,398,069
1906	c 27,404,596	7,503,655	1,859,696		36,767,947
1907	d 25,156,732	6,446,628	376,245		31,979,605
1908	e 21,209,394	5,359,709			26,569,103
1909	f 20,108,990	9,212,649	1,403,129		30,724,768
1910	g 24,169,365	3,631,827	2,364,120		30,165,312
1911	h 19,762,229	4,749,319	4,018,598	i 1,488,327	30,018,473
1912	j 18,077,971	9,580,497	1,358,742	k 1,957,825	30,975,035
1913	l 26,623,268	9,879,666	1,136,031	m 1,937,134	39,576,099
1914	n 21,945,746	5,893,965	758,323	o 1,978,140	30,576,174
1915	p 27,532,168	2,917,460	4,793,208		35,242,836
Total	358,575,821	85,904,245	20,709,853	7,361,426	472,551,345

a Eggs from which hatched obtained from United States Bureau of Fisheries.
b 6,826,540 eggs were obtained from United States Bureau of Fisheries.
c 7,714,000 eggs were obtained from United States Bureau of Fisheries.
d 3,550,000 eggs were obtained from United States Bureau of Fisheries.
e 3,020,000 eggs were obtained from United States Bureau of Fisheries.
f 6,581,000 eggs were obtained from United States Bureau of Fisheries.
g 6,465,300 eggs were obtained from United States Bureau of Fisheries.
h 3,950,000 eggs were obtained from United States Bureau of Fisheries.
i 1,500,000 eggs were obtained from United States Bureau of Fisheries.
j 8,000,000 eggs were obtained from United States Bureau of Fisheries.
k 2,000,000 eggs were obtained from United States Bureau of Fisheries.
l 2,000,000 eggs were obtained from United States Bureau of Fisheries.
m 21,491,000 eggs were obtained from United States Bureau of Fisheries.
n 1,000,000 eggs were obtained from United States Bureau of Fisheries.
o 2,000,000 eggs were obtained from United States Bureau of Fisheries.
p Eggs were obtained from the United States Bureau of Fisheries.

COLUMBIA RIVER AND TRIBUTARIES.

The first fish-cultural work upon the Columbia River and in Oregon was at Clackamas, on the Clackamas River, a tributary of the Willamette River, which empties into the Columbia River about 180 miles from its mouth.

This hatchery was built in 1876 by the Oregon & Washington Fish Propagating Co., which operated it until 1880. In 1887 the State provided for and there was appointed a State fish commission. Almost the first work of the commission was to spend $12,000, appropriated by the legislature to put in repair and operate this hatchery. On July 1, 1888, it was informally turned over to the United States Commission of Fish and Fisheries, which paid over the purchase price, took formal possession in the following winter, and has operated it ever since, with the exception of several years when the building of dams stopped the progress of salmon to the hatchery. During this period a temporary station for the collection of eggs was established on Sandy River, about 15 miles away, and on Salmon River, a tributary of Sandy River, both tributaries of the Columbia River. Some eggs were also brought in from the California hatcheries and hatched at the Clackamas station. In 1901 the hatchery was moved about 4 miles down the river and has since been operated as both a rearing and a collecting station. In 1901 the State established another hatchery on the Clackamas River about 30 miles below the main station and between the north and south forks. In 1904 all were turned over to the United States. In 1915 the hatchery was moved again. In 1907 an experimental station for the collection of eggs of the early variety of chinook salmon was established by the State of Oregon on the Clackamas River below the Portland Railway, Light & Power Co.'s dam at Cazadero, but this was later operated by the United States Bureau of Fisheries. The building of a dam having cut off this station, another was established in 1913 at a point 30 miles distant from Portland.

In 1889 the State established a hatchery in the cannery of F. M. Warren, at Warrendale, in Multnomah County, on the Columbia River, which was operated in that year and in 1890.

In 1895 some of the Oregon salmon packers combined and organized the Columbia River Packers' Propagating Co., which established a hatchery on the upper Clackamas River at the junction of the Warm Springs and the Clackamas and operated it in 1895 and 1896. The Government operated it in 1897 and 1898, after which it was turned over to the State and moved to the opposite siae of the river.

In 1898 the collection of steelhead trout eggs was first undertaken on the northwest coast by the State of Oregon on Salmon River, a tributary of the Columbia River, and met with fair success. In March, 1899, the Government sent a party to the falls of the Willamette River, near Oregon City, to collect steelhead eggs, and also operated for this purpose at its substation on the Salmon River, but the latter effort met with failure, as the rack was washed away. This station was turned over to the State on June 15, 1899.

In 1901 the State of Oregon did some experimental work at Swan Falls, on Snake River, the boundary for a considerable distance between Oregon and Idaho. During the winter and early spring of 1902 the State also worked Tucannon River, which is a tributary of Snake River, for steelhead, but met with poor success. Snake River was worked again in 1902 at the foot of Morton Island, which is situated 2 miles above Ontario, in Malheur County. Title to the necessary property was secured from the War Department in 1903 and permanent buildings were erected. It was closed for some years and finally abandoned in 1911.

In 1901 the State of Oregon established an experimental hatchery in Wallowa County, on the Grande Ronde River, at the mouth of a small tributary called the Wenaha River, which enters the main stream about 50 miles from its mouth. A permanent station was established in the canyon about 1½ miles below the Wallowa bridge on the Wallowa River, a tributary of the Grande Ronde River, in 1903.

In 1902 the State of Oregon erected a permanent plant on Salmon River at its junction with Boulder Creek. This plant was closed in 1911.

In the same year the State established an experimental station on the McKenzie River, a tributary of the Willamette River, about one-half mile above Vida post office. This experimental work was resumed in 1905 at a point 2 miles below Gate Creek. The hatchery was permanently established at a spot about 30 miles from Eugene and near the town of Leaburg a year or two later.

In 1903 a hatchery was built by the State of Oregon on the Snake River, near the town of Ontario, in eastern Oregon.

In 1906 an experimental station was established by the State on Breitenbush Creek a short distance above its junction with the Santiam River, a tributary of the Willamette River, but the plant was destroyed, very shortly after its establishment, by a forest fire. An experimental station was reestablished here in 1909, but a heavy freshet raised the river so high that the penned fish escaped around the rack.

In 1909 the State of Oregon built at Bonneville, on Tanner Creek, a tributary of the Columbia River, a large central hatchery capable of handling 60,000,000 eggs, it being the intention of the State to hatch at this plant the eggs collected at other stations.

In the same year a temporary hatchery was located on the Santiam River by the State of Oregon.

During 1910 the State of Oregon received 1,500,000 red-salmon eggs from the Yes Bay (Alaska) hatchery of the United States Bureau of Fisheries, and yearly since they have received a consignment from the same source, as will be noted in the statistical tables. These were hatched out in the Bonneville hatchery and planted in the Columbia River.

The State of Oregon built a hatchery on the Klaskanine River, a tributary of Youngs River, near Olney, in Clatsop County, in 1911. In the same year an eyeing station for spring chinooks was opened by the State on the Willamette River, near Lowell.

The first entrance of Washington (then a Territory) into fish-cultural operations was in 1879, when the State fish commissioner paid the Oregon & Washington Fish Propagating Co., which was operating the hatchery on the Clackamas River, $2,000 for salmon fry deposited in that river. In 1893 the State Legislature established a hatchery fund which was to be supplied by licenses from certain lines of the fishery business. In 1895 its first hatchery in the Columbia River Basin was built on the Kalama River, about 4 miles distant from its junction with the Columbia, and in Cowlitz County. Shortly after this hatchery was built it was discovered that it was above where the salmon spawned, and a second hatchery was built 1¼ miles below the first named, as the rugged mountainous character of the country made transportation between the two sites difficult. Of recent years a road has been constructed along the river bank, and it is probable that the upper buildings will be abandoned entirely.

Another station for the collection and eyeing of eggs was established on the Chinook River, a small stream which empties into Baker Bay near the mouth of the Columbia.

During the fiscal year 1897 the United States Fish Commission established a station on Little White Salmon River, a stream which empties into the Columbia, on the Washington side, about 14 miles above the Cascades. During the fiscal year 1901 an auxiliary station was operated on Big White Salmon River, while fishing was carried on in Eagle and Tanner Creeks, in Oregon, the eggs obtained from these creeks being brought to the Little White Salmon hatchery.

In 1899 the State of Washington built and operated hatcheries on the Wenatchee River, a tributary of the Columbia River, about 1½ miles from Chiwaukum station on the Great Northern Railway, and on Wind River, a tributary of the Columbia, about 1 mile from the junction.

In 1900 Washington State hatcheries were established in the Columbia River Basin as follows: White River hatchery, which was built on Coos Creek, which empties into a tributary of the White River, the location being about 2½ miles from where the Green River joins the White River; Methow River hatchery, built on the Methow River at the point where it is joined by the Twisp, about 22 miles from the Columbia River; Colville River hatchery, built on the north bank of Colville River, about 1½ miles from its mouth, and about 1 mile from Kettle Falls; Klickitat River hatchery, located on the east bank of the Klickitat River, about 6 miles from its mouth; and one on the Little Spokane River, about 10 miles from its mouth and about 9 miles north of the city of Spokane. The Klickitat River hatchery never was operated, while most of the others were operated intermittently.

In 1906 a hatchery was established by the State of Washington on the Lewis River, some distance above the town of Woodland.

In 1909 the State of Washington established a hatchery near Pateros, on the Methow River, a tributary of the Columbia River, and on the Tulton.

In 1915 Clarke County, Wash., built a hatchery on the east side of Cold Creek, about 2 miles from the town of Vancouver.

A temporary station was established by the State of Washington on Wenatchee Lake, near Leavenworth, in 1915.

The following table shows the plants of salmon and steelhead trout in the Columbia River and its tributaries by the Bureau of Fisheries and the States of Oregon and Washington:

PLANTS OF SALMON FRY IN THE COLUMBIA RIVER BASIN SINCE 1877.

Years ending June 30—	Columbia River and tributaries.					Total fry.
	Sockeye fry.	Chinook fry.	Silverside fry.	Steelhead trout fry.	Chum fry.	
1877	....	300,000	....	....	....	300,000
1878	....	79,620	....	....	....	79,620
1879	....	3,076,500	....	....	....	3,076,500
1880	....	1,834,290	....	....	....	1,834,290
1881	....	2,554,290	....	....	....	2,554,290
1888	....	1,300,000	....	....	....	1,300,000
1889	....	4,500,000	....	....	....	4,500,000
1890	....	3,756,475	....	....	....	3,756,475
1891	....	5,694,000	....	....	....	5,694,000
1892	....	1,332,400	....	....	....	1,332,400
1893	....	4,100,000	....	....	....	4,100,000
1894	....	213,000	....	....	....	213,000
1895	....	[a]2,523,000	....	....	....	2,523,000
1896	....	[b]10,389,300	....	....	....	10,389,300
1897	....	10,641,394	....	....	....	10,641,394
1898	....	26,212,074	....	....	....	26,212,074
1899	....	19,979,241	....	8,625	....	19,987,866
1900	....	22,510,869	7,175,824	299,000	....	29,985,693
1901	....	[c]24,978,978	5,559,750	245,000	....	30,783,728
1902	....	44,328,085	17,545,724	256,327	....	62,130,136
1903	....	40,174,313	8,721,720	[d]600,583	....	49,496,616
1904	....	71,694,587	8,422,085	158,981	....	80,275,653
1905	....	17,107,217	1,354,610	[e]768,235	....	19,230,062
1906	....	[f]36,372,785	[g]828,872	[h]1,769,494	....	38,971,151
1907	....	23,171,235	2,657,349	26,640	....	25,855,224
1908	....	[i]34,852,008	1,705,543	15,000	....	36,572,551
1909	....	[j]33,098,943	2,439,415	[k]1,058,657	....	36,597,015
1910	....	[l]37,744,002	3,374,733	[m]2,063,688	....	43,182,423
1911	1,488,327	[n]28,802,795	[o]1,308,900	1,982,331	420,730	34,003,083
1912	1,957,825	[p]50,740,925	1,243,660	[q]1,503,800	106,020	55,552,230
1913	1,937,134	70,211,177	4,591,500	40,000	105,800	76,885,611
1914	1,978,140	[r]83,727,844	636,900	[s]932,700	591,638	87,867,222
1915	....	[t]82,317,442	608,747	4,128,833	8,299,572	95,354,594
Total	7,361,426	800,318,789	68,175,332	15,857,894	9,523,760	901,237,201

[a] Includes 23,000 eggs.
[b] Includes 557,150 yearlings, fingerlings, or adults.
[c] Includes 1,668 yearlings, fingerlings, or adults.
[d] Includes 37,033 yearlings, fingerlings, or adults.
[e] Includes 50,000 eggs.
[f] Includes 48,200 eggs and 47,980 yearlings, fingerlings, or adults.
[g] Includes 300 yearlings, fingerlings, or adults.
[h] Includes 24,383 yearlings, fingerlings, or adults, and 58,000 eggs.
[i] Includes 1,995,746 yearlings, fingerlings, or adults.
[j] Includes 16,949 yearlings, fingerlings, or adults.
[k] Includes 50,000 eggs.
[l] Includes 225 yearlings, fingerlings, or adults.
[m] Includes 25,000 eggs.
[n] Includes 11,700 yearlings, fingerlings, or adults.
[o] Includes 100,000 eggs.
[p] Includes 1,405,860 yearlings, fingerlings, or adults.
[q] Includes 116,300 yearlings, fingerlings, or adults.
[r] Includes 1,000,000 eggs and 1,732,805 yearlings, fingerlings, or adults.
[s] Includes 79,000 eggs.
[t] Includes 812,801 yearlings, fingerlings, or adults.

WASHINGTON.

Willapa River.—In 1899 Washington established a hatchery on Trap Creek, a tributary of the Willapa River, situated about 200 yards from the creek's mouth.

Chehalis River.—The construction of a hatchery on the Chehalis River, about 4 miles above the city of Montesano, was begun by the State in October, 1897, but owing to bad weather and extreme high water was not completed until late in 1898. The hatchery was a failure until 1902 when a fair season was had, as was again true in 1903. It was not operated in 1904. Since the State began taking eggs from the Satsop River, a tributary of the Chehalis, it has been possible to fill the hatchery each season.

In 1909 the site where eggs had been gathered on the Satsop River was purchased, and a new hatchery was erected there. It has three concrete rearing ponds and is fully equipped for the taking of spawn and the hatching out and caring for 5,000,000 fry. This plant was first operated in the fall of 1909.

Work was begun in September, 1914, by the United States Bureau of Fisheries on a hatching station on Lake Quinault, Wash., and a take of eggs was made the same year.

In lieu of installing fishways in their dams in the Humptulips River and tributaries, in the Grays Harbor section, two timber firms agreed to furnish the money needed to build a hatchery on Stevens Creek, west of Humptulips, and the same was constructed and put into operation in October of the same year. The plant is now the property of the State.

Puget Sound and tributaries.—In 1896 the State established a hatchery on Baker Lake, which is the head of Baker River, a tributary of the Skagit River, and this was the first establishment for the hatching of sockeye salmon. In July, 1899, it was sold to the United States Fish Commission. In 1901 steelhead trout eggs were collected on Phinney Creek, about 5 miles from the town of Birdsview, and some 30 miles from Baker Lake. In 1901 an auxiliary station was opened at Birdsview, on Skagit River, and steelhead trout eggs were collected on Phinney and Grandy Creeks and brought to Baker Lake to be hatched.

In 1898 a private hatchery (the necessary money being raised by subscription among the residents of Fairhaven, now Bellingham, and vicinity) was built near Lake Samish, a few miles from Fairhaven.

In 1899 a hatchery was built by the State on Kendall Creek, a tributary of the Nooksak River, about 300 yards from same, and about 2 miles from the railway station of Kendall. Except in 1903, this hatchery has since been operated continuously. An eyeing station was built in 1907 on the south fork of the Nooksak River, about 1 mile from Acme.

In the same year the State built a hatchery on the Skokomish River, about 4 miles from its mouth. An eyeing station was also erected on the north fork of the same river. The main station was not operated in 1904 and only on a small scale in 1903 and 1905.

The State in 1889 built a hatchery on Friday Creek, a tributary of the Samish River, situated about 1 mile from the mouth of the creek.

The following State hatcheries were first operated in 1900: Snohomish hatchery, built on the west bank of Skykomish River, a few miles from its mouth; Nisqually River hatchery, built on Muck Creek, about one-half mile from the Nisqually River, and about 4 miles from the town of Roy, in Pierce County; and the Stillaguamish hatchery, located on the Stillaguamish River, about 4 miles from the town of Arlington, in Snohomish County. The latter has since been moved to Jim Creek, a tributary of the south branch of the Stillaguamish River.

The Startup hatchery, located near Startup, on the Skykomish River, was formerly used as a collecting station for the Snohomish hatchery. It is still used for this purpose, but also retains and hatches a considerable quantity of spawn. The station is about 4 miles from the Snohomish hatchery.

In 1900 the State established a fisheries experimental station at Keyport Landing, on the east arm of Port Orchard Bay, with Pearson as the nearest post office. The work of the station was devoted to salmon and oysters until it was abandoned a few years later.

The State established a hatchery on the Dungeness River, about 7 miles from the town of Dungeness, in Clallam County, in 1901. In 1906 it constructed a hatchery on a small tributary of the Skagit River, between Hamilton and Lyman. The station built on Sauk River, a tributary of the Skagit, has been operated only occasionally since the Skagit hatchery was built.

The White River hatchery was constructed on Suice Creek, a tributary of Green River, some years ago. During the summer of 1909 a new hatchery was built at this station, the old one being too small to accommodate the amount of spawn that could be taken. The new hatchery is located on the east side of Suice Creek near the county road. The building contains 140 hatching troughs. The plant has a pond system, where the fry are kept and fed until they are able to shift for themselves.

During the summer of 1911 the city of Tacoma constructed a large concrete dam in the Green River, about 4 miles west of Eagle Gorge.

As this dam prevented the salmon from reaching the spawning beds, the State established an eyeing station the same year just below the dam. In 1913 the name was changed to Green River hatchery, to conform to the name of the main stream.

In 1912 the United States Bureau of Fisheries completed the Quilcene and Duckabush hatcheries. Both are on small tributaries entering the west side of Hoods Canal, an arm of Puget Sound.

In 1913 a new station was operated by the Bureau on the Dusewallips River, a tributary of Hoods Canal, Puget Sound, near Brinnon. Two new field stations—on Elwell River, a tributary of the Skykomish River, near Sultan, and on Sauk River, a tributary of the Skagit River, near Darrington—were also put into operation the same year. The Sauk River had been worked by the State at one time.

In 1913 the Middle Fork Nooksak eyeing station was transformed into a hatchery. In the same year the eyeing station on the south fork was moved farther up the river.

In 1914 stations were established by the United States Bureau of Fisheries on Day Creek and Illabot Creek, tributaries of the Skagit River, while a substation was opened on Hamahama River at Eldon, distant about 9 miles up Hood Canal from the mouth of the Duckabush River.

On May 23, 1914, the Baker Lake hatchery building was destroyed by fire. In addition to the building and equipment, 1,305,820 silver fry and 823,097 sockeye fry were destroyed. The station has since been rebuilt.

In 1915 the State built a hatchery on the Pilchuck River, a tributary of the Skykomish River, near Granite Falls.

In lieu of building a fishway in its dam on the Elwha River, near Port Angeles, the Olympic Power Co. furnished the funds needed to build a hatchery below the dam, and this was opened by the State in 1915.

The following tables show the total output of the salmon hatcheries in the State of Washington owned by the United States Bureau of Fisheries and the hatcheries owned by the State itself:

OUTPUT OF THE SALMON HATCHERIES IN WASHINGTON OWNED BY THE UNITED STATES BUREAU OF FISHERIES.

Year ending June 30—	Chinook.			Sockeye, or blueback.			Silver, or coho.		
	Eggs.	Fry.	Fingerlings, yearlings, and adults.	Eggs.	Fry.	Fingerlings, yearlings, and adults.	Eggs.	Fry.	Fingerlings, yearlings, and adults.
1897	....	1,848,760	....	....	....	....	....	....	....
1898	....	7,391,886	....	....	....	....	....	....	....
1899	4,926,000	1,791,056	....	....	....	....	....	....	....
1900	2,686,000	6,626,947	....	....	10,683,000	....	....	....	....
1901	6,581,000	5,427,680	....	....	3,834,453	....	....	174,041	....
1902	....	15,637,687	....	....	3,371,000	....	....	....	....
1903	....	16,774,030	....	....	3,731,789	....	....	81,812	....
1904	7,506,000	17,386,183	....	....	3,855,000	....	....	3,984,645	....
1905	....	4,236,276	....	....	7,819,281	10,000	107,000	8,071,081	....
1906	7,714,000	14,846,905	....	880,000	3,285,130	9,500	239,180	6,445,574	....
1907	3,550,000	6,512,738	....	....	4,224,255	....	760,000	3,636,952	....
1908	1,485,000	12,372,503	1,537,941	75,000	8,514,305	....	296,000	13,262,714	....
1909	3,050,000	11,565,553	14,186	100,000	5,430,626	....	272,000	7,661,110	....
1910	3,813,250	9,175,610	....	....	4,554,825	....	275,000	10,888,025	....
1911	3,350,000	7,307,455	11,700	....	5,496,000	....	102,000	4,550,615	....
1912	8,020,000	10,959,728	655,095	....	4,692,573	....	52,000	10,599,939	....
1913	19,713,000	19,933,300	....	....	5,751,700	....	102,000	10,754,617	....
1914	4,584,000	31,140,440	1,130,505	50,000	2,583,469	120,000	....	13,591,354	....
1915	4,998,000	38,162,139	987,495	155,000	10,820,441	46,575	35,000	20,673,056	41,500
Total	81,976,250	239,096,876	4,336,922	1,260,000	88,647,847	186,075	2,240,180	114,875,535	41,500

Year ending June 30—	Humpback.		Steelhead trout.			Chum fry.	Total.		
	Eggs.	Fry.	Eggs.	Fry.	Fingerlings, yearlings, and adults.		Eggs.	Fry.	Fingerlings, yearlings, and adults.
1897	....	....	....	....	....	....	....	1,848,760	....
1898	....	....	....	....	....	....	....	7,391,886	....
1899	....	....	....	....	....	....	4,926,000	1,791,056	....
1900	....	....	....	26,000	....	....	2,686,000	17,335,947	....
1901	....	....	....	....	....	....	6,581,000	9,436,174	....
1902	....	....	....	110,000	....	....	....	19,118,687	....
1903	....	....	80,000	440,000	223,815	....	80,000	21,027,631	223,815
1904	....	176,597	255,000	70,000	....	....	7,761,000	25,472,425	....
1905	....	....	414,400	3,205	....	....	521,400	20,129,843	10,000
1906	2,000	969,990	348,000	540,000	....	....	9,183,180	26,087,599	9,500
1907	....	....	200,000	941,505	....	....	4,510,000	15,316,450	....
1908	502,000	6,764,762	224,000	136,916	....	....	2,582,000	41,051,200	1,537,941
1909	....	....	220,000	717,691	....	....	3,642,000	25,374,980	14,186
1910	....	1,368,000	300,000	1,437,038	....	....	4,388,250	27,423,498	....
1911	....	96,000	660,000	911,650	....	69,000	4,112,000	18,430,720	11,700
1912	....	2,566,325	906,000	2,284,315	....	2,495,000	8,977,000	33,597,880	655,095
1913	....	1,880	1,330,000	1,477,150	....	19,479,000	21,145,000	57,397,647	....
1914	13,260,000	a21,118,378	729,000	1,792,430	....	8,672,735	18,623,000	78,898,806	1,250,505
1915	....	6,929,500	126,000	2,008,698	137,665	35,504,707	5,313,000	114,098,541	1,213,235
Total	13,764,000	39,991,432	5,790,400	12,896,598	361,480	66,220,442	105,030,830	561,228,730	4,925,977

a Includes 4,355 fingerlings, adults, and yearlings.

OUTPUT OF THE SALMON HATCHERIES OWNED BY THE STATE OF WASHINGTON.

Year ending June 30—	Chinook fry.	Chum fry.	Hump-back fry.	Silver, or coho, fry.	Sockeye, or blue-back, fry.	Steelhead trout fry.	Total.
1896	4,500,000						4,500,000
1897	4,050,000				5,500,000		9,550,000
1898	4,275,000				5,400,000		9,675,000
1899	8,595,000			189,000			8,784,000
1900	12,251,600	10,301,760		13,778,280		1,736,560	38,068,200
1901	12,275,400	16,478,280		19,747,894		1,398,476	49,900,050
1902	14,766,822	9,937,390		32,964,593		2,481,371	60,150,176
1903	14,283,499	9,937,390		28,659,079		3,134,076	56,014,044
1904	13,261,184		295,200	15,725,196		3,868,866	33,150,446
1905	7,101,180			12,226,294		2,433,635	21,761,109
1906	10,943,550	3,268,800		28,906,380		2,769,784	45,888,514
1907	8,897,670	6,120,000		28,668,600		3,575,943	47,262,213
1908	18,647,600	4,342,350	2,655,900	29,273,202		4,578,075	59,497,127
1909	17,440,950	8,218,000		24,543,200		4,080,450	54,282,600
1910	21,168,350	8,607,500	519,600	30,894,100		4,855,000	66,044,550
1911	16,458,502	13,326,750		33,097,750		5,163,180	68,046,182
1912	23,380,516	4,684,950	370,785	37,164,125		4,832,067	70,432,443
1913	30,542,928	14,711,400		50,263,290		9,089,250	104,606,868
1914	35,529,709	7,842,266	1,532,737	33,494,380	49,702	3,601,514	82,050,398
1915 [a]	[b]39,784,092	27,458,665	578,504	60,169,474	62,631	3,457,130	131,510,496
Total	318,153,552	145,235,501	5,952,726	479,764,837	11,012,423	61,055,377	1,021,174,416

[a] A considerable proportion of the fry was fed in rearing ponds for some time before planting.
[b] 29,900 eggs were distributed in addition.

NOTE.—As the printed reports of the State before 1913 in many instances report as the output the number of eggs gathered, it has been necessary in such cases to make an arbitrary reduction from these figures, in order to allow for the loss in the egg stage.

The following table shows the plantings made in waters of Washington other than the Columbia River by the United States Bureau of Fisheries and the State of Washington:

PLANTS OF SALMON FRY AND FINGERLINGS IN THE WATERS OF WASHINGTON OTHER THAN THE COLUMBIA RIVER.[a]

Year ending June 30—	Puget Sound and tributaries.					
	Chinook.	Sockeye.	Silver, or coho.	Hump-back.	Chum.	Steelhead.
1897		5,500,000				
1898		5,400,000				
1899	7,470,000		189,000			
1900		10,683,000	6,749,280		10,301,760	1,572,560
1901	300,000	3,834,453	14,360,185		16,478,280	1,398,476
1902	2,141,322	3,371,000	23,161,069		9,937,390	2,591,371
1903	2,113,850	3,731,789	21,507,771		9,937,390	[b]3,326,091
1904	1,865,933	3,855,000	14,071,845	471,797		3,518,476
1905	2,590,738		16,441,375			[c]1,329,940
1906	4,819,290	[d]3,582,630	[e]29,770,414	969,990	1,800,000	[f]3,177,174
1907	3,907,598		26,960,552	4,224,255	5,220,000	3,964,808
1908	8,356,709	8,514,305	37,613,466	9,420,662	2,278,350	4,566,491
1909	9,647,288	5,430,626	28,622,310		6,048,000	[g]4,499,141
1910	11,681,060	4,554,825	36,837,125	1,887,600	7,748,500	6,292,338
1911	4,984,482	5,496,000	29,941,865	96,000	12,074,060	4,841,330
1912	4,646,254	4,692,573	39,788,614	5,432,110	3,526,170	[h]6,733,805
1913	7,561,328	5,751,700	56,128,207	1,888	31,408,960	9,731,400
1914	7,392,826	[i]2,803,261	42,213,911	[j]22,651,415	15,535,046	4,444,271
1915	15,242,734	7,371,056	74,505,147	7,508,004	51,852,050	4,925,555
Total	94,721,412	84,572,238	498,862,136	52,663,721	184,145,956	66,912,727

[a] In addition to the waters given, plants of 19,913 chinook, 3,558,591 blueback, or sockeye, 198,966 silver, or coho, and 10,598 steelhead were made in the Quinault River in 1915.
[b] Of these, 218,200 were yearlings, fingerlings, or adults.
[c] Of these, 14,400 were eggs.
[d] Of these, 9,500 were yearlings, fingerlings, or adults.
[e] Of these, 14,840 were yearlings, fingerlings, or adults.
[f] Of these, 15,000 were yearlings, fingerlings, or adults.
[g] Includes 100,000 eggs.
[h] Of these, 25,000 were eggs and 1,000 yearlings, fingerlings, or adults.
[i] Includes 59,000 eggs and 120,000 fingerlings.
[j] Includes 4,355 fingerlings.

PLANTS OF SALMON FRY AND FINGERLINGS IN THE WATERS OF WASHINGTON OTHER THAN THE COLUMBIA RIVER—Continued.

Year ending June 30—	Chehalis River.				Willapa River.			
	Chinook.	Silver, or coho.	Chum.	Steelhead.	Chinook.	Silver, or coho.	Chum.	Steelhead.
1899	1,215,000	....	....	....	....	....	....	....
1900	2,355,300	....	....	....	881,000	....	....	190,000
1901	1,909,800	....	....	....	653,400	....	....	....
1903	....	....	....	....	2,163,019	1,800,000	....	500,000
1904	900,000	....	....	....	819,504	204,876	....	420,390
1905	....	....	....	....	630,080	1,800,000	....	288,000
1906	....	2,563,380	1,468,800	....	529,650	2,160,000	....	171,550
1907	....	2,250,000	900,000	....	393,660	2,250,000	....	526,500
1908	163,000	3,275,000	2,064,000	....	678,600	654,500	....	148,500
1909	148,000	1,800,000	1,757,000	....	322,200	504,000	....	399,000
1910	403,000	1,577,000	859,000	....	455,200	64,000	....	....
1911	111,150	4,041,900	900,960	937,500	734,350	2,457,900	....	300,000
1912	118,750	3,575,700	1,052,760	93,752	748,600	3,111,750	....	303,825
1913	119,700	1,690,200	3,177,680	412,500	729,600	1,386,000	....	382,500
1914	139,000	2,977,260	497,300	701,118	3,247,345	1,785,580	....	248,555
1915	93,250	4,989,440	1,230,000	561,900	302,461	581,730	1,581,750	105,440
Total	7,675,950	28,739,880	13,907,500	2,706,770	13,288,589	18,760,336	1,581,750	3,984,260

Year ending June 30—	Total by species.						Grand total.
	Chinook.	Sockeye.	Silver, or coho.	Humpback.	Chum.	Steelhead.	
1878	a 3,000	....	....	....	....	....	3,000
1897	....	5,500,000	....	....	....	....	5,500,000
1898	....	5,400,000	....	....	....	....	5,400,000
1899	8,685,000	....	189,000	....	....	....	8,874,000
1900	3,236,300	10,683,000	6,749,280	....	10,301,760	1,762,560	32,732,900
1901	2,863,200	3,834,453	14,360,185	....	16,478,280	1,398,476	38,934,594
1902	2,141,322	3,371,000	23,161,069	....	9,937,390	2,591,371	41,202,152
1903	4,276,869	3,731,789	23,307,771	....	9,937,390	3,826,091	45,079,910
1904	3,585,437	3,855,000	14,276,721	471,797	....	3,938,866	26,127,821
1905	3,220,738	....	18,241,375	....	....	1,617,940	23,080,053
1906	5,348,940	3,582,630	34,493,794	969,990	3,268,800	3,348,724	51,012,878
1907	4,301,258	....	31,460,552	4,224,255	6,120,000	4,490,808	50,596,873
1908	9,198,309	8,514,305	41,542,966	9,420,662	4,342,350	4,714,991	77,733,583
1909	10,117,488	5,430,626	30,926,310	....	7,805,000	4,898,141	59,177,565
1910	12,539,260	4,554,825	38,478,125	1,887,600	8,607,500	6,292,838	72,359,648
1911	5,829,982	5,496,000	36,441,665	96,000	12,975,020	6,078,830	66,917,497
1912	5,513,604	4,692,573	46,476,064	5,432,110	4,578,930	7,131,382	73,824,663
1913	8,410,628	5,751,700	59,204,407	1,888	34,586,640	10,526,400	118,481,663
1914	10,779,171	2,803,261	46,976,751	22,651,415	16,032,346	5,393,944	104,636,888
1915	15,658,358	10,929,647	80,275,283	7,508,004	54,663,800	5,603,493	174,638,585
Total	115,708,864	88,130,809	546,561,318	52,663,721	199,635,206	73,614,355	1,076,311,293

a These were brought from the Clackamas (Oreg.) station and planted in some unnamed lake.

BRITISH COLUMBIA.

Fraser River.—The first hatchery established by the Dominion of Canada on the Pacific coast was erected in 1884 at what is now Bon Accord, a point on the lower river some 4 miles above New Westminster, and on the opposite shore. The next built was in 1901 on Granite Creek, Shuswap Lake, which discharges into the Fraser through the South Thompson River, the lake being about 280 miles from New Westminster. In 1904 another hatchery was established on Harrison Lake on the Lillooet River, first large tributary of the Fraser on the north side; also one about 4 miles east of the lower extremities of Pemberton Meadows, at the junction of Owl Creek and the Birkenhead River, 4 miles above its confluence with the eastern branch of the Lillooet River, which in turn discharges into Lillooet Lake. In 1907 a hatchery was built on Stuart Lake, near the headwaters of the Fraser.

In 1914 the Bon Accord hatchery had to be abandoned, due to the laying out of a town site around it, and the equipment was transferred to Queen's Park, New Westminster.

The Province of British Columbia owns Seton Lake hatchery, which was established in 1903 on Lake Creek, on the north side, about half a mile from the outlet of Seton Lake, and it has been operated continuously ever since. Seton Lake is a part of the Fraser River chain and is some 300 miles above the mouth of the river. Lake Creek, the outlet of Seton Lake, empties into the Cayoosh Creek, a tributary of the Fraser, 45 miles north of the latter's junction with the Thompson, and 1 mile south of the town of Lillooet.

Nimpkish River.—In 1902 S. A. Spencer, of the Alert Bay cannery (now belonging to the British Columbia Packers Association), in return for certain special fishery privileges granted by the Dominion, established a hatchery on this river, which is located on the northeast shore of Vancouver Island. The hatchery was burned down in 1903, but was immediately rebuilt. Since its establishment it has been operated by the Dominion.

Rivers Inlet.—A hatchery was established by the Dominion on McTavish Creek, one of the tributaries of Oweekayno Lake, about 20 miles up Rivers Inlet, in 1905, and has been operated ever since.

Skeena River.—In 1902 the Dominion established a hatchery on Lakelse Lake, in the Skeena River Basin, about 65 miles up the river from Port Essington. In 1907 another was constructed on Babine Lake, the source of the Skeena River.

In 1910 the Dominion put three new hatcheries into operation, all on Vancouver Island. They were located on Anderson Lake, Kennedy Lake, and Cowichan Lake, respectively. The two former are used for sockeyes and the latter for king and coho salmon and steelhead and other varieties of trout.

In 1913, the year of the quadrennially big run of sockeye salmon on the Fraser River, the contractors who were building the new Canadian Northern Railway, in blasting their way along the banks of the river, threw the rock and other débris into the stream until in the narrow part of the canyon south of North Bend at Whites Creek, Hells Gate, China Bar, and Scuzzy Rapids, all within a few miles of each other, the débris formed great sloping banks extending out into the stream at these points, and entirely changed the direction of the currents, and of course, the velocity of the water. At best the salmon had a hard time getting through there, but the added obstructions rendered it practically impossible.

At a rather late hour the authorities woke up to the menace this work was to the run of salmon, and the dumping of débris into the river in such a manner as to obstruct their ascent was stopped.

How to clear the stream once more was now the problem, and this was seriously complicated by a slide of rock which took place in Hells Gate in February, 1914, which narrowed the channel of the stream considerably.

In March, 1914, the Dominion Marine and Fisheries Department contracted with a private concern to remove the obstructions, and this was done from Scuzzy Rapids, China Bar, and Whites Creek entirely within a short period of time, but a couple of seasons' work were required to clear up Hells Gate so as to permit of easy passage for the fish.

The following table shows the plantings made in the waters of British Columbia from the Dominion and provincial hatcheries:

PLANTS OF SALMON FRY MADE IN THE WATERS OF BRITISH COLUMBIA.

Years.	Fraser River.[a]						
	Chum.	Coho, or silver.	Spring, or king.	Hump-back.	Sockeye.	Steel-head trout.	Total.
1885					1,800,000		1,800,000
1886					2,625,000		2,625,000
1887					4,414,000		4,414,000
1888					5,807,000		5,807,000
1889					4,419,000		4,419,000
1890					6,640,000		6,640,000
1891					3,603,800		3,603,800
1892					6,000,000		6,000,000
1893					5,674,000		5,674,000
1894					6,300,000		6,300,000
1895					6,390,000		6,390,000
1896					10,393,000		10,393,000
1897					5,928,000		5,928,000
1898					5,850,000		5,850,000
1899					4,742,000		4,742,000
1900					6,200,000		6,200,000
1902 [b]		90,000			15,808,000	75,000	15,973,000
1903	75,000	1,750,000	22,000		12,521,000		14,368,000
1904		210,000		50,000	13,729,200	12,000	14,001,200
1905		5,576,100	4,381,400		9,244,300		19,201,800
1906		4,774,000	1,791,500		160,479,000	4,000	167,048,500
1907		3,219,200	1,814,900		36,965,900		42,000,000
1908		5,890,000	2,815,000	22,500,000	51,855,200		83,060,200
1909		7,375,400	5,772,400		41,909,500		55,057,300
1910		450,000	6,300,000		105,312,500		112,062,500
1911		5,318,800	2,129,500		24,146,300		31,594,600
1912		3,899,500	5,962,500	28,773,350	34,183,850		72,819,200
1913	1,100,000	1,995,600	4,533,550		41,062,700		48,691,850
1914		1,522,000	50,000	500,000	92,308,000		94,380,000
1915	125,000	2,196,000	2,614,700		27,496,000		32,431,700
Total	1,300,000	44,216,600	38,187,450	51,823,350	693,807,250	91,000	829,475,650

[a] Some of the reports from the provincial hatchery at Seton Lake show merely the take of eggs; it has been necessary to make an arbitrary reduction in order to show the loss of eggs and fry before planting.
[b] No plants made in 1901.

PLANTS OF SALMON FRY MADE IN THE WATERS OF BRITISH COLUMBIA—Continued.

Years.	Skeena River.			Rivers Inlet.			Nimpkish River.
	Humpback.	Sockeye.	Total.	Spring, or king.	Sockeye.	Total.	Sockeye.
1903		3,450,000	3,450,000				1,636,000
1904		4,000,000	4,000,000				2,496,000
1905		3,767,900	3,767,900				2,850,000
1906		3,784,450	3,784,450		8,000,000	8,000,000	4,873,400
1907		4,125,750	4,125,750		8,440,000	8,440,000	4,870,000
1908		8,946,950	8,946,950	4,706,000	8,594,000	13,300,000	4,800,000
1909		11,882,400	11,882,400		13,300,000	13,300,000	4,500,000
1910		a11,521,700	11,521,700		12,750,000	12,750,000	5,055,000
1911		12,556,470	12,556,470		11,436,000	11,436,000	6,414,000
1912		12,367,500	12,367,500		11,791,000	11,791,000	5,114,500
1913		11,430,430	11,430,430		10,981,000	10,981,000	4,981,000
1914		11,843,200	11,843,200		12,397,000	12,397,000	5,053,000
1915	16,000	11,899,613	11,915,613		12,712,000	12,712,000	4,880,000
Total	16,000	111,576,363	111,592,363	4,706,000	110,401,000	115,107,000	57,522,900

Years.	Vancouver Island.					
	Chum.	Coho, or silver.	Spring, or king.	Sockeye.	Steelhead trout.	Total.
1911	40,000	4,550,000	425,000	7,862,000	145,200	13,022,200
1912		3,487,500	456,000	13,620,750	37,200	17,601,450
1913		3,180,000	712,500	15,031,750	173,900	19,098,150
1914		2,252,000	701,000	15,314,500	87,200	18,354,700
1915		2,229,220	250,600	15,911,000	55,000	18,445,820
Total	40,000	15,698,720	2,545,100	67,740,000	498,500	86,522,320

a Includes 80,000 coho fry.

PLANTS OF SALMON FRY MADE IN THE WATERS OF BRITISH COLUMBIA—Continued.

Years.	Total by species.						Grand total.
	Chum.	Coho, or silver.	Spring, or king.	Humpback.	Sockeye.	Steelhead trout.	
1885					1,800,000		1,800,000
1886					2,625,000		2,625,000
1887					4,414,000		4,414,000
1888					5,807,000		5,807,000
1889					4,419,000		4,419,000
1890					6,640,000		6,640,000
1891					3,603,800		3,603,800
1892					6,000,000		6,000,000
1893					5,674,000		5,674,000
1894					6,300,000		6,300,000
1895					6,390,000		6,390,000
1896					10,393,000		10,393,000
1897					5,928,000		5,928,000
1898					5,850,000		5,850,000
1899					4,742,000		4,742,000
1900					6,200,000		6,200,000
1902		90,000			15,808,000	75,000	15,973,000
1903	75,000	1,750,000	22,000		17,607,000		19,454,000
1904		210,000		50,000	20,225,200	12,000	20,497,200
1905		5,576,100	4,381,400		15,862,200		25,819,700
1906		4,774,000	1,791,500		117,136,850	4,000	123,706,350
1907		3,219,200	1,814,900		54,401,650		59,435,750
1908		5,890,000	7,521,000	22,500,000	74,196,150		110,107,150
1909		7,375,400	5,772,400		71,591,900		84,739,700
1910		450,000	6,300,000		134,639,200		141,389,200
1911	40,000	9,868,800	2,554,500		62,414,770	145,200	75,023,270
1912		7,387,000	6,418,500	28,773,350	77,077,570	37,200	119,693,620
1913	1,100,000	5,175,600	5,246,050		83,486,880	173,900	95,182,430
1914		3,744,000	751,000	500,000	136,915,700	87,200	141,997,900
1915	125,000	4,425,220	2,865,300	16,000	72,898,613	55,000	80,385,133
Total	1,340,000	59,935,320	45,438,550	51,839,350	1,041,047,483	589,500	1,200,190,203

ALASKA.

In 1891 several of the canneries operating at Karluk, on Kodiak Island, combined forces and built a hatchery on the lagoon at that place. As the cannery men were at swords' points in regard to their fishing rights on the spit, in 1892 the hatchery was closed. In May, 1896, the Alaska Packers Association broke ground for a hatchery at the eastern end of the lagoon, near the outlet of Karluk River, a short distance from where the hatchery was located in 1891, and operated it until 1916, when it was closed temporarily.

In 1892 Capt. John C. Callbreath, manager of the Point Ellis cannery, on Kuiu Island, operated a small hatchery on the left bank of Kutlakoo stream. It was a very primitive place, and an exceptionally high tide destroyed the whole plant in September. It was never rebuilt.

Capt. Callbreath, however, after seeing to the operation of the hatchery, had returned to Wrangell during the summer, where his attention was again attracted to hatchery work, and in the fall of 1892 he built a small hatchery on Jadjeska stream, Etolin Island, about 200 yards from its mouth. The stream is about one-half mile in length and is the outlet of a small lake. Finding the location unsuitable Capt. Callbreath removed the hatchery in 1893 to the northern side of the lake, about three-eighths of a mile from the head of the outlet, where it still stands. The owner's intention was to build up a stream which had a small natural run of red salmon until it had a large run, with the hope that the Government would then give him the exclusive right to take these fish from the stream for commercial purposes. The experiment was kept up until the end of the season of 1905, when Capt. Callbreath's failing eyesight compelled the cessation of the actual hatching. Until 1910 a man was stationed on the stream during the run of spawning fish for the purpose of lifting them over the dam, so that they could reach the spawning beds at the head of the lake, and the project was abandoned entirely shortly thereafter. The owner's expectation of a big run as a result of hatching operations was never realized.

In 1896 the Baranof Packing Co., which operated a cannery on Redfish Bay, on the western coast of Baranof Island, built a small hatchery on the lake at the head of Redfish stream. The following winter was so cold that not only the flume, but the whole cataract, froze solid, and as the hatchery was thus left without water the eggs were put into the lake and left to their fate and the hatchery closed down permanently.

In 1897 the North Pacific Trading & Packing Co., at Klawak, Prince of Wales Island, established a hatchery near the head of Klawak stream, close to Klawak Lake. In 1898 the plant was moved to the mouth of a small stream entering the lake about halfway up the western shore. This hatchery has been operated continuously ever since. In 1909 the North Alaska Salmon Co. acquired a half interest in it, which it relinquished to the original owners a few years later.

The Pacific Steam Whaling Co., in 1898 erected a small hatchery on Hetta Lake, on the west side of Prince of Wales Island, which was operated until the close of the hatching season of 1903–4, when the Pacific Packing & Navigation Co., successor to the original owner, went into the hands of a receiver. In 1907 it was reopened by the Northwestern Fisheries Co., which had acquired the interests of the old company, and has been operated each season since.

Up to 1900 the work of hatching salmon was entirely voluntary on the part of the packers. On May 2 of that year the following regulation was promulgated at the Treasury Department, which at that time had control of the Alaska salmon-inspection service:

7. Each person, company, or corporation taking salmon in Alaskan waters shall establish and conduct, at or near the fisheries operated by him or them, a suitable artificial propagating plant or hatchery; and shall produce yearly and place in the natural spawning waters of each fishery so operated red-salmon fry in such numbers as shall be equal to at least four times the number of mature fish taken from the said fisheries, by or for him or them, during the preceding fishing season. The management and operation of such hatcheries shall be subject to such rules and regulations as may hereafter be prescribed by the Secretary of the Treasury. They shall be open for inspection by the authorized official of this department; annual reports shall be made, giving full particulars of the number of male and female salmon stripped, the number of eggs treated, the number and percentage of fish hatched, and all other conditions of interest; and there shall be made a sworn yearly statement of the number of fry planted and the exact location where said planting was done.

On January 24, 1902, this regulation was amended so as to require the planting of "red-salmon fry in such numbers as shall be equal to at least ten times the number of salmon of all varieties taken from the said fisheries."

Although the regulation was mandatory, but few of the packers obeyed it, some because no suitable place was to be found within a reasonable distance of their plants, others because the establishment and operation of such a hatchery would cost more than their returns from the industry justified, and others because of lack of knowledge required in hatchery work. The greater number of them absolutely ignored it, and as a result those who conformed to the regulation were placed under a heavy financial handicap. The injustice of this arrangement was patent on its face, and in 1906, when a comprehensive revision of the law was made by Congress, provision was made for reimbursing in the future those cannery men who operated salmon hatcheries. The section covering this point reads as follows:

SEC. 2. That the catch and pack of salmon made in Alaska by the owners of private salmon hatcheries operated in Alaska shall be exempt from all license fees and taxation of every nature at the rate of ten cases of canned salmon to every one thousand red or king salmon fry liberated, upon the following conditions.

That the Secretary of Commerce and Labor may from time to time, and on the application of the hatchery owner shall, within a reasonable time thereafter, cause such private hatcheries to be inspected for the purpose of determining the character of their operations, efficiency, and productiveness, and if he approve the same shall cause notice of such approval to be filed in the office of the clerk or deputy clerk of the United States district court of the division of the District of Alaska wherein any such hatchery is located, and shall also notify the owners of such hatchery of the action taken by him. The owner, agent, officer, or superintendent of any hatchery the effectiveness and productiveness of which has been approved as above provided shall, between the thirtieth day of June and the thirty-first day of December of each year, make proof of the number of salmon fry liberated during the twelve months immediately preceding the thirtieth day of June, by a written statement under oath. Such proof shall be filed in the office of the clerk or deputy clerk of the United States district court of the division of the District of Alaska wherein such hatchery is located, and when so filed shall entitle the respective hatchery owners to the exemption as herein provided; and a false oath as to the number of salmon fry liberated shall be deemed perjury and subject the offender to all the pains and penalties thereof. Duplicates of such statements shall also be filed with the Secretary of Commerce and Labor.

It shall be the duty of such clerk or deputy clerk in whose office the approval and proof heretofore provided for are filed to forthwith issue to the hatchery owner, causing such proofs to be filed, certificates which shall not be transferable and of such denominations as said owner may request (no certificate to cover fewer than one thousand fry), covering in the aggregate the number of fry so proved to have been liberated; and such certificates may be used at any time by the person, company, corporation, or association to whom issued for the payment pro tanto of any license fees or taxes upon or against or on account of any catch or pack of salmon made by them in Alaska; and it shall be the duty of all public officials charged with the duty of collecting or receiving such license fees or taxes to accept such certificates in lieu of money in payment of all license fees or taxes upon or against the pack of canned salmon at the ratio of one thousand fry for each ten cases of salmon. No hatchery owner shall obtain the rebates from the output of any hatchery to which he might otherwise be entitled under this act unless the efficiency of said hatchery has first been approved by the Secretary of Commerce and Labor in the manner herein provided for.

Of recent years so much objection has been raised to the system of hatchery rebates that the matter of the Federal Government taking over all private hatcheries in Alaska, at a fair valuation, and operating same, is being favorably considered.

In 1901 the Pacific Steam Whaling Co. established two small hatcheries—one on Nagel Stream, which enters the northern side of Quadra Lake, on the mainland of southeast Alaska, and one on a stream entering Freshwater Lake Bay, Chatham Strait. Both were closed down in 1904 when the company failed. In 1908 the Northwestern Fisheries Co., which had acquired the Quadra plant, removed it to a small stream entering the head of the lake and has operated it ever since.

In 1901 the Alaska Packers Association erected a hatchery on Heckman Lake, the third of a series of lakes on Naha Stream, Revillagigedo Island, and about 8 miles from Loring, where the association has a cannery. This is without question the largest and costliest salmon hatchery in the world, having a capacity of 110,000,000 eggs, and the association is entitled to great credit for the public spirit it has shown and the work it has done, entirely without remuneration until 1906, in building and operating not only this hatchery but also the one at Karluk.

The Union Packing Co., at Kell Bay, on Kuiu Island, and F. C. Barnes, at Lake Bay, on Prince of Wales Island, in 1902 built and operated small hatcheries, both of which were abandoned after one season's work.

Up to 1905 the work of hatching salmon in Alaska was confined to the salmon cannery men. In that year, however, the United States Bureau of Fisheries erected a hatchery on Yes Lake, which empties through a short stream into Yes Bay, on Cleveland Peninsula. In 1907 the bureau constructed another hatchery, on Afognak Lake, near Litnik Bay, Afognak Island.

The eruption of Katmai Volcano, on the Alaska Peninsula, June 6, 1912, covered the island of Afognak with volcanic ash and sand to an average depth of 9 inches. It is estimated that 20,000 salmon perished at the head of Litnik Lake, while thousands were driven back into the ocean. As a result of these conditions the work at the Afognak station was much hampered and curtailed. Even as late as 1915 work at this station was still being hampered by the volcanic ash and sand which fell in 1912.

In 1913 collecting stations were established at Eagle Harbor and Uganak Lake, on Kodiak Island. In 1915 another was established at Seal Bay, on Afognak Island.

In 1913 a collecting station was established on Ketchikan Creek, but, owing to the objections of the citizens of the town against the taking away of the eggs, the station was abandoned in 1915.

The following tables show the eggs gathered and the fry planted by the Government and privately owned hatcheries in Alaska:

OUTPUT OF THE SALMON HATCHERIES IN ALASKA OWNED BY THE UNITED STATES BUREAU OF FISHERIES, 1906 TO 1915.

Year ending June 30—	Yes Lake hatchery.							
	Red, or sockeye.		Coho, or silver, fry.	Steelhead fry.	Humpback.		Total.	
	Eggs.	Fry.			Eggs.	Fry.	Eggs.	Fry.
1906		6,638,550						6,638,550
1907		54,610,800		143,500				54,754,300
1908		61,369,000						61,369,000
1909		48,653,000	9,900					48,662,900
1910		69,879,600						69,879,600
1911		68,239,900			100,000		100,000	68,239,900
1912		68,335,000						68,335,000
1913		60,422,100						60,422,100
1914	2,000,000	42,726,400				4,500,000	2,000,000	47,226,400
1915		[a] 37,445,000			2,000,000		2,000,000	37,445,000
Total	2,000,000	518,319,350	9,900	143,500	2,100,000	4,500,000	4,100,000	522,972,750

[a] Includes 2,925,000 fingerlings, yearlings, or adults.

OUTPUT OF THE SALMON HATCHERIES IN ALASKA, OWNED BY THE UNITED STATES BUREAU OF FISHERIES, 1906 TO 1915—Continued.

Year ending June 30—	Afognak hatchery.						
	Red, or sockeye.		Coho, or silver, fry.	Humpback.		Total.	
	Eggs.	Fry.		Eggs.	Fry.	Eggs.	Fry.
1909	....	39,325,870	....	....	10,000	....	39,335,870
1910	....	71,647,170	....	....	363,740	....	72,010,910
1911	....	26,755,000	....	....	364,150	....	27,119,150
1912	....	18,394,700	....	3,271,740	....	3,271,740	18,394,700
1913	....	12,551,100	....	....	....	....	12,551,100
1914	3,970,000	7,761,705	50,000	....	12,034,399	3,970,000	19,846,104
1915	....	a 6,387,080	....	12,500,000	b 343,480	12,500,000	6,730,560
Total	3,970,000	182,822,625	50,000	15,771,740	13,415,769	19,741,740	195,988,394

Year ending June 30—	Total, by species.						Grand total.	
	Red, or sockeye.		Coho, or silver, fry.	Steelhead fry.	Humpback.			
	Eggs.	Fry.			Eggs.	Fry.	Eggs.	Fry.
1906	....	6,638,550	....	....	....	....	....	6,638,550
1907	....	54,610,800	....	143,500	....	....	....	54,754,300
1908	....	61,369,000	....	....	....	....	....	61,369,000
1909	....	87,978,870	9,900	....	....	10,000	....	87,998,770
1910	....	141,526,770	....	....	....	363,740	....	141,890,510
1911	....	94,994,900	....	....	100,000	364,150	100,000	95,359,050
1912	....	86,729,700	....	....	3,271,740	....	3,271,740	86,729,700
1913	....	72,973,200	....	....	....	....	....	72,973,200
1914	5,970,000	50,488,105	50,000	....	....	16,534,399	5,970,000	67,072,504
1915	....	c 43,832,080	....	....	14,500,000	d 343,480	14,500,000	e 44,175,560
Total	5,970,000	701,141,975	59,900	143,500	17,871,740	17,615,769	23,841,740	718,961,144

a Includes 5,444,830 fingerlings, yearlings, or adults.
b Includes 119,480 fingerlings, yearlings, or adults.
c Includes 8,369,830 fingerlings, yearlings, or adults.
d Includes 119,480 fingerlings, yearlings, or adults.
e Includes 8,489,310 fingerlings, yearlings, or adults.

Output of Private Salmon Hatcheries of Alaska, 1893 to 1915.

[Unless otherwise stated in footnotes, all of the fry liberated were red salmon.]

Year ended June 30—	Callbreath's hatchery.		Karluk hatchery.		Klawak hatchery.	
	Eggs.	Fry.	Eggs.	Fry.	Eggs.	Fry.
1893	900,000	600,000	...	...	...	...
1894	3,000,000	2,204,000	...	...	...	...
1895	6,300,000	5,291,000	...	...	...	...
1896	6,200,000	5,475,000	...	...	...	...
1897	4,400,000	4,390,000	3,236,000	2,556,440	...	...
1898	3,400,000	2,526,000	8,454,000	6,340,000	2,023,000	800,000
1899	3,000,000	2,050,000	4,491,000	3,369,000	3,600,000	3,000,000
1900	3,400,000	2,335,000	10,496,900	7,872,000	3,600,000	[a] 1,000,000
1901	(b)	...	19,334,000	15,566,800	(c)	...
1902	6,000,000	5,500,000	32,800,000	28,700,000	3,500,000	2,800,000
1903	6,000,000	5,000,000	23,400,000	17,555,000	3,500,000	1,500,000
1904	6,000,000	5,000,000	28,113,000	22,000,000	3,000,000	1,700,000
1905	6,050,000	5,250,000	45,500,000	33,670,000	2,800,000	2,000,000
1906	7,700,000	6,500,000	36,933,000	28,236,412	2,800,000	2,300,000
1907	(d)	(d)	38,679,200	36,846,000	3,600,000	1,187,000
1908	(e)	(e)	47,808,200	43,655,000	3,500,000	2,776,000
1909	(e)	(e)	40,320,000	37,105,000	3,500,000	3,200,000
1910	(e)	(e)	45,228,000	40,620,000	5,800,000	5,300,000
1911	(e)	(e)	49,626,000	37,722,000	6,786,500	6,200,000
1912	...	...	41,026,800	37,495,100	5,600,000	3,530,000
1913	...	...	45,600,000	41,803,155	3,835,000	3,075,000
1914	...	...	34,629,160	31,546,080	3,645,000	3,465,000
1915	...	...	[f] 30,240,000	27,704,000	3,816,000	3,653,000
Total	[g] 63,350,000	52,121,000	585,915,260	500,361,987	64,905,500	48,086,000

Year ended June 30—	Hetta hatchery.		Quadra Bay hatchery.		Freshwater Bay hatchery.	
	Eggs.	Fry.	Eggs.	Fry.	Eggs.	Fry.
1893	...	...	...	...	...	...
1894	...	...	...	...	...	...
1895	...	...	...	...	...	...
1896	...	...	...	...	...	...
1897	...	...	...	...	...	...
1898	...	...	...	...	...	...
1899	2,800,000	2,600,000	...	...	...	...
1900	2,000,000	1,500,000	...	...	...	...
1901	1,800,000	[a] 500,000	...	...	...	...
1902	2,500,000	1,700,000	4,500,000	3,500,000	1,500,000	1,000,000
1903	4,800,000	4,000,000	5,500,000	4,000,000	(b)	(b)
1904	5,127,500	3,750,000	600,000	[c] 400,000	(d)	(d)
1905	(h)	(h)	(h)	(h)	(h)	(h)
1906	(h)	(h)	(h)	(h)	(h)	(h)
1907	(h)	(h)	(h)	(h)	(h)	(h)
1908	8,000,000	6,125,000	(h)	(h)	(h)	(h)
1909	8,400,000	8,134,000	3,325,000	3,025,750	(h)	(h)
1910	10,313,000	9,000,000	10,863,000	9,850,000	(h)	(h)
1911	9,141,000	8,552,500	11,200,000	10,350,000	(h)	(h)
1912	2,585,000	2,342,000	11,000,000	10,166,000	(h)	(h)
1913	3,780,000	3,592,000	10,000,000	8,127,000	(h)	(h)
1914	4,082,000	3,590,500	18,400,000	17,054,000	(h)	(h)
1915	7,438,500	7,142,500	21,300,000	20,300,000	(h)	(h)
Total	72,767,000	62,528,500	96,688,000	86,772,750	1,500,000	1,000,000

a Many eggs frozen.
b No run of fish.
c Hatchery was not used, the eggs being hatched out in the lake.
d No report.
e Fish coming in to spawn were lifted over the dam.
f A collection of 7,400,000 humpback eggs was made for Afognak, and these appear in the report of that hatchery.
g A considerable proportion of these are coho eggs.
h Not operated.

OUTPUT OF PRIVATE SALMON HATCHERIES OF ALASKA, 1893 TO 1915—Continued.

Year ended June 30—	Fortmann hatchery.		Kell Bay hatchery.		Total.	
	Eggs.	Fry.	Eggs.	Fry.	Eggs.	Fry.
1893	....	....	....	....	900,000	600,000
1894	....	....	....	....	3,000,000	2,204,000
1895	....	....	....	....	6,300,000	5,291,000
1896	....	....	....	....	6,200,000	5,475,000
1897	....	....	....	....	8,636,000	6,946,440
1898	....	....	....	....	13,877,000	9,666,000
1899	....	....	....	....	13,891,000	11,019,000
1900	....	....	....	....	19,496,900	12,707,000
1901	....	....	....	....	21,134,000	16,066,800
1902	11,460,000	10,300,000	....	....	62,280,000	53,500,000
1903	40,050,000	29,005,000	2,500,000	2,000,000	85,750,000	63,060,000
1904	22,203,000	13,780,000	(a)	(a)	65,043,500	46,630,000
1905	65,010,000	63,181,000	(a)	(a)	119,360,000	104,101,000
1906	68,715,000	67,643,000	(a)	(a)	116,148,000	104,679,412
1907	105,450,000	80,973,000	(a)	(a)	147,729,200	119,006,000
1908	[b] 41,280,000	33,920,000	(a)	(a)	100,588,200	86,476,000
1909	24,465,000	22,785,000	(a)	(a)	80,010,000	74,249,750
1910	53,340,000	50,725,000	(a)	(a)	125,544,000	115,495,000
1911	34,920,000	30,245,000	(a)	(a)	111,673,500	93,069,500
1912	107,520,000	100,335,000	(a)	(a)	167,731,800	153,868,100
1913	23,160,000	20,800,000	(a)	(a)	86,375,000	77,997,155
1914	9,480,000	8,700,000	(a)	(a)	70,236,160	64,355,580
1915	22,500,000	20,820,000	(a)	(a)	85,294,500	79,619,500
Total	629,553,000	553,212,000	2,500,000	2,000,000	1,517,178,760	1,306,082,237

a Not operated.

b Includes 30,000 coho eggs taken and 27,000 fry liberated.

FISH LAWS OF MISSISSIPPI RIVER STATES

A DIGEST OF STATUTES RELATING TO THE PROTECTION OF FISH AND MISCELLANEOUS AQUATIC ANIMALS OF STATES BORDERING ON THE MISSISSIPPI RIVER

By Emerson Stringham

Scientific Assistant, Bureau of Fisheries

Appendix IV to the Report of the U. S. Commissioner of Fisheries for 1916

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FISH LAWS OF MISSISSIPPI RIVER STATES: A DIGEST OF STATUTES RELATING TO THE PROTECTION OF FISH AND MISCELLANEOUS AQUATIC ANIMALS OF STATES BORDERING ON THE MISSISSIPPI RIVER.

By EMERSON STRINGHAM, *Scientific Assistant, Bureau of Fisheries.*

INTRODUCTION

This digest of the laws as they existed January 1, 1917, is based upon the statutes or pamphlet copies of the statutes as issued by the commissions or wardens of the several States, as follows:

Arkansas.—Act 124, 1915, and "Game and fish laws of the State of Arkansas" (no date).

Illinois.—Game and fish act of 1915.

Iowa.—Fish and game laws in force July 4, 1915.

Kentucky.—Fish and game laws in force June 14, 1916.

Louisiana.—Conservation laws, compiled 1914–15, and acts of State of Louisiana, 1916.

Minnesota.—Game and fish laws, 1915.

Mississippi.—Code of 1906 and session laws 1908 to 1916, inclusive.

Missouri.—Game law as amended by Forty-eighth General Assembly (1915).

Tennessee.—Game and fish law. (Ch. 152, acts 1915.)

Wisconsin.—Chapter 594, laws 1915.

Section references used hereinafter are for the sections as numbered in the pamphlet copies of the laws. The Louisiana and Kentucky pamphlets include several statutes, each with its own series of numbers for sections; to have indicated the act each time would have made references cumbersome, and it was thought better to avoid this even at the cost of some indefiniteness in references.

Penalties, administration, and procedure, have not been covered; the last includes authority to arrest, seize unlawful implements, etc., rewards for information as to violations, forgery of licenses, provisions for witnesses, limitations of times within which actions may be commenced, sale or destruction of things confiscated, and disposition of fines, fees, etc. Special provisions for counties, and other subdivisions of the States are not always included in the pamphlet copies of game laws, and are generally not digested herein.

The omission of provisions as to administration is not due to a belief that these are of minor importance. Probably they are as well worth attention as the provisions for size limits and so on. In most fields of legislation efficient administration is now recognized to be at least of equal importance with wise substantive provisions. But the question of administration is so different that it seems better not to attempt to combine it with this brief treatment of closed seasons and such matters. The United States Department of Agriculture issues annually a "Directory of Officials and Organizations Concerned with the Protection of Birds and Game." Of the States under consideration, Illinois (sec. 25 of act) and Minnesota (sec. 4761 of act) have statutory provision for a fish culturist and superintendent of fisheries, respectively; the other States do not provide by statute for any officials separately concerned with fish.

It is hoped that this digest will be of service to both commercial and game fishermen, especially those who move from State to State, and possibly that it may be found useful by legislators and those interested in legislation, and in some small measure contribute to greater uniformity of fish protective laws. It has not been possible, within reasonable limits, to give in detail all provisions regulating commercial fishing, but an effort has been made to indicate every such provision not restricted to special waters or subdivisions of the State.

I. NAMES OF FISHES.

As the same species or genus is given different names in different statutes, and even in the same statute, the names by which the fishes will be distinguished herein are listed, together with cross references from other names that are in common use or are found in the statutes. When a genus includes more than one species, all the species are often, perhaps usually, included under one English name, so that such names are commonly generic rather than specific, at least on the Mississippi River. Because of the infinite confusion in the use of these popular names it can not always be determined with certainty to what species or genus a statute refers. Care has been taken to be as accurate as possible under these circumstances.

Barfish. See Bass, striped.
Bass, black. *Micropterus* Lacépède, both species.
Bass, calico. See Crappie.
Bass, gray. See Bass, black.
Bass, Oswego. See Bass, black.
Bass, rock. *Ambloplites rupestris* (Rafinesque), and probably *Chænobryttus gulosus* (Cuvier and Valenciennes).
Bass, silver. See Bass, striped; Crappie.
Bass, strawberry. See Crappie.
Bass, striped. *Roccus chrysops* (Rafinesque) and *Morone interrupta* Gill.
Bass, white. See Bass, striped; Crappie.
Bass, yellow. See Bass, striped; Bass, black.
Billfish. See Gar.
Black-fin. See Cisco.
Bowfin. *Amiatus calva* (Linnæus).
Buffalofish. *Ictiobus* Rafinesque, all species and probably *Carpiodes* Rafinesque, all species.

Bullhead. *Ameiurus* Rafinesque, all species of the region, doubtless excepting *lacustris* (Walbaum).

Burbot. *Lota maculosa* (Le Sueur).

Carp. *Cyprinus carpio*, Linnæus, and probably (but not in Illinois) *Carpiodes* Rafinesque, all species.

Cat, shovel-nose. See Paddlefish.

Cat, spoonbill. See Paddlefish.

Catfish. *Ictalurus* Rafinesque, all species; *Leptops olivaris* (Rafinesque); and probably *Ameiurus lacustris* (Walbaum), and in some cases all species of *Ameiurus*, the bullheads.

Chub. See Minnow. The "chub" of Illinois (Lake Michigan) is herein called cisco.

Cisco. *Leucichthys* Dybowski, or *Argyrosomus* Agassiz, all species. See also Tullibee.

Crappie. *Pomoxis* Rafinesque, both species.

Dace. See Minnow.

Dogfish. See Bowfin.

Drum, fresh-water. *Aplodinotus grunniens* Rafinesque.

Eel-pout. See Burbot.

Gar. *Lepisosteus* Lacépède, all species.

Gaspergou. See Drum, fresh-water.

Grayling. *Thymallus* Cuvier, all species.

Grinnel (Grindle). See Bowfin.

Hackleback. See Sturgeon.

Herring, lake. See Cisco.

Lawyer. See Burbot, also Bowfin.

Longjaw. See Cisco.

Minnow. Cyprinidæ, except *Cyprinus carpio* Linnæus, the carp.

Muskellunge. *Esox masquinongy* Mitchill.

Paddlefish. *Polyodon spathula* (Walbaum).

Perch, black. See Bass, rock.

Perch, lake. See Perch, yellow.

Perch, pike. *Stizostedion* Rafinesque, both species.

Perch, ring. See Perch, yellow.

Perch, white. See Drum, fresh-water.

Perch, yellow. *Perca flavescens* (Mitchill).

Pickerel. *Esox* Linnæus, all species except *masquinongy*, the muskellunge.

Pike. See Pickerel. The "pike" of Wisconsin and Iowa is herein called pike perch.

Pike, blue. See Perch, pike.

Pike, sand. See Perch, pike.

Pike, wall-eyed. See Perch, pike.

Quillback. *Carpiodes* Rafinesque, all species. See also Carp and Buffalo-fish.

Redhorse. *Moxostoma* Rafinesque, all species, and *Placopharynx duquesnii* (Le Sueur).

Sac-a-lait. See Crappie.

Salmon, jack. See Perch, pike.

Salmon, landlocked. *Salmo sebago* Girard.

Salmon, wall-eye. See Perch, pike.

Salmon, yellow. See Perch, pike.

Sauger. *Stizostedion canadense* (Smith). See Perch, pike.

Shad, gizzard. *Dorosoma cepedianum* (Le Sueur).

Shad, hickory. See Shad, gizzard.

Sheepshead. See Drum, fresh-water.

Spoonbill. See Paddlefish.

Sturgeon. Acipenseridæ.

Sucker. Catostomidæ, except, usually or always, the genera *Ictiobus*, *Carpiodes*, *Moxostoma*, and *Placopharynx*.

Sunfish. *Lepomis* Rafinesque, all species.

Trelipie. See Tullibee.

Trout. *Salvelinus* (Nilsson) Richardson, all species except *Salvelinus namaycush* (Walbaum), the lake trout, and its subspecies; also *Salmo* (Artedi) Linnæus, all species of the region except *Salmo sebago* Girard, the landlocked salmon. See also Trout, lake.

Trout, brook. *Salvelinus fontinalis* (Mitchill). See Trout.

Trout, brown. See Trout.

Trout, green. See Bass, black.

Trout, lake. *Cristivomer*, or *Salvelinus namaycush* (Walbaum).

Trout, rainbow. See Trout.

Tullibee. *Leucichthys tullibee* (Richardson), and probably other species of the same genus; name used in Minnesota. See also Cisco.

Wall-eye. *Stizostedion vitreum* (Mitchill). See Perch, pike.

Whitefish. *Coregonus clupeaformis* (Mitchill), *C. Albus* Le Sueur, and *C. quadrilateralis* Richardson.

II. TIME, PLACE, AND MANNER OF CAPTURE.

TABLE OF PROVISIONS FOUND IN STATUTES GENERALLY, WITH REFERENCES TO SECTIONS OF PAMPHLET LAWS.

Subject.	Ark.	Ill.	Iowa.	Ky.	La.	Minn.	Miss.	Mo.	Tenn.	Wis.
	Sec.	*Sec.*	*Sec.*	*Sec.*	*Sec.*	*Sec.*	*Sec.*	*Sec.*	*Sec.*	*Sec.*
Fish generally, or certain species, or in certain places, shall not be taken in nets, or shall be taken only with hook and line	18	35, 41	2	1, 2	33 40	4808 4838	.....	6535 6548	45	62.30 62.33 62.40
Minnow seine permitted	41	37	2, 4	7	33	.....	.....	6548	45 46	62.33 62.41
Close seasons provided as hereinafter noted	18	35, 36	2, 9 11 13	.....	37, 60	(*a*)	.....	6548 6551	17	62.28 62.29 62.35 62.36 62.37 62.39 62.43
Fishing near dam or fishway or both prohibited; hook and line excepted in Iowa, Missouri, Tennessee, and Wisconsin	.....	25	2	.....	.....	4864	.....	6549	49	62.29
Use of either poison, drugs, etc., or explosives, prohibited	45, 49	40	3	3	57	4865	1173 1329	6537 6538	45	62.32
Fishing on premises of another without consent, prohibited	47, 48	40B	.....	1259	26	.....	.....	.....	.....	.....
Authorization to take fish for scientific purposes, or to propagate, or to destroy noxious species	.....	38	9	3	19, 47	4758 4771 4846	.....	6524 6568 6570 6571 6572	.....	62.15 62.50 62.55 62.56 62.57
Provision for private ponds	.....	.....	8	1-5, 1252	22, 54, 61	4777 4861 4862 4870	.....	6548	45	62.55 62.58
Areas may be closed to mussel fishing	.....	57	.....	.....	.....	(*b*)	.....	.....	.....	.....

[a] Ch. 261 of 1915, and sec. 4807, 4808, 4820, 4821, 4829, 4830, and 4874. [b] Ch. 276, laws 1915.

PROVISIONS PECULIAR TO THE RESPECTIVE STATES, WITH REFERENCES TO SECTIONS OF PAMPHLET LAWS.

Arkansas.—Mesh of nets shall be at least 3 inches square; no seine, net, trap, or other device shall be used March 1 to June 15 (sec. 18). In some counties nets and similar devices are prohibited (sec. 41, 44).

Illinois.—Hoop, fyke, dip nets, or baskets with mesh not less than $1\frac{1}{2}$ inches square, may be used July 1 to April 15 and seine with same mesh September 1 to April 15, except for black bass, pickerel, pike perch, whitefish, trout, cisco, and yellow perch (sec. 35). Gill and pound nets with mesh not less than $2\frac{1}{4}$ inches square may be used for whitefish and lake trout December 1 to November 1 (sec. 36). Gill, dip, and pound nets with mesh not less than $1\frac{1}{4}$ inches square may be used for cisco, or with mesh not less than $1\frac{1}{8}$ inches square for yellow perch, provided not over 10 per cent of catch at any lift consists of lake trout of a less weight than $1\frac{1}{4}$ pounds dressed each, and such lake trout may be sold only locally and not shipped (sec. 36). Rough fish may be taken from fish preserves by net under special permit (sec. 35). Maximum lengths for nets are: Hoop, fyke, or pound 200 yards and seine 1,000 yards; they shall not obstruct more than half the width of a watercourse (sec. 39).

Firearms, artificial lights, snare spears, gig graines, and trammel nets shall not be used to catch fish (sec. 40B).

Mussel fishing may be practiced commercially with one boat only or an additional boat for towing, and with only two crowfoot bars not over 16 feet long each, and only one dredge not over 3 feet long; such fishing is permitted only April 15 to November 30 (sec. 55).

Frogs over quarter pound shall not be taken May or June (sec. 34).

Iowa.—Closed seasons are as follows: "Salmon" and trout, October 1 to April 15; "bass," pike perch, crappie, pickerel, catfish, and "other game fish," December 1 to May 15 (sec. 2); in interstate waters pike perch, bass, and crappie, March 31 to June 1 (sec. 13). The statute does not define "game" fish, but Mr. E. C. Hinshaw, the State game warden, writes under date of December 14, 1915, that the Department of Fish and Game construes it to include any food fish that takes a live bait. Bag limit is 40 of said species, and not over 20 of them shall be bass, pike perch, or pickerel (sec. 2). Fishing is prohibited in streams stocked with breeding trout over two years old within one year from date of stocking, if notice be posted (sec. 2). In ice fishing no structure for protection against the weather or means for creating artificial heat may be used (sec. 2). Only two lines with one hook each, or three united hooks in trolling may be used (sec. 5).

One set line may be used, May 15 to December 1, in streams, in Big Sioux River and boundary portion of Des Moines River, but shall not extend more than halfway across (sec. 2 and 11). Spears may be used to take carp, sucker, redhorse, and buffalofish in slues, etc., of Mississippi River (sec. 2).

From certain lakes, buffalofish, carp, quillback, redhorse, suckers, and gar may be taken in nets under special permit and supervision of warden, but no seine shall be used December 1 to June 15 (sec. 9). Nets may be used in Mississippi and Missouri Rivers, but shall have mesh not less than 2½ inches stretch measure (sec. 11). It is unlawful to net food fishes and not use them (sec. 14).

Kentucky.—Except in private ponds, it is forbidden to use wing net, set net, seine, trap, trammel net, dip net, or other contrivance (sec. 2), or to shoot fish (sec. 4), or to use gig or spear, or to fish by groping, grabbing, tickling or in other manner with the hands, except hook and line, trot line, hand line, or set line (sec. 5), or to kill or stun fish by striking upon the rocks or ice (sec. 6).

Louisiana.—Bag limit is 25 black bass, striped bass, or crappie, and 100 "perch" and sunfish (resolution of Conservation Commission adopted September 10, 1912). Specified game fish shall be caught with rod, hook and line only, having not more than five sets of hooks, or with a trolling line and artificial bait (sec. 40).

Hoop nets are prohibited in bayous, lagoons, and streams less than 40 yards wide and seining in fresh water is prohibited, except in certain waters for common species such as buffalofish and catfish under permit by Commission (sec. 33); letter of the president of the Conservation Commission to Dr. H. M. Smith, United States Commissioner of Fisheries, dated October 25, 1915, includes paddlefish and "gaspergou" (fresh-water drum) as such common species. Seines shall not be used within 100 feet of the shore and shall not exceed 900 feet in length; splashing of water or pounding of boat to drive fish into seine is not permitted; vegetation hauled out with seine must be returned to the water; gars taken in seine must be killed. (Rules on permits issued by Conservation Commission.) Permits may be revoked if shown to be detrimental to game fish resources (sec. 33). Hoop nets must be made of twine and be at least 3-inch mesh on bar between knot and knot (sec. 64). Seine, hoop net, or set line shall not be used for buffalofish February 15 to April 15, or for paddlefish January 1 to July 15, or for catfish May 15 to July 15; no paddlefish shall be had in possession which does not contain roe suitable to be made into caviar (sec. 37). Puddling water to catch fish, and using lights, fyke, gill, or trammel nets, or other permanent set means are prohibited (sec. 44, 45, 55), hoop nets are probably not intended to be included in this prohibition for they are regulated as hereinbefore noted.

The Conservation Commission may prohibit the taking of any kind of fresh-water fish in any part of the State for not over three years (sec. 24, 52).

Diamond-back terrapin shall not be taken or sold April 15 to June 15; if artificially propagated they may be taken or sold during that period, but not for food (sec. 60, 61). Nest or eggs of terrapin must not be molested (act 50 of 1910).

Salt-water operations for fish, shrimp, and oysters are regulated by several acts.

Minnesota.—Close season for trout, except lake trout, is September 1 to April 15; for black bass, March 1 to May 29; other varieties of fish, March 1 to May 1 (sec. 4807). Bag limit is 25 crappie or trout, 15 pike perch, 15 bass, except rock bass, and no person shall have in possession more than 25 bass (sec. 4808), and the taking of over 25 fish in one day is prohibited, with exceptions (sec. 4896). Crappie, trout, pike perch, and bass (except rock bass) shall be taken only with hook and line and not more than one line shall be used with not more than one bait, except that 3 artificial flies may be used in trout fishing (sec. 4808). Fishing for game fish in interstate waters is prohibited March 1 to May 29 (sec. 4830). Provision is made for closing trout streams to all fishing except during season for trout (sec. 4857–4859). And there are provisions for special localities (sec. 4885–4895).

Fishing by means of set lines (sec. 4835), fishhouse (sec. 4866), and tip-ups (sec. 4867, 4868) is regulated; see also provisions as to license fees for pole and line fishing by nonresidents, and set line fishing. Spears may be used for pickerel, suckers, redhorse, carp, and bullhead, subject to numerous restrictions (sec. 4808).

Netting in inland lakes for whitefish and tullibee is permitted with numerous restrictions (sec. 4808). In the Mississippi River within the State (from Falls of St. Anthony to 1,000 feet above the mouth of the St. Croix River) pound net, seine, or dip nets may be used to take sturgeon, redhorse, bowfin, buffalofish, catfish, pickerel, carp, and suckers, as follows: Not within 1,000 feet of mouth of a stream; pound net not over 75 feet long; seine not over 150 feet long; mesh in all cases not less than 2½ inches on bar (sec. 4819). Netting in certain waters is allowed for specified rough fish, under supervision of warden and subject to exceptions and to provisions as to mesh, bond, and reports, except, for most waters, April 1 to October 1 (ch. 261, laws 1915). In international waters pound and gill nets may be used by United States citizens, resident in Minnesota, under restrictions as to size, mesh, number of nets, leads, position, and season (sec. 4820, 4821). Netting in Lake Superior (except for cisco) is prohibited November 1 to December 1; also prohibited within half mile of shore (sec. 4874). In interstate waters fish, except catfish under 15 inches rough, 12 inches dressed, "pike" (pike perch?), pickerel, bass, sunfish, yellow perch, and crappie, may be taken by residents with nets, set lines, and spears, except April 15 to June 15 (sec. 4826, 4827, 4829, 4833, 4834, 4835); no license is required for spearing (sec. 4833); the mesh is limited for each kind of net and for different parts of the same kind (sec. 4834); set lines may have not more than 25 hooks, shall not be baited with live bait, and no person may have more than one (sec. 4835); nets must bear license number above water, and seines shall not be longer than 4,000 feet and shall not be raised at night (sec. 4840); fyke nets must be raised at least weekly (sec. 4841).

Mussel fishing may be practiced commercially with one boat only, or an additional boat for towing, and with only two crowfoot bars not over 16 feet long each and only one dredge not over 3 feet long with prongs or forks not more than 4 inches long (ch. 276, sec. 3, laws 1915).

Commission may prescribe a closed season for frogs in certain districts (ch. 288, laws 1915).

Mississippi.—Boards of supervisors have authority to regulate the times and the places in which and the circumstances under which fish may be taken (sec. 2306); they may entirely prohibit the catching of fish for one or more years or seasons when they believe that the supply of fish is about to be exhausted (sec. 2309); they may prohibit the use of seines, barrel nets, gill nets, and other like contrivances, or any of them, or may restrict the use of the same to places which annually go dry, and may prohibit or regulate the use of the same in particular waters, and may prescribe what kinds of seines or nets may be used and when and where (sec. 2312). Fish traps may be prohibited or regulated by boards, but shall not wholly obstruct the passage of fish (sec. 2313).

Missouri.—Fishing through ice is prohibited (sec. 6549).

Not more than 50 pounds of fish, in addition to one individual fish, shall be gigged or speared in one day, and that for domestic use only. Gigging and spearing are prohibited December to April; all fishing, except hook and line and gigging, are prohibited April and May; it is unlawful to seine, net, or trap within 100 yards of the mouth of any stream or slue emptying into the Mississippi or Missouri Rivers; these prohibitions do not apply to private ponds or to fish taken by residents for domestic use from temporary overflows; the owner of the land, or other person by his permission, may use a 2-inch mesh seine to take fish from unnavigable streams for consumption but not for sale during July, August, and September; bowfin, paddlefish, and gars may be taken at any time or in any manner, except by explosives; seines, trammel and hoop nets with mesh at least 2-inch are permitted in the Mississippi and Missouri Rivers June to March, but not within 300 yards of the mouth of any stream or slue (sec. 6548).

Pearl fishing is prohibited March to June (sec. 6551).

Tennessee.—Closed season on trout, black bass, landlocked salmon, crappie, and rock bass is May 1 to June 15 (sec. 47).

Seines are prohibited, but trammel nets, baskets, dip nets, and set nets with mesh at least 2-inch may be used in designated rivers, but not within 200 feet of any inlet (sec. 49).

Wisconsin.—Close seasons (omitting most provisions for special counties, or bodies of water) are as follows, all dates being inclusive: Black bass, March 2 to May 28. Crappie, rock bass, pike, perch, and pickerel in counties bordering on the Mississippi River and on various inland waters, March 2 to May 28. Pike perch and pickerel on outlying waters except Mississippi River, March 11 to April 30. Catfish on Mississippi River and Lakes Pepin and St. Croix and inland waters, March 2 to May 28. Muskellunge on inland waters, March 2 to May 28. Trout on inland waters, except some counties, September 1 to April 14. Yellow perch in counties bordering on Mississippi River and on certain inland waters, March 2 to May 28. Sunfish in counties bordering on Mississippi River, March 2 to May 28. Lake trout on Lake Superior, September 16 to October 14 (sec. 62.28).

Bag limit for trout is 45 a day and for black bass and yellow bass 15 a day (sec. 62.28).

All fishing is prohibited: (1) In unnavigable waters containing trout, during the close season for trout; (2) or at any time in any spring hole or artificial well connected with any of the waters of the State; (3) or by means of shutting or drawing off water for that purpose (sec. 62.29).

Not more than five lines may be used with not more than one hook each, and they shall not be left unattended; spearing for rough fish is prohibited: (1) In unnavigable waters containing trout, (2) in navigable waters containing trout during the close season for trout, (3) in certain specified waters, and (4) at night time in inland waters; the use of snag line or snag pole is prohibited (sec. 62.30).

Fishing through ice is prohibited: (1) On certain waters, and (2) under protection of any shelter except on certain waters (sec. 62.31).

Net and set line fishing is regulated as follows: No seine shall be drawn over spawning beds of game fish during their spawning season; no apron or other device to catch small fish shall be used in pound net; no net shall shut off more than two-thirds of any channel or passageway of a stream; nets and set lines must have flags bearing license number; licensees must permit State officials to accompany them and the officials may at any time raise set lines; lifting nets at night in Great Lakes waters is forbidden; buffalofish, carp, burbot, gar, redhorse, suckers, bowfin, and fresh-water drum shall not be returned to waters (sec. 62.33). Set lines of specified lengths are authorized in the Mississippi River and other specified waters, subject to various regulations (sec. 62.39).

Elaborate and complicated regulations are provided for net and set line fishing in Great Lakes waters (sec. 62.34). Net fishing is prohibited in the Mississippi River and Lakes Pepin and St. Croix: (1) April 16 to June 14, inclusive, (2) at all times in specified waters, and (3) for pike perch, bass of any variety, crappie, sunfish, pickerel, and yellow perch; in said waters seines shall not exceed 4,000 feet, and mesh shall be not less than 5-inch on the wings, or 4-inch in the center of the pot, the pot not exceeding 150 feet, and gill nets shall have mesh not less than 7-inch, and pound nets not less than 6-inch in the leaders, 5-inch in the hearts, or 3 inch in the hoops, and bait nets shall be used without leads, have mesh not less than 3-inch and front hoop not over 4 feet (sec. 62.35).

Gill netting in certain inland lakes for whitefish and cisco is authorized for a short season (sec. 62.36). Netting in inland waters, with specified exceptions, for specified rough fish, is authorized, subject to various restrictions (sec. 62.37, 62.38). Dip nets of specified sizes may be used without license to capture various rough fishes in specified waters (sec. 62.40).

Gill nets may be used to take lake trout and whitefish during specified dates and for the purpose of propagating these species, under special permit by the commission (sec. 62.57).

Minnow seines shall not be used in some waters (sec. 62.41).

Crawfish and crabs shall not be taken March 1 to June 10, or frogs during March and April, except that frogs may be had in possession by a person in the business of propagating them for scientific purposes (sec. 62.43). Frogs shall not be taken from lands owned by another without his consent (sec. 4565dm).

Nonresident mussel fishermen may use one boat only. Mussels shall not be taken with a dredge (sec. 62.44).

III. SIZE LIMITS FOR AQUATIC ANIMALS.

TABLE OF LIMITS WITH REFERENCES TO SECTION OR SECTIONS OF PAMPHLET LAWS OF EACH STATE.

Names.	Ill., sec. 41, 42, 42A, 56.	Iowa. Interstate waters, sec. 13.	Iowa. State generally, sec. 2.	La., sec. 37, 40, 60.	Minn. [a]	Mo., sec. 6550.	Tenn., sec. 50.	Wis., sec. 62.28, 62.33, 62.34, 62.35.
	In.	*In.*	*In.*	*In.*	*In.*	*In.*	In.	*In.*
Fish, except rock bass, sunfish, and bullheads					6			
Rough fish in outlying waters, except bait								7
Bass, black	10	11	10	8	9	11	7	10
Bass, rock	6						6	
Bass, striped	8	8	10	8		8		
Buffalofish	18	15		12				
Bullhead	7							
Carp	15	15						
Catfish	13	13	10	12	([b])	13		([b])
Crappie	8	8	8			8	6	7
Drum, fresh water	10					10		
Muskellunge					30			([b])
Perch, pike	13	15	12		([b])	11		13
Perch, yellow	7							
Pickerel	18	18	12			11		16
Salmon, landlocked							7	
Sturgeon		([b])			([b])			
Sunfish	4					6		
Trout			10			8	7	7
Trout, lake	([b])				([b])			([b])
Whitefish	([b])				([b])			([b])
Mussels	2				$1\frac{3}{4}$			
Turtle or terrapin, or both	7			[b] $5\frac{1}{2}$				

[a] Minnesota: Sec. 4827, 4873, and ch. 276, laws 1915.

[b] See text following.

PROVISIONS PECULIAR TO THE RESPECTIVE STATES.

Arkansas.—No limits.

Illinois.—Restrictions do not apply to pole and line fishing. The limit on lake trout and whitefish is 1¼ pounds. The catfish restriction states "blue and channel catfish."

Fish measurements are taken for "the length of the entire fish from the extreme tip of the snout to the extreme end of the tail fin," and turtle or terrapin for the extreme ends of the shell.

Iowa.—A different limit is set for the species of sturgeon, being 1 pound for the sand sturgeon, or shovel-nose sturgeon, or hackleback, *Scaphirhynchus platorhynchus* (Rafinesque), and 3 pounds for the rock sturgeon or lake sturgeon, *Acipenser rubicundus* Le Sueur; the former would perhaps include the white sturgeon, *Parascaphirhyncus albus* Forbes and Richardson. The limit on lake trout and white fish is 1¼ pounds.

Kentucky.—No limits.

Louisiana.—The terrapin restriction is only on the diamond-back. Size limits for salt-water species are fixed by acts 53 and 54 of 1914.

Minnesota.—Measurements are taken from tip of snout to fork of tail. A different size limit is set for the two species of pike perch, being 14 inches or 1 pound dressed for the wall-eye, and 10 inches for the sauger. Catfish under 15 inches tip to tip rough, or 12 inches dressed shall not be taken in nets in interstate waters. The limit on sturgeon is 15 pounds dressed weight; on lake trout 2 pounds round, or undressed weight, and 1½ pounds dressed weight; and on whitefish 2½ pounds undressed weight, or 2 pounds dressed weight.

Mississippi.—No statutory limits. County boards have general authority to protect fish (sec. 2305–2315).

Missouri.—Measurements are taken from nose to fork of tail. The restrictions are applicable only to fish sold. The catfish restriction states "blue or channel catfish."

Wisconsin.—Measurements are taken from tip of snout to tip of tail. The limit for catfish in the Mississippi River and Lakes Pepin and St. Croix is 15 inches round and 12 inches with head off; in all other waters 1½ pounds round and 1 pound dressed. The limit on muskellunge is 5 pounds round and 4 pounds dressed. Lake trout less than 14 inches long shall not be taken with pound net in specified Great Lakes waters. The limit on whitefish is 2 pounds round and 1½ pounds dressed.

IV. LICENSES REQUIRED AND FEES THEREFOR.

Arkansas.—The fee for devices other than hook and line for the purpose of catching fish for market is $25 (sec. 16); and for using artificial bait $1 (sec. 17).

Illinois.—Fees for net fishing are as follows, the amounts in parentheses being for nonresidents: Each 100 yards of seine $5 ($10); dip or fyke nets, $1 ($2); hoop net, 50 cents ($2); basket or trap net, 50 cents (?); in operation of gill or pound nets, steam tug, $25 ($200), gasoline launch, $15 ($50), sail or row boat, $10 ($30) (sec. 22). Clerk's fee is 25 cents extra (sec. 23).

Owners of property, their children and tenants may do net fishing, without license, from waters wholly within their property and not connected with any open stream (sec. 22). Gill and pound nets shall be operated only from a boat as listed hereinbefore (sec. 39). The fee for conducting a wholesale fish business is $10.50 (sec. 24). The commercial mussel fishing fee is $1.25 for residents and $25.50 for nonresidents; plus in either case $25 if a dredge is used (sec. 55).

Iowa.—Fees for nets in the Mississippi and Missouri Rivers are as follows: Each 500 feet of seine, $10; pound net having more than 100 feet of lead on each side, $4;

pound net with less lead, $1; each bait, dip, hoop, and fyke net, 50 cents; each 300 feet of trammel net used for floating fishing, $5. Metal tags are required and nonresidents must give bond (sec. 11).

Louisiana.—Fees for seines are as follows: Less than 300 feet, $25; 300 to 600 feet, $50; 600 to 900 feet, $100 (sec. 33). Fees for wholesale dealing in fresh-water fish are $5 to $150, depending on the amount of business and whether the dealer is a resident or nonresident (sec. 34, 35). Fees for vessels purchasing fresh-water fish to make a cargo are $5 to $40, depending on tonnage of boat (sec. 36). The fee for buying and selling diamond-back terrapin is $25, and for buying, selling and shipping $100 for a resident and $200 for a nonresident or unnaturalized foreign-born resident (sec. 63).

The fees for salt-water operations are fixed by several acts.

Minnesota.—Licenses of Wisconsin are accepted if it reciprocates (sec. 4845 and ch. 276 of laws 1915).

The fee for seine, pound, or dip nets in the Mississippi River within the State is $5 for each net (sec. 4819). In international waters the fees are $25 for pound net and $10 for gill net (sec. 4820, 4821). In interstate waters the fees are: For seine $1 a hundred feet up to 500 feet, then $2 a hundred to 1,000 feet, then $3 a hundred to 1,500 feet, then $4 a hundred to 2,000 feet, then $5 a hundred to 2,500 feet, then $6 a hundred to 4,000 feet; for gill nets $5 for 2,000 feet and $5 for each additional thousand; for pound net, with leader not exceeding 700 feet, $5, and for each pound net in excess of one used with one leader, $5; fyke or hoop net, $5; bait or turtle nets, $1; metal tags are 25 cents each (sec. 4836). Fee for inland commercial fishing is 20 per cent of gross receipts plus expenses and compensation of warden (ch. 261 of laws 1915).

Fees for set line (sec. 4836), fishhouse (sec. 4866), tip-up license (sec. 4868), and nonresident pole and line license if fisherman over 21 years old (sec. 4879) are $1 each.

The commercial mussel fishing fee is $1 for residents and $25 for nonresidents, plus in either case $25, if a dredge is used (ch. 276 of laws 1915).

Tennessee.—The fee is $2 for each net or basket (sec. 49).

Wisconsin.—Fishing licenses of Minnesota and Iowa are accepted if those States reciprocate (sec. 62.07).

Licenses are issued only to natural persons (not to corporations) (sec. 62.11).

Fees for nonresidents are as follows: Mussel fishing, $50 (sec. 62.44); fishing in inland waters if fisherman over 16 years old, $1 (sec. 62.25); operating gill net in Great Lakes waters with steam vessel having steam lifter, $200, or without steam lifter, $100, or with any other vessel not propelled by oars, paddle, or pole, $50 (sec. 62.34).

Fees for residents or nonresidents in Great Lakes waters are as follows: Pound or gill nets (except as hereinbefore noted), $2; fyke, drop, or trap nets, trammel net, seine, or set lines, $1 (sec. 62.34).

Fees for fishing in the Mississippi River and Lakes Pepin and St. Croix are as follows: Seines for first 500 feet $1 a hundred, second 500 feet $2 a hundred, third at $3, fourth at $4, fifth at $5, and 2,500 to 4,000 feet at $6 a hundred; gill nets for first 2,000 feet $5 and for each additional thousand feet $5; pound or hoop nets with 700-foot leader and one pound $5 and for each additional pound $5; bait nets, $1 each. For these waters fishermen must give bonds (sec. 62.35).

Metal tags are required for nets and set lines at 25 cents each (sec. 62.34, 62.35, 62.39).

Fees are from $5 to $50 for net fishing in specified inland waters (sec. 62.37, 62.38).

Fee for set lines in specified waters is $1 (sec. 62.39).

V. SHIPPING AND SELLING FISHERIES PRODUCTS.

Arkansas.—Shipping of game fish beyond State line is prohibited (sec. 19).

Illinois.—Black bass shall not be sold nor, if taken within the State, pickerel or pike perch (sec. 41). Said fish shall not be shipped, except not over 25 fish, in one lot as baggage (sec. 43, 44). No frogs over a quarter of a pound, or fish shall be shipped April 20 to July 1, inclusive, except whitefish, lake trout, cisco, and yellow perch (sec. 44). Shipments of fish must be marked to show contents and other facts (sec. 43, 45).

Iowa.—Game fish shall not be shipped from inland waters for the purpose of sale, and any person shipping game fish must deliver to the carrier a sworn statement (sec. 2). As noted on page 9 hereof, "game" fish is construed to include any food fish that takes a live bait.

Louisiana.—Black bass, striped bass, crappie, "white perch" (crappiep), "any species of perch," and sunfish shall not be sold (sec. 38). All shipments of fish and shipments without the State of diamond-back terrapin must be marked to show contents and other facts (sec. 41, 62).

Minnesota.—The sale or shipping of pike perch from stocked waters, or of brook trout or black bass, is prohibited (sec. 4870, 4871; see also sec. 4876 as to certain counties). Fish shall not be shipped beyond the State except specified rough fish and except not over 50 pounds taken by a nonresident for personal use; packages shall be marked to show contents and other facts (sec. 4875). The commission may prohibit the sale of crappie, yellow perch, or sunfish caught in stocked lakes (sec. 4877).

Mississippi.—Boards of supervisors have authority to regulate by whom and in what quantities and to what extent fish may be marketed (sec. 2306).

Wisconsin.—Shipments of fish must be marked to show the contents and other facts, and the consignor must be the owner and must deliver to the carrier a statement that he is. (Sec. 62.10, 62.35, 62.37, 62.38.)

Subject only to the preceding, minnows, suckers, carp, redhorse, fresh-water drum, burbot, bowfin, gar, buffalofish, and lizards may be shipped. Other varieties of fish taken in inland waters may be shipped only as follows: One shipment of lake trout containing not more than 20 pounds may be transported by any person in each period of 7 days when accompanied by the consignor; other varieties of trout may be transported when accompanied by the consignor; of the remaining varieties of fish, one package containing not more than 20 pounds or in lieu thereof not more than 2 fish of any weight may be made in each 7 days; or (without 7-day limit) up to 50 pounds may be transported to a point within the State when accompanied by the consignor (sec. 62.42).

Other restrictions regulate shipments from Green Bay and Fox River; pike perch and pickerel taken from outlying waters; imported pike perch and pickerel in their natural frozen state; and provide that any shipment originating at any other than ports on outlying waters shall be subject to provisions hereinbefore noted as to fish taken in inland waters; and prohibit the transportation of living young of carp or bowfin (sec. 62.42). Transportation of wild animals (includes fish) into this State is forbidden, if shipped from another State in violation of its laws relating to transport tation (sec. 62.07).

Trout other than lake trout shall not be served at eating places (sec. 62.10).

VI. MISCELLANEOUS PROVISIONS.

TABLE OF PROVISIONS FOUND IN STATUTES GENERALLY, WITH REFERENCES TO SECTIONS OF PAMPHLET LAWS.

Subject.	Ark.	Ill.	Iowa.	Ky.	La.	Minn.	Miss.	Mo.	Tenn.	Wis.
	Sec.	*Sec.*	*Sec.*	*Sec.*	*Sec.*	*Sec.*	*Sec.*	*Sec.*	*Sec.*	*Sec.*
Ownership of fish, etc., declared in State	([a])	32	59, 60	....	1	4778	......	6508	1	62.08
Obstructing the passage of fish forbidden	......	......	......	....	53	....	2313	6535	48	62.09
Fishways required over dams	50	49	16	1392A	....	4772	......	6552	......	......
Contamination of waters prohibited	......	......	......	....	57	4773	3286	6536	51	62.32
Having fish in possession smaller than the legal limit, or during close season, or in excess of bag limit, is declared unlawful or presumed to be unlawful	.....	42A	6, 26	....	18, 39	4785, 4786 4808, 4838 4870, 4871 4873	.....	......	......	62.07 62.10
Commission or warden to propagate and rescue fish and assist in stocking waters	6	25, 46	1, 12	3, 9	1, 19, 21 22, 23 49, 51	4758	......	......	......	62.55
Commission may establish fish preserves	......	25	......	8	22, 30	....	......	......	......	......
Reports by licenses required on fish caught or handled	.....	......	......	....	35, 36	([b])	......	......	......	62.34 62.35
Reports required on catch of mussels	......	58	......	....	....	([c])	......	......	......	......

[a] Sec. 15 of act of 1903. [b] Sec. 4820 and ch. 261, laws of 1915. [c] Ch. 276, laws of 1915.

PROVISIONS PECULIAR TO THE RESPECTIVE STATES, WITH REFERENCES TO SECTIONS OF PAMPHLET LAWS.

Arkansas.—Nonresidents are forbidden to fish, except in one locality with hook and line (sec. 16 of act of 1903).

Illinois.—"Objectionable" fish is defined to mean gar and gizzard shad (sec. 51).

Iowa.—Cities and towns may prevent the escape of fish from boundary lakes (sec. 17).

Louisiana.—Intake pipes for irrigation must be screened to prevent entrance of fish, except on the Mississippi River (sec. 56).

Fish may be had in possession five days after end of open season (sec. 39).

Police juries of each county are authorized to make regulations for the protection of alligators (act 37 of 1908).

The commission may adopt rules and regulations for the comprehensive control of fish (sec. 2, 24, 52); shall assist in protecting private ponds (sec. 2); may prescribe regulations for stocked streams (sec. 23, 51); and may regulate seines, hoop nets and set lines (sec. 42). No spawn or fish from without the State shall be liberated without permission from the commission (sec. 22, 50).

Game and fish preserves are established. (Acts 172 of 1912 and 273 of 1910.)

Minnesota.—It is unlawful to have fish in possession if unlawfully taken without the State (sec. 4785). Provision is made for the removal of carp (ch. 348, laws 1915). Counties may screen navigable lakes that have been stocked (sec. 753).

Wisconsin.—Waters of State are divided into "outlying" and "inland" and each defined (sec. 62.26). Game fish are declared to be trout, grayling, lake trout, whitefish, crappie, black bass, striped bass, rock bass, pike perch, catfish, muskellunge, sturgeon, and pickerel, in all waters, and yellow perch in certain waters; rough fish are all others (sec. 62.27). Fishermen must permit State officials to remove eggs and milt from fish captured (sec. 62.56).

CONDITION AND EXTENT OF THE NATURAL OYSTER BEDS AND BARREN BOTTOMS IN THE VICINITY OF APALACHICOLA, FLA.

By ERNEST DANGLADE
Scientific Assistant, Bureau of Fisheries

Appendix V to the Report of the U. S. Commissioner of Fisheries for 1916.

CONTENTS.

CONDITION AND EXTENT OF THE NATURAL OYSTER BEDS AND BARREN BOTTOMS IN THE VICINITY OF APALACHICOLA, FLA.

By Ernest Danglade, *Scientific Assistant, Bureau of Fisheries.*

INTRODUCTION.

The survey began on January 16, 1915, in the western portion of St. George Sound about 1 mile east of the first oyster bed and was completed April 16 at the western extremity of St. Vincent Sound. The Fisheries steamer *Fish Hawk*, in command of Boatswain J. J. O'Brien, arrived off Apalachicola, Fla., December 21, 1914, and served as the base of operations. The interval from the arrival of the vessel until the beginning of the survey was utilized in recovering triangulation stations established by the United States Coast and Geodetic Survey, constructing signals over these stations, and selecting prominent points for additional and auxiliary signals.

During the progress of the survey 43 signals were built, 3 of which, owing to the low elevation of the shore and the width of Apalachicola Bay, were much larger than any heretofore erected by this Bureau. The signals were anchored and secured by guy lines of telephone wire. Including range beacons, Cape St. George Lighthouse, and other fixed objects, a total of 56 signals were in use. Figure 1 is from a photograph of the signal built on St. Vincent Point.

Permanent cement monuments, in the top of each of which there is a 3-inch brass disk inscribed "U. S. Bureau of Fisheries, 1915," were planted under signals Marsh, Yent, Fet, Cedar, and Schep.

During the early part of the investigation the weather was unfavorable on account of high winds or haze, but there were no violent storms and but few heavy rains. The latter part of the season, especially during the month of April, was almost ideal for both hydrographic work and biological investigations.

Gasoline motor boats were used for the work and proved to be entirely satisfactory for the needs of the party. They were better and more economical than the steam launches employed on previous oyster surveys.

Throughout the survey Boatswain J. J. O'Brien, United States Navy, and Templeton Van de Bogert were the observers. The latter also did practically all the plotting and made the smooth sheet and chart. The tide-gauge observations were made at Apalachicola by Thomas J. Adams and J. H. Marshall and at the station on St. Vincent Island by Oscar Barrow, all of the *Fish Hawk*. At the remaining stations the readings were made by either civilians or by members of the working party detailed for that purpose. The survey was greatly facilitated by the zeal and interest taken by those engaged in the work.

During the season of 1895–96 the Bureau made a survey of the oyster beds in these waters [a] from Indian Pass to and including Cat Point, Bulkhead, and East Hole Bars.

HISTORICAL DATA.

Although no written word is left of their labors, the first persons engaged in the oyster industry in this region were undoubtedly the aborigines. These people were evidently keenly observant of the economic worth of oysters and carried on the fishery quite extensively for a long time, as is indicated by the presence of large quantities of oyster shells in long windrows and piles on the banks. This is particularly noticeable along the north shore of the western half of St. Vincent Sound.

The following brief account of this oyster region, covering a period of 80 years, is based on data kindly furnished by John G. Ruge and others of Apalachicola, Fla., and also from the report of the previous survey.

Oysters were first taken for the local market in 1836, but the industry did not attain much importance until 1850. It continued rather active until the Civil War, when work practically ceased. The beds meanwhile improved and were in very good condition. After the war the oyster business was again taken up, but it was not until 1878 that it was carried on at all extensively. It then continued active for about eight years, when, on January 12, 1886, the greater part of the oysters, owing to a series of low tides, was materially injured by a hard freeze. The reefs, however, recovered and the season of 1890–91 was very productive.

During the winter of 1893–94 the beds of St. Vincent Sound and Apalachicola Bay were nearly destroyed, and for the next two years practically no oysters were taken from these places. Meanwhile Cat Point, Bulkhead, and Porter Bars furnished the greater part of the oysters brought to market.

On October 8, 1894, a heavy gale caused many of the oysters to be covered with sand and mud. Then this was followed by a freeze on December 29 and for several days the temperature fell to 14° F.,

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[a] Report of a survey of the oyster regions of St. Vincent Sound, Apalachicola Bay, and St. George Sound, Fla. By Lieut. Franklin Swift, U. S. Navy. Report of the Commissioner for 1896, p. 187-221.

killing many of the oysters that were not protected by sand and mud. On February 7, 1895, the thermometer registered 10° F., being the lowest known in that section, it is said, for 60 years. The fishermen could not catch enough oysters the next year to make a living, and consequently the plants operated for only a short time.

Up to this time the shipments of raw oysters were mainly in the shell to local or near-by points, but during this season the first active shipments of shucked raw oysters were made.

Another freeze occurred on January 28, 1897, at a time when the tide was very low. Owing to the exposure many oysters were destroyed and for the season 1896–97 the dealers handled only about one-half the quantity of the usual yield. However, during the following season, although of shorter duration, production was increased, showing that the beds were recovering in productivity.

On August 2, 1898, a severe gale covered some of the oysters with sand and mud, and in September of that year a very heavy freshet occurred, the combined effects being the destruction of many of the oysters at Cat Point and practically all at St. Vincent. On February 12, 1899, there was another freeze, the temperature dropping to 10° for a few days, but not for as long duration as in 1895. The operation of the two canneries and the shipments of raw oysters during the season of 1898–99 were nearly equal to those for seasons prior to 1895, thus again showing the great productivity of the bars. The output for 1899–1900 was less than for the preceding season, but there was an increase of about 50 per cent in 1900–1901.

A temperature of 20° F., December 16 to 18, 1901, did not result seriously to the oysters, and the output of the canneries and raw shipments for 1901–2 increased, although the season was shorter than the year before. The following year gave about the same returns.

A gale on August 13 and 14, 1903, covered the oysters on Porter Bar with sand and mud, practically destroying them. Cat Point and East Hole Bars were also injured, and St. Vincent Bar, which was regaining its productivity after the disaster of 1898, was covered with sand. The season's operation was very short and the output greatly reduced.

The season of 1904–5 was mostly very favorable. A strike closed one canning plant shortly after it started, but did not interfere with the other. The shipments of raw stock, however, were about as usual, and in the aggregate the output was fully equal to the previous year. There was a temperature of 22° F., February, 1905, but as the winds were favorable for high tides the oysters were not affected.

Although a heavy gale on September 27, 1906, covered many oysters with mud and sand, they were able to recover readily and the damage was slight. The yield of the two seasons, 1905–7, was about normal. The total output from all sources for 1907–8 was quite large. During the first week of May, 1908, there was a very high freshet accompanied by southeast winds, which prevailed for three days, but they were followed by heavy northwest winds, which drove the fresh water to the eastward, without forming mud deposits, leaving the oysters uninjured. A temperature of 22° F. on February 1, 1909, produced no serious results, and about the middle of March of the same year a heavy freshet occurred, but the prevailing winds forced the fresh water out to East Pass, and, fortunately, it was too early in the season to have any effect on the spat.

On September 20 and 21, 1909, a gale occurred which did but little harm at this place, although there was very extensive damage on Mississippi Sound, and on October 11 and 12 there was another storm, but, owing to the direction of the wind, the oyster reefs escaped practically unharmed.

During the second and third weeks of April, 1910, there was a freshet, but the prevailing wind carried the water eastward, so that the deposit of silt was not sufficient to smother the spat.

The yields for the seasons 1910–1914 were equal to the average. For 1913–14 there were gathered 240,436 tubs, or so-called bushels, statistically reported by the Florida State Shell Fish Commissioner as 120,218 barrels.

The season of 1914–15 bid fair to be a good one, but, incident to the European war, there was less demand for steamed oysters or raw material. So for this season the yield was but 144,940 tubs, or 72,470 barrels.

There was a freshet in January, 1915, but little, if any, damage was done.

METHODS OF THE SURVEY.

The methods employed were those pursued in former surveys of like character, and are explained in detail in a description of the beds of the James River,[a] from which some of the following is repeated.

A "boat sheet" was prepared, on which were accurately platted the positions, as determined by triangulation, of lighthouses, buildings, tripods, etc., used as signals. These data were furnished by the United States Coast and Geodetic Survey.

The oyster beds were discovered by soundings with a lead line, but principally by means of a length of chain dragged over the bottom at the end of a copper wire running from the sounding boat. The wire was wound on a reel, and its unwound length was adjusted to the depth of water and the speed of the launch, so that the chain was always on the bottom. Whenever the chain touched a shell or an oyster the shock or vibration was transmitted up the wire to the hand

[a] Moore, H. F.: Condition and extent of the oyster beds of James River, Va. Bureau of Fisheries document no. 729.

of a man whose sole duty it was to give heed to such signals and report them to the recorder.

The launches from which the soundings were made were run at a speed between 3 and 4 miles per hour. At intervals of three minutes—in some cases two minutes—the position of the boat was determined by two simultaneous sextant observations of the angles between a set of three signals, the middle one of which was common to the two angles, the position being immediately platted on the boat sheet. At regular intervals of 15 seconds, as measured by a clock under the observation of the recorder, the leadsman made a sounding and reported to the recorder the depth of the water and the character of the bottom, immediately after which the man at the wire reported the character of the chain indications since the last sounding—that is, whether they showed barren bottom or dense, scattering, or very scattering growths of oysters.

With the boat running at 3 miles per hour the soundings were between 60 and 70 feet apart, and, as the speed of the boat was uniform, the location of each was determinable within a yard or two by dividing the platted distance between the positions determined by the sextant by the number of soundings. The chain, of course, gave a continuous indication of the character of the bottom, but the record was made at the regular 15-second intervals observed in sounding.

The chain, while indicating the absence or the relative abundance of objects on the bottom, gives no information as to whether they are shells or oysters, nor, if the latter, their size and condition. To obtain these data it was necessary to supplement the observations already described by others more definite in respect to the desired particulars. Whenever, in the opinion of the officer in charge of the sounding boat, such information was required, a numbered buoy was dropped, the time and number being entered in the sounding book. A launch, which followed the sounding boat, anchored alongside the buoy, and a quantity of the oysters and shells were tonged up, separated by sizes, and counted.

This boat at each station made a known number of "grabs" with the oyster tongs, exercising care to clean the bottom of oysters as thoroughly as possible at each grab. In a given depth of water and using the same boat and tongs, an oysterman will cover practically the same area of the bottom at each grab, but, other factors remaining the same, the area of the grab will decrease with an increase in the depth.

Careful measurements were made and tabulated showing the area per grab covered by the tonger employed on the work at each foot of depth of water and for each pair of tongs and boat used. With these data, and knowing the number of "grabs," the number of oysters of each size per square yard of bottom was readily obtainable by simple calculation. The following example will illustrate the data obtained and the form of the record:

DEPARTMENT OF COMMERCE.

BUREAU OF FISHERIES.

Field record of examinations of oyster beds.

Serial number, *1001*. General locality, *Apalachicola Bay*.

Local name of oyster ground, *St. Vincent Bar*.

Date, *March 25, 1915*.	Time, *3.15 p. m.*
Angle, *K 69–70*.	Buoy No. *7*.
Depth, *4 feet*.	Bottom, *Hard*.
Bottom soundings, —	Average, —
Density, —	Temperature, —
Condition of water, *Clear*.	Stage of tide, *Ebb*.
Tongman, *Meyer*.	Boat, *No. 2*.
Number grabs made, *8*.	Tongs, *12 C*.
Total area covered, *3.05* square yards.	
Number oysters taken: — 1 in., *0*. X in.—4 in., *35*.	1 in.—X in., *21*. 4 in., *17*.
Quantity shells, *32*.	Dead, *5*.
Result: Spat per square yard, *0*. Culls per square yard, *6.9*. Counts per square yard, *17.1*.	
X in.=cull limit prescribed by law.	

This furnishes an exact statement of the condition of the bed at the spot, which can be platted on the chart with error in position of not more than a few yards. From the data obtained a close estimate may be formed of the number of bushels of oysters and shells per acre in the vicinity of the examination, and, by multiplying the observations, for the bed as a whole. In the course of the survey 1,306 observations were made at various places, both on the natural rocks and on the barren bottoms.

In estimating the productiveness of the bottoms it appeared desirable to use the method employed in Delaware Bay[a] rather than that followed in the James River survey.

Where tongs are used exclusively a bed with a given quantity of oysters lying in shoal water is more valuable commercially than one with the same quantity of oysters in deeper water, owing to the fact that the labor of the tonger is more efficient on the former. As has been pointed out, the area covered by a "grab" decreases with the depth, other factors being the same; and, moreover, the deeper the water the greater is the labor involved in making the grab and the smaller is the number of grabs which can be made in a given time. Where, however, the depth is practically uniform and shoal, as in

[a] Moore, H. F.: Condition and extent of the natural oyster beds of Delaware. Bureau of Fisheries document no. 745, 1911.

the region treated in this report, it is unnecessarily refined and laborious to make such allowance for depth, and it is nearly as accurate and satisfactory to rate the bottoms in accordance with an arbitrary standard.

In this report the classification of the relative productiveness of the various beds and parts of beds, as exhibited on the chart and discussed in the text, is as follows:

Dense growth	Bearing over 150 bushels per acre.
Scattering growth	Bearing between 75 and 150 bushels per acre.
Very scattering growth	Bearing between 25 and 75 bushels per acre.
Depleted bottom	Bearing less than 25 bushels per acre.

This classification refers solely to oysters of a size assumed to be large enough for the market, in this case to those 3 inches or more in length. As the classification takes no account of the smaller oysters, certain areas bearing a heavy growth of young may be described and shown on the charts as depleted, owing to the paucity of mature oysters. While the charts can not indicate this, the descriptions of the beds show it in all cases. The charts show in general terms the character of the beds in respect to the product available for market, so far as mere size of the oysters is concerned, at the time of the survey. If the oysters were of ordinarily good condition and shape, the areas indicated as bearing dense and scattering growth would yield a product sufficient to make tonging remunerative under the economic conditions existing. Where the market oysters are rated as very scattering, the growth is insufficient to support a fishery at the low price which the product would yield. The depleted bottom is that on which the product of market oysters, at the time of the survey, was very small, and is not necessarily formerly productive bottom now denuded, as might be supposed from a strict definition of the descriptive term employed. On the contrary, it may be formerly barren bottom now coming into production.

The barren bottom, which is that totally devoid of oysters, and in most cases of shells, vastly exceeds the oyster bottom in extent. Its interest in connection with the survey lies in its relative availability for oyster culture; that is, whether or not its general character is such as to enable it to become productive if proper measures to that end be taken. The most important consideration is, usually, the character and degree of stability of its constituent materials. If the bottom be too soft, the shells and oysters deposited thereon will soon become engulfed.

In the earlier surveys the method ordinarily used by oystermen was employed, the consistency of the bottom being determined by probing with a pole. By noting the resistance which the bottom imposes to the penetration of the probe, the observer forms an opinion of its relative hardness and of its suitability in that respect for oyster culture. In many cases different observers will not agree as to the proper term by which to describe the bottom so tested, and it is therefore difficult to convey to another the meaning desired. To overcome this difficulty an instrument [a] has been devised which gives these data mechanically, by measuring the number of inches the bottom is penetrated by a plunger of a constant weight and size falling through a uniform distance. The instrument is used from an anchored boat, from 6 to 10 tests being made at each station. Any readings which are markedly higher or lower than the others are discarded on the assumption that the plunger has fallen into a crab hole or other depression, or that it has encountered a shell or similar accidental obstruction. The average of the remaining depths of penetration, as indicated on the scale of inches inscribed on the rod, is regarded as the measure of the consistency of the bottom.

The following designations used to indicate the different degrees of hardness, as shown by the instrument, are arbitrary, although based on the terms used by the oyster growers:

Hard	Penetration less than 4 inches.
Stiff	Penetration between 4 and 8 inches.
Soft	Penetration between 8 and 13 inches.
Very soft	Penetration between 13 and 18 inches.
Ooze	Penetration over 18 inches.

These various types of bottom are shown on the chart by means of circles, the relative area of black included within them indicating the relative degree of hardness, as follows: Hard, a black circle; stiff, a black semicircle; soft, a black quadrant; very soft, two crossing diameters; ooze, one diameter.

The bottoms classed as hard and stiff, those in which the plunger will not penetrate more than 8 inches, are suitable for planting without preparation, provided they are not composed of shifting sand. As sand invariably gives a reading of less than 4 inches, and is therefore rated as "hard," it follows that all "stiff" bottom shown on the chart by a black semicircle can be accepted as safe for planting. Part of the hard bottom is composed of mud and part of sand. The former may be accepted without hesitation, but the latter should be examined with respect to its liability to shift. Soft bottom should be planted with care, and toward its upper or less consistent limits may require some preliminary hardening with shells or sand. Very soft bottom and ooze should not be considered, as oysters planted there will sink, and if not killed, as is probable, will be ill-shaped and inferior in every respect. The ratings on which the classification is based have been checked by observation on bottoms actually used for oyster culture in Chesapeake Bay.

[a] Illustrated and described in "Condition and extent of the natural oyster beds and barren bottoms of Mississippi Sound, Alabama." By H. F. Moore. Bureau of Fisheries document no. 769.

The instrument employed has been thoroughly tested and is reliable for the purposes of oyster surveys, but there may be errors in cases where hard bottom is overlaid by several inches of soft mud and ooze. Such bottoms are always readily detected by probing with a pole.

THE BAY AND SOUNDS.

The oyster grounds and barren bottoms covered by the present survey and reported on in this paper embrace all of Apalachicola Bay and St. Vincent Sound and the western part of St. George Sound. Neither East Bay, with the exception of its southern border, nor Indian Lagoon at the extreme western limits of St. Vincent Sound were included in the work. Although bearing some good oysters, they were not deemed of sufficient economic importance to warrant the expenditure of the time and money. Sheephead and Big Bayous on the northern shore of St. Vincent Island have some good oyster growths, but as these were within the confines of the island they were not examined.

St. George Sound lies within the southern limits of Franklin County, Fla., and is situated between the mainland and St. James Island on the north and east and St. George and Dog Islands and Dog Island Reef on the south. It connects with the Gulf of Mexico at East Pass, Duer Channel, and the shallow water on Dog Island Reef. On the west it unites with Apalachicola Bay on a line between Cat Point and St. George Island. Its length is about 26 miles, and it has an average width of about 3½ miles. Carrabelle River is the only stream flowing into the sound. As only the western portion of the sound supports productive oyster beds, the survey was conducted westward from signals Marsh and Spartan. This part of the sound has an area of about 34 square miles and measures about 7 by 4½ miles and carries about 9 feet at low water. It contains many bars and shoals but is well buoyed for navigation.

Apalachicola Bay is bounded on the north by the mainland and East Bay, on the east by St. George Sound, on the south by St. George Island, and on the west by St. Vincent Island and Sound. Its length is about 14 miles and the greatest width about 7 miles. The direct connection with the Gulf is through West Pass. There are three dredged channels, one through Bulkhead to St. George Sound, one near West Pass, and one in the vicinity of Apalachicola, which afford depths for moderate-draft vessels. The bay receives the waters from the Apalachicola, St. Marks River, and other affluents of East Bay. The greater part of the oyster bars are located in the western portion of the bay; elsewhere the bottom is generally barren and soft.

St. Vincent Sound, a rather shallow body of water, is the western extension of Apalachicola Bay. Beginning with the line between Green and St. Vincent Points it reaches to Indian Pass, a distance of, approximately, 9½ miles. Its width at the eastern end is about 3 miles, and it gradually tapers toward the west until it is about three-fourths mile in width. It has an approximate area of 18 square miles. With the exception of the shallow water along the shore, the eastern third of the sound generally has a soft bottom; the central section contains the greater number of oyster bars; while the western section though practically devoid of large oyster bars, has a hard or shell-gravel bottom. The sound receives no fresh water other than the surface drainage of the adjacent lands and that coming indirectly from the Apalachicola, St. Marks, and other affluents of East Bay.

The greatest depth recorded in St. George Sound was 35 feet; in Apalachicola Bay 13 feet, excepting in dredged channels; in St. Vincent Sound 33 feet; West Pass 55 feet; and Indian Pass 20 feet. On the bar beyond Indian Pass a depth of 6½ feet was found.

The area surveyed embraces, approximately, 130 square miles, of which about 119 square miles consisted of barren bottoms and 11.1 square miles comprised the oyster bars and reefs. The total length of the sounds and bay is about 30 miles and the average width about 4.4 miles.

During the progress of the survey 35,549 soundings were made over a distance of 666.1 miles, and 3,492 sextant angles determined the various positions of the boat. Observations by means of the chain were made constantly throughout the entire distance run by the sounding boat, the oysters were tonged up, examined, and counted at 577 places, and the barren bottoms were tested at 729 stations.

DESCRIPTION OF NATURAL BEDS.

1. GOOSE ISLAND BAR (ST. GEORGE SOUND).

This, the easternmost oyster bar of St. George Sound, is located along the southern border of the sound in the vicinity of Goose Island. Its length, in an east and west direction, is about 1 mile, the average width is nearly one-fourth mile, and the area is about 150 acres. It is directly connected with Silvia Bar by a narrow neck of dense oysters having a width of approximately 150 yards.

The bar lies in rather shallow water, ranging from 2½ to 5½ feet in depth, and, with the exception of both the east and west extremities, is but slightly elevated above the general level of the sound. The bottom, for the most part, is composed of firm hard sand. The area, condition of growth, and estimated content of this bar are shown in the following tables:

OYSTER GROWTH ON GOOSE ISLAND BAR.

Character of oyster growth.	Area.	Oysters per acre.			Estimated content of oysters.
		Under 3 inches.	Over 3 inches.	Total.	
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense	24	115	358	473	11,352
Very scattering	126	24	58	82	10,332
Total	150				21,684

DETAILS OF EXAMINATION OF GOOSE ISLAND BAR.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
65	Jan. 23	3.0	2.94	0	4.8	12.4	10	41	286	327	Dense.
87	..do....	5.5	1.87	6.4	12.3	16.5	15	159	382	541	Do.
373	Feb. 11	5.0	2.55	0	17.2	17.6	10	146	406	552	Do.
41	Jan. 21	2.0	3.56	.3	2.5	2.5	2	24	58	82	Very scattering.

That portion of the bar immediately contiguous to Goose Island, and containing about five-sixths of the total area, has but a scattering growth of oysters, while the remaining portion, which lies to the extreme west, has a dense growth. The oysters occur generally in large clusters, with sharp edges. Mussels were only fairly abundant, but the greatest disadvantage to the growth of oysters was the presence of both red and green algæ, which at times was in quantities sufficient to smother the oysters. Tonging was not carried on extensively, especially on the very scattering area, and during our observations only one or two boats were engaged in the fishery on the dense portion.

2. SILVIA BAR.

This comparatively small bed of 69 acres is directly connected with Goose Island bed on the east and Drum Bar on the southeast. There are, however, no distinct lines of demarcation separating the three beds, the divisions being more or less arbitrarily made. The bed is very irregular in shape, the northernmost half consisting of a projecting point bearing a crude resemblance in outline to a turtle's head. Its length is about five-eighths of a mile and the average width approaches 200 yards. The depth of water is from 2½ to 9 feet, while the bed is elevated above the immediate level from 1½ to 8 feet, the greatest difference being along the western border, which is near the ship channel. The bottom consists of sand or sand and mud.

The bed is composed of dense, scattering, and very scattering growths, as shown in the following tables:

OYSTER GROWTH ON SILVIA BAR.

Character of oyster growth.	Area.	Oysters per acre.			Estimated content of oysters.
		Under 3 inches.	Over 3 inches.	Total.	
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense	57	136	337	473	26,961
Scattering	4	165	104	269	1,076
Very scattering	8	4	67	71	568
Total	69				28,605

DETAILS OF EXAMINATION OF SILVIA BAR.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
77	Jan. 23	7.5	1.55	20.0	13.5	20.0	4	285	463	748	Dense.
78	...do	9.0	1.55	5.1	13.9	22.5	17	161	520	681	Do.
79	...do	8.5	1.55	2.9	3.8	4.5	4	57	104	161	Do.
80	...do	3.5	2.70	6.3	5.9	8.1	25	104	187	291	Do.
81	...do	6.0	1.75	3.4	17.3	20.6	30	176	475	651	Do.
372	Feb. 11	8.0	2.04	1.4	3.9	11.7	10	33	270	303	Do.
91	Jan. 23	7.0	1.55	9.7	9.7	4.5	24	165	104	269	Scattering.
371	Feb. 11	10.0	2.04	1.4	0.5	2.9	5	4	67	71	Very scattering.

The oysters of this bar occur in clusters of rather good shape, excepting a few of the raccoon or scissor-bill type on the top of the bar. Some algæ, a few mussels, barnacles, *Martesia*, and coral were observed at nearly all of the stations. The oysters, on the day of the examination, were generally of good flavor and fat, more especially on the western and southwestern limits of the bed.

3. DRUM BAR.

This bar may be considered as the southward extension of Silvia Bar, with which it is connected. It forms a somewhat irregular half circle in outline. The depth of water on the bed varies from 2½ to 9 feet. The elevation above the surrounding bottoms is from 1 to 3 feet. The dimensions are approximately 1 mile in length by 350 yards in width. The area is 111 acres, of which about 73 per cent supports dense growth, the remainder being depleted. The bottom is generally hard, excepting along the southern border, where it is composed of mud or mud and sand. The extent and general condition of the bed are shown in the following tables:

OYSTER GROWTH ON DRUM BAR.

Character of oyster growth.	Area.	Oysters per acre.			Estimated content of oysters.
		Under 3 inches.	Over 3 inches.	Total.	
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense	81	108	336	444	35,904
Depleted	30	32	12	44	1,320
Total	111				37,284

DETAILS OF EXAMINATION OF DRUM BAR.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
68	Jan. 23	5.0	2.00	1.5	9.5	20.0	13	81	462	543	Dense.
73	..do..	9.0	1.55	9.3	11.9	33.1	54	180	774	954	Do.
76	..do..	9.5	1.55	8.7	8.1	6.8	12	143	157	300	Do.
84	..do..	7.5	1.55	1.9	14.8	9.0	10	142	208	350	Do.
85	..do..	8.0	1.55	2.6	4.5	5.1	8	60	118	178	Do.
86	..do..	5.0	2.00	1.5	13.0	11.5	28	123	265	388	Do.
366	Feb. 11	8.0	2.04	2.5	10.8	23.1	15	92	533	625	Do.
367	..do..	6.5	2.12	5.6	10.4	10.8	9	88	250	338	Do.
368	..do..	5.0	2.55	.4	16.1	21.2	21	137	490	627	Do.
369	..do..	5.5	2.38	1.2	3.4	4.6	9	29	106	135	Do.
74	Jan. 23	11.0	1.55	0	7.5	0	4	64	0	64	Depleted.
370	Feb. 11	7.0	2.04	0	0	1.0	3	0	23	23	Do.

The oysters are found in large irregular clusters with sharp edges, but occasionally they are taken as singles. On the upper half of the bar they are of rather good quality, but on the lower portion they are inclined to be watery and in poor condition, more particularly on the softer bottoms, where they are but seldom fished. A number of barnacles, mussels, and an extensive growth of algæ were observed on the oysters.

4. SAND FLAT.

This beach bed is situated off Shell Point of St. George Island and is south of Drum Bar and separated from it by a narrow channel having a depth of 5 to 7 feet. It measures about one-half mile in length by one-eighth mile in width and has an area of 40 acres. The depth of water ranges from 1½ to 5 feet. The bottom is hard firm sand. The northern rim of the bed is about 2 feet above the adjacent bottoms, while the southern portion becomes gradually shallower to the water's edge. The tables given herewith present in outline the general conditions on this bed:

OYSTER GROWTH ON SAND FLAT.

Character of oyster growth.	Area.	Oysters per acre. Under 3 inches.	Over 3 inches.	Total.	Estimated content of oysters.
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense	20	77	231	308	6,160
Scattering	20	77	115	192	3,840
Total	40				10,000

DETAILS OF EXAMINATION OF SAND FLAT.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard. Spat.	Culls.	Counts.	Shells per square yard.	Estimated quantity oysters per acre. Seed.	Market.	Total.	Character of oyster growth.
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
83	Jan. 23	5.0	2.00	0	9.0	10.0	2	77	231	308	Dense.
75	...do....	4.5	2.23	1.4	7.7	5.0	12	77	115	192	Scattering.

The northeastern half of the bar supports dense growth of oysters, the remaining portion being scattering. Practically no fishing is carried on at this place, as beach oysters usually lack flavor and fatness. No doubt the character of the mollusks would be improved if the clusters were broken up and culled. Some mussels, barnacles, and marine algæ were found growing on the oysters.

5. PELICAN BAR.

This bar is located about three-eighths mile north of Goose Island and, exclusive of the eastern projection, is somewhat rudely circular in outline. The depth of water is from 1½ to 5½ feet, the greatest depth being along the western margin. The bar extends in an east-and-west direction for five-eighths mile and averages about one-fourth mile in width. It has an area of 97 acres. The entire bed is fairly well raised above the neighboring bottoms from ½ to 3½ feet. The following tables show the data obtained from this bed:

OYSTER GROWTH ON PELICAN BAR.

Character of oyster growth.	Area.	Oysters per acre. Under 3 inches.	Over 3 inches.	Total.	Estimated content of oysters.
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense	69	97	453	550	37,950
Scattering	17	106	130	236	4,012
Very scattering	6	30	46	76	456
Depleted	5	19	21	40	200
Total	97				42,618

DETAILS OF EXAMINATION OF PELICAN BAR.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
59	Jan. 23	3.0	2.95	0	1.7	22.7	1	14	524	538	Dense.
60	..do..	5.0	2.00	0.5	8.0	23.0	15	72	531	603	Do.
61	..do..	4.5	2.23	0	3.1	23.1	7	26	533	559	Do.
62	..do..	5.0	2.00	.5	16.5	25.0	25	145	577	722	Do.
89	..do..	6.0	1.75	0	6.8	6.8	14	58	157	215	Do.
90	..do..	7.5	1.55	3.2	25.8	22.6	20	246	522	768	Do.
108	Jan. 25	3.0	2.95	.3	13.9	14.3	3	118	330	448	Do.
88	Jan. 23	6.0	1.75	6.8	12.0	5.7	9	160	132	292	Scattering.
107	Jan. 25	5.0	2.00	1.0	6.0	5.5	5	51	127	178	Do.
42	Jan. 21	5.0	2.00	.5	3.0	2.0	2	30	46	76	Very scattering.
58	Jan. 23	4.5	2.23	5.3	2.2	.9	9	19	21	40	Depleted.

The greater part of the bar has dense growth of oysters, a portion of the southern and western borders has scattering growth, while to the eastward very scattering and depleted areas are found. The oysters occur in rather large clusters and, as a rule, are only of fair quality. The bed is not extensively fished, although some factory stock is taken. Mussels and barnacles were not excessive, but some of our stations revealed an extra heavy growth of algæ.

6. NORTH LUMP.

This small patch of 10 acres is situated about 600 yards due north of Pelican Bar and a short distance south of the center of the sound. It is cordate, or trilobe, in form, measuring about 300 yards in length and 160 yards in width. At mean low water the depth is from 4 to 11 feet, the greatest depth being on the south and west central portions. The adjoining bottoms, which are composed of soft to stiff mud, have a depth of 11 to 14 feet. The following tables show the area of the different growths and details of examination of this bed:

OYSTER GROWTH ON NORTH LUMP.

Character of oyster growth.	Area.	Oysters per acre.			Estimated content of oysters.
		Under 3 inches.	Over 3 inches.	Total.	
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Scattering	5	81	145	226	1,130
Depleted	5	7	....	7	35
Total	10	....	....	....	1,165

DETAILS OF EXAMINATION OF NORTH LUMP.

Station.	Date of examination.	Depth. of water.	Area. covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
111.....	Jan. 25	11.5	1.55	1.3	10.9	7.1	1	93	164	257	Scattering.
116.....	...do....	6.0	1.75	0	9.1	8.0	2	77	185	262	Do.
110.....	...do....	5.0	2.00	2.0	11.0	5.5	4	93	127	220	Do.
112.....	...do....	7.5	1.55	0	7.1	4.5	15	60	104	164	Do.
109.....	...do....	9.0	1.55	0	2.6	0	13	22	0	22	Depleted.
113.....	...do....	a 12.0	......	......	......	......	......	......	......	......	Do.
114.....	...do....	8.0	1.55	0	.6	0	20	5	0	5	Do.
115.....	...do....	a 13.5	......	......	......	......	......	......	......	......	Do.

a Hard bottom.

The oysters are in sharp-edged clusters of good shape, and when examined were in good condition and flavor, but fresh. It was stated that two men could tong 20 barrels in one and one-half days.

7. GREEN POINT BAR AND ADJACENT PATCH.

Green Point Bar is situated about 1½ miles off the main shore of the sound and about the same distance north of North Lump. Its dimensions are about five-eighths mile in length by one-eighth mile in width. Including the adjacent patch 300 yards to the north, the area is approximately 57 acres. The bar is well raised above the contiguous bottoms and has a depth of 3 to 5½ feet at mean low water. The upper limits of the bar have very scattering growth, the central portion is dense, while the lower third has dense, scattering, and depleted areas. The small patch has very scattering growth and depleted bottoms.

The oysters occur in small clusters or singles of fair shape, and when examined were fat, of good flavor, but fresh. Red and green algæ and *Martesia* were noted. The bed is fished for raw stock, but not extensively.

The general conditions on the bar and patch are shown in the following tables:

OYSTER GROWTH ON GREEN POINT BAR AND ADJACENT PATCH.

Character of oyster growth.	Area.	Oysters per acre.			Estimated content of oysters.
		Under 3 inches.	Over 3 inches.	Total.	
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense..........	21	106	194	300	6,300
Scattering..........	9	24	132	156	1,404
Very scattering..........	17	21	67	88	1,496
Depleted..........	10	21	20	41	410
Total..........	57	....	....	....	9,610

DETAILS OF EXAMINATION OF GREEN POINT BAR AND ADJACENT PATCH.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
96	Jan. 25	6.5	1.62	10.3	9.7	7.9	16	170	183	353	Dense.
98	..do..	5.0	2.00	5.5	5.0	8.0	36	89	185	274	Do.
99	..do..	4.0	2.46	2.4	4.4	9.3	6	58	215	273	Do.
97	..do..	4.0	2.46	1.6	1.2	5.7	10	24	132	156	Scattering.
35	Jan. 21	6.0	1.75	0	2.3	3.1	18	19	72	91	Very scattering.
101	Jan. 25	7.0	1.55	5.7	2.7	2.7	8	23	62	85	Do.
29	Jan. 21	8.0	......	......	......	......	......	......	......	......	Depleted.
30	..do..	6.0	......	......	......	......	......	......	......	......	Do.
31	..do..	7.0	......	......	......	......	......	......	......	......	Do.
46	Jan. 23	6.0	1.75	1.1	1.1	1.7	5	19	39	58	Do.
95	Jan. 25	8.0	1.55	1.3	1.3	0	4	22	0	......	Do.

8. PLATFORM BAR.

This long narrow bar is located a little south of the center of the sound, and extends from Porter Light west by north for three-quarters of its length, thence the trend is due north. Its dimensions are, approximately, 2¼ miles in length by one-fourth mile in width. Its area is about 339 acres. The bar has a depth of water ranging from 3 to 7 feet and is elevated above the contiguous bottoms from 1 to 20 feet, the greatest difference abutting the channel in the vicinity of the light at the eastern extremity. The bottom is generally firm and consists of mud and sand, although the margins are occasionally found to be rather soft. Over 60 biological stations were made, the results of which are given in the following tables:

OYSTER GROWTH ON PLATFORM BAR.

Character of oyster growth.	Area.	Oysters per acre.			Estimated content of oysters.
		Under 3 inches.	Over 3 inches.	Total.	
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense	332	111	671	782	259,624
Very scattering	5	0	18	18	90
Depleted	2	0	0	0	0
Total	339	....	....	....	259,714

DETAILS OF EXAMINATION OF PLATFORM BAR.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
70	Jan. 23	5.0	2.00	1.5	11.5	11.0	46	111	254	365	Dense.
71	...do...	5.0	2.00	1.0	11.5	5.5	46	107	127	234	Do.
173	Jan. 28	7.0	2.04	0	12.8	31.9	3	109	736	854	Do.
174	...do...	6.0	2.21	0	9.9	19.9	4	84	460	544	Do.
175	...do...	5.0	2.55	8.6	22.7	37.7	3	193	856	1,049	Do.
177	Jan. 30	7.5	2.04	0	39.8	34.4	6	338	786	1,124	Do.
184	...do...	3.0	3.65	0	11.8	15.6	7	100	360	460	Do.
185	...do...	4.0	3.05	0	5.5	18.0	8	47	415	462	Do.
186	...do...	5.0	2.55	.8	22.3	33.4	4	189	773	962	Do.
187	...do...	6.0	2.21	2.7	20.4	39.9	7	173	922	1,095	Do.
199	...do...	6.0	2.21	1.8	15.4	29.4	7	131	679	810	Do.
200	...do...	5.0	2.55	.8	12.2	26.8	8	104	618	722	Do.
201	...do...	5.0	2.55	.4	21.2	30.9	7	180	714	894	Do.
202	...do...	5.0	2.55	0	11.8	22.4	8	100	515	615	Do.
204	...do...	4.0	3.05	0	11.8	11.4	5	100	332	432	Do.
205	...do...	4.5	2.75	3.3	16.0	60.7	15	136	1,402	1,538	Do.
206	...do...	6.5	2.12	2.9	8.1	25.2	5	69	582	651	Do.
207	...do...	7.0	2.04	0	13.7	27.0	3	116	624	740	Do.
208	...do...	8.0	2.04	0	3.9	2.9	2	33	67	100	Do.
209	...do...	8.5	2.04	0	14.7	13.2	5	125	305	430	Do.
210	...do...	6.5	2.12	0	21.4	41.5	4	182	959	1,141	Do.
218	Feb. 2	9.0	2.04	0	13.8	17.2	1	117	397	514	Do.
219	...do...	9.0	2.04	.5	3.9	8.8	5	33	203	236	Do.
220	...do...	7.0	2.04	2.9	14.7	25.5	7	125	589	714	Do.
221	...do...	5.0	2.55	.4	15.3	14.5	5	130	335	465	Do.
222	...do...	3.5	3.35	4.5	16.1	21.5	6	137	496	633	Do.
223	...do...	5.5	2.38	1.3	19.7	34.0	2	167	785	952	Do.
224	...do...	5.0	2.55	.8	22.7	35.3	13	193	816	1,009	Do.
225	...do...	5.0	2.55	0	31.3	64.2	6	266	1,483	1,749	Do.
226	...do...	5.0	2.55	1.6	13.3	21.2	7	118	564	682	Do.
374	Feb. 11	5.0	2.55	0	3.1	9.4	7	26	217	243	Do.
375	...do...	5.0	2.55	0	17.2	32.2	12	146	744	890	Do.
377	...do...	6.0	2.21	0	21.2	58.7	7	180	1,355	1,535	Do.
378	...do...	5.5	2.38	0	16.4	56.3	10	139	1,301	1,440	Do.
379	...do...	4.5	2.80	0	10.7	33.2	8	91	766	857	Do.
380	...do...	6.5	2.12	0	14.2	44.3	6	121	1,025	1,046	Do.
381	...do...	5.5	2.38	.4	10.9	37.4	6	94	864	958	Do.
382	...do...	5.0	2.55	0	10.2	27.4	10	87	634	721	Do.
383	...do...	4.0	3.05	0	6.2	14.4	8	53	332	385	Do.
384	...do...	5.0	2.55	0	14.5	23.2	30	123	535	658	Do.
385	...do...	7.0	2.04	0	23.1	66.7	8	196	1,541	1,737	Do.
386	...do...	6.0	2.21	0	10.0	31.2	9	85	721	806	Do.
387	...do...	4.0	3.05	0	10.7	14.4	11	91	332	423	Do.
388	...do...	4.0	3.05	0	7.2	27.8	6	61	642	703	Do.
389	...do...	6.0	2.21	.9	13.1	44.3	9	111	1,025	1,136	Do.
392	...do...	8.0	2.04	0	6.4	29.4	5	54	680	734	Do.
393	...do...	7.0	2.04	0	7.3	35.8	6	62	827	889	Do.
394	...do...	4.5	2.80	0	10.7	33.5	6	91	774	865	Do.
395	...do...	4.5	2.80	0	11.0	29.6	7	93	684	777	Do.
396	...do...	4.5	2.80	0	12.1	18.2	6	103	420	523	Do.
397	...do...	5.0	2.55	0	15.3	41.6	7	130	962	1,092	Do.
398	...do...	5.0	2.55	0	16.8	40.3	12	143	925	1,068	Do.
399	...do...	8.5	(a)	0	......	......	......	......	......	......	Do.
401	...do...	4.5	2.80	0	10.7	39.3	3	91	907	998	Do.
402	...do...	6.0	2.21	0	9.5	26.2	6	81	605	686	Do.
403	...do...	7.0	2.04	0	7.3	21.1	11	62	486	548	Do.
405	...do...	5.0	2.55	1.2	6.7	25.5	10	57	581	638	Do.
406	...do...	5.0	2.55	0	19.6	58.8	10	167	1,358	1,525	Do.
407	...do...	7.0	2.04	.5	9.8	43.6	4	83	1,008	1,091	Do.
408	...do...	7.0	2.04	2.5	10.8	45.1	16	92	1,040	1,132	Do.
409	...do...	9.0	2.04	0	4.4	28.4	3	37	655	692	Do.
400	...do...	8.0	2.04	0	0	3.4	1	0	78	78	Do.
404	...do...	9.0	2.04	0	0	4.4	2	0	101	101	Do.
390	...do...	8.0	2.04	0	0	1.5	2	0	35	35	Very scattering.
391	...do...	9.0	(b)	......	......	......	......	......	......	......	Do.
376	...do...	9.5	(a)	......	......	......	......	......	......	......	Depleted.

a Hard bottom.

b Hard mud and sand.

The entire bar, with the exception of two small tracts totaling 7 acres and a mud hole of about 5 acres northwest of the light, supports dense growth of oysters. For the most part, the oysters occur in large, irregular clusters, and are inclined to be flattish and, at times, of the scissor-bill type. The quality varies from poor to fair, and during the examination they were fresh and rather watery. It appears that the bed is not worked enough to break up the clusters to obtain the best results. The fishery is pursued chiefly for steam stock. The daily yield is from 15 to 25 tubs for two men; price, about 35 cents per tub. Mussels and barnacles were not plentiful, but on some of the stations an abundance of algæ occurred on the clusters. One rather large drill was found, but no injured oysters having drill holes were observed.

9. PORTER BAR.

This fine bed, slightly more than 1 mile north of Platform Bar, consists of a tonguelike projection, which, from its origin of a skirting of oysters along the main shore, reaches in a southeasterly direction for a distance of 2¼ miles. It is about 320 yards wide and has an area of 260 acres. The depth of water is from 2 to 6 feet, while the adjoining grounds are from 2 to 7 feet deeper. The bed is, therefore, well elevated, and, as the tide ebbs and flows almost at right angles to its length, the oysters are generally kept clean and are furnished with an abundance of food material. The bar has a firm foundation and for the most part is sand or gravel, although some of our stations revealed considerable mud. The following tables indicate its area and distribution of oyster growth:

OYSTER GROWTH ON PORTER BAR.

Character of oyster growth.	Area.	Oysters per acre.			Estimated content of oysters.
		Under 3 inches.	Over 3 inches.	Total.	
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense	114	94	248	342	38,988
Scattering	9	53	114	167	1,503
Very scattering	25	12	47	59	1,475
Depleted	112	27	25	52	5,824
Total	260				47,790

DETAILS OF EXAMINATION OF PORTER BAR.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
117....	Jan. 25	8.5	1.56	0	5.1	9.0	1	43	208	251	Dense.
118....	...do....	6.0	1.75	0	20.6	12.6	7	175	291	466	Do.
119....	...do....	8.5	1.55	0	3.8	4.5	10	32	104	136	Do.
120....	...do....	7.0	1.55	7.6	15.9	10.8	20	135	249	384	Do.
124....	...do....	4.5	2.23	1.8	10.8	7.1	3	92	164	256	Do.
127....	...do....	6.5	1.62	3.2	5.3	10.7	6	45	247	292	Do.
128....	...do....	6.0	1.75	4.0	10.8	18.8	4	92	434	526	Do.
131....	...do....	5.5	1.87	.5	11.2	14.9	4	95	344	439	Do.
132....	...do....	3.5	2.70	2.9	6.3	6.7	10	54	154	208	Do.
134....	...do....	6.5	1.62	6.6	7.3	13.9	4	62	321	383	Do.
135....	...do....	4.5	2.23	2.6	11.5	9.3	5	98	215	313	Do.
140....	...do....	5.5	1.87	8.0	19.8	9.1	14	168	210	378	Do.
142....	...do....	6.0	1.75	9.1	16.0	12.0	3	136	277	413	Do.
123....	...do....	6.5	1.62	1.8	9.7	4.3	11	82	99	181	Scattering.
125....	...do....	7.0	1.55	1.9	6.4	5.7	3	54	132	186	Do.
143....	...do....	4.5	2.23	2.6	2.6	4.8	3	22	111	133	Do.
121....	...do....	6.5	1.62	0	1.8	2.4	9	9	55	64	Very scattering.
122....	...do....	9.0	1.55	1.9	1.3	1.9	7	9	44	53	Do.
133 [a]...	...do....	7.5	1.55	0	1.3	1.3	1	9	30	39	Do.
141....	...do....	4.5	2.23	3.5	2.2	2.6	9	19	60	79	Do.
129....	Jan. 25	8.0	1.55	0	1.4	0	3	12	0	12	Depleted.
130....	...do....	5.0	2.00	2.5	2.0	1.0	3	17	23	40	Do.
137....	...do....	7.5	1.55	5.7	3.1	1.9	3	26	25	51	Do.
138....	...do....	7.0	1.55	4.4	1.9	1.3	2	16	24	40	Do.
139....	...do....	5.5	1.87	.5	.5	1.6	6	4	25	29	Do.
144....	...do....	3.5	2.70	3.3	5.8	1.8	12	49	25	74	Do.
166....	Jan. 28	4.0	3.05	4.9	7.5	1.6	6	64	25	89	Do.
167....	...do....	3.0	3.65	.3	3.3	2.5	3	28	58	86	Do.

[a] Off edge of bar.

The dense and depleted areas occupy about 43 per cent each of the entire bar, the remaining portions being populated by scattering or very scattering growth. The oysters, which occur both in clusters and as singles, are of good shape and size. At the time of the investigation they were fat, of good quality, and in demand. They hold their flavor after being shucked, command a higher price per tub than the product of the neighboring beds, and are considered to be the best grade in St. George Sound. From three to five schooners were engaged in the industry on this bar. But very few mussels, barnacles, or coral were noted, although there was some algæ along the inner limits of the bar.

The shape of this bed and its position in the sound subject it adversely, more than otherwise would happen, to the occasional violent storms and render it liable to almost complete destruction. Conditions of this kind have occurred, and it required some years to reestablish its former productiveness.

10. PEANUT PATCH.

From its union with the southeastern extremity of Cat Point Bar this patch has a due east course for 1 mile, with an average breadth of about 330 yards and an area of 123 acres. In outline it bears a crude resemblance to a peanut. The depth of water is from 4½ to 7 feet and averages about 6 feet. The connecting grounds on the north side are about 1 foot below the bed, but on the south side, being near the channel, they are 3 or 4 feet deeper. The bottom consists mostly of mud. The patch is composed entirely of dense growth, as shown in the following tables:

OYSTER GROWTH ON PEANUT PATCH.

Character of oyster growth.	Area.	Oysters per acre.			Estimated content of oysters.
		Under 3 inches.	Over 3 inches.	Total.	
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense	123	140	547	687	84,501

DETAILS OF EXAMINATION OF PEANUT PATCH.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
241	Feb. 3	6.0	2.21	0	13.6	14.9	4	121	396	517	Dense.
242	...do...	6.0	2.21	0	18.5	15.8	5	165	420	585	Do.
250	...do...	6.0	2.21	0	22.6	19.0	7	169	506	675	Do.
251	...do...	5.5	2.38	.8	10.5	10.5	4	93	279	372	Do.
260	...do...	7.0	2.04	0	8.8	12.3	2	78	327	405	Do.
261	...do...	6.0	2.21	1.4	9.9	26.2	1	88	696	784	Do.
268	...do...	6.0	2.21	0	13.1	10.4	9	116	277	393	Do.
269	...do...	6.0	2.21	2.3	18.5	22.2	5	165	591	756	Do.
270	...do...	6.0	2.21	.9	30.3	22.2	8	260	591	851	Do.
271	...do...	6.5	2.12	.9	30.6	19.8	10	262	526	788	Do.
457	Feb. 15	7.0	2.04	0	16.2	34.3	10	138	792	930	Do.
458	...do...	7.5	2.04	1.5	16.2	52.4	2	144	1,394	1,538	Do.
459	...do...	8.0	2.04	0	6.9	20.1	6	61	535	596	Do.
494	Feb. 17	7.0	2.04	0	2.0	6.4	0	18	170	188	Do.
495	...do...	7.0	2.04	0	25.0	26.7	0	222	710	932	Do.

The oysters were found mostly in clusters, although some singles were noted. A number of the stations, especially on the eastern half of the bed, showed rather a large percentage of the raccoon or scissor-bill type. On the days of the examination the oysters varied in quality from poor to good, the better grades being on the central and west portions of the bed. They are used largely for steam stock. Barnacles, mussels, coral, and *Martesia* were observed at nearly all of the stations, but in small quantities.

11. CAT POINT BAR.

It may be said that this large, productive bar has its origin in a broad skirting of dense growth along the north shore at Cat Point and spreads southward to the dredged channel or cut-in line of beacons B. C. F. and B. C. R. The channel is recognized as an arbitrary line of demarcation. The bed, however, extends entirely across the sound to St. George Island, a distance of about 4 miles.

The eastern boundary is practically a straight line running in a south-southeast direction to Peanut Patch. The western boundary is indented and very irregular and has two rather prominent projections and two corresponding inlets or bays. It has a length of about 2 miles, an average width of five-eighths mile, and an area of 794 acres. The depth of water ranges from 3 to 7 feet, the greater depth being along the east and west terminations. Through the center of the bed there is a rather broad north and south ridge, which slopes both to the east and west. The marginal elevations are from 1 to 2 feet above the adjacent regions. The bottom is firm and in good condition, excepting that the east and west borders are inclined to be soft or muddy.

The present limits of the bed have not changed greatly since the survey made 20 years ago. It appears, however, that there has been a gradual shifting to the westward and that the western border has become more irregular and indented. The width has remained nearly constant.

The greater part of the bar is covered by dense growth, within which are four patches of scattering growth and one small area of depleted bottom. The oysters are found mostly in rather small clusters and singles. Not many of the raccoon or scissor-bill type were observed. They vary in flavor from fair to good and fatten readily when the comparatively fresh and food-ladened water from East Bay flows over the bed.

The bar is extensively fished and has been a good producer. During the survey as many as 38 oyster schooners were engaged in the industry at one time. There were shipped daily to Carrabelle, Fla., from this and some of the bars to the eastward from 75 to 150 gallons of oysters. Out of 100 gallons of freshly shucked stock there was only about 1 quart of dark or discarded oysters of poor quality. No pink or yellow color was observed or reported from this bed. The oysters will yield about 1½ gallons per tub of 2.2 standard bushels.

There were many mussels and barnacles and some *Martesia* in the old shells. Algæ were found on the clusters near shore.

The following tables show the area and distribution of oyster growth:

OYSTER GROWTH ON CAT POINT BAR.

Character of oyster growth.	Area.	Oysters per acre.			Estimated content of oysters.
		Under 3 inches.	Over 3 inches.	Total.	
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense	686	78	473	551	377,986
Scattering	102	40	114	154	15,708
Depleted	6	63	21	84	504
Total	794				394,198

DETAILS OF EXAMINATION OF CAT POINT BAR.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	Feet.	Sq. yds.					Bush.	Bush.	Bush.	
276	Feb. 3	3.5	3.35	2.7	8.9	7.1	3	79	189	268	Dense.
277	...do	3.5	3.35	2.8	9.2	8.1	3	82	216	298	Do.
278	...do	3.5	3.35	2.4	16.1	12.5	5	143	332	475	Do.
279	...do	7.0	2.04	0	7.3	10.3	5	65	274	339	Do.
281	...do	6.5	2.12	0	11.3	17.5	9	101	465	566	Do.
282	...do	7.0	2.04	.9	13.7	20.6	3	122	547	669	Do.
283	...do	6.0	2.21	.9	19.9	33.9	12	177	902	1,079	Do.
297	...do	7.0	2.04	0	2.5	26.5	5	22	705	727	Do.
298	...do	4.5	2.80	1.8	11.8	15.7	4	105	417	522	Do.
300	...do	5.5	2.38	.4	5.5	22.3	7	45	593	638	Do.
301	Feb. 4	4.5	2.80	1.1	17.5	21.1	9	156	561	717	Do.
324	Feb. 9	7.0	2.04	1.5	2.0	17.2	14	18	457	475	Do.
363	Feb. 10	4.0	3.05	0	4.3	11.1	2	38	295	333	Do.
365	...do	5.0	2.55	0	20.4	21.6	15	182	574	756	Do.
410	Feb. 12	4.5	2.80	0	17.2	38.2	6	153	1,002	1,155	Do.
411	...do	6.0	2.21	0	11.3	19.9	5	101	529	630	Do.
412	...do	5.0	2.55	0	2.7	9.4	6	24	250	274	Do.
413	...do	5.0	2.50	0	6.3	13.3	6	56	354	410	Do.
417	Feb. 15	8.0	2.04	0	2.5	11.3	7	22	300	322	Do.
418	...do	4.5	2.80	0	6.8	7.5	11	60	200	260	Do.
419	...do	4.0	3.05	.3	9.8	23.6	4	87	628	715	Do.
421	...do	8.0	2.04	0	4.4	23.5	8	39	625	664	Do.
422	...do	8.0	2.04	0	6.9	24.5	1	61	652	713	Do.
423	...do	7.0	2.04	0	6.9	31.4	5	61	835	896	Do.
424	...do	5.0	2.55	0	5.9	16.5	2	52	439	491	Do.
425	...do	5.0	2.55	0	11.4	33.7	5	102	897	999	Do.
426	...do	5.0	2.55	0	13.3	18.1	8	118	482	600	Do.
427	...do	5.0	2.55	0	16.5	16.5	7	147	439	586	Do.
429	...do	8.5	2.04	0	10.3	13.7	4	92	364	456	Do.
431	...do	5.0	2.55	0	7.1	16.1	3	63	428	491	Do.
433	...do	6.0	2.21	0	3.6	15.4	3	32	409	441	Do.
434	...do	8.0	2.04	0	11.8	15.2	2	105	404	509	Do.
435	...do	7.0	2.04	2.0	14.2	22.6	1	126	601	727	Do.
436	...do	5.0	2.55	0	5.5	23.6	4	49	628	677	Do.
437	...do	4.0	3.05	0	18.7	30.2	9	165	804	969	Do.
438	...do	4.0	3.05	0	11.8	24.9	4	105	662	767	Do.
449	...do	5.5	2.38	0	8.8	20.6	3	78	548	626	Do.
450	...do	7.0	2.04	0	16.7	44.6	4	149	1,186	1,335	Do.
467	Feb. 16	9.0	2.04	0	7.2	19.1	2	64	192	256	Do.
468	...do	5.5	2.38	.4	6.7	10.1	0	60	268	328	Do.
470	...do	5.0	2.55	.8	15.7	16.1	2	140	428	568	Do.
471	...do	5.0	2.55	.8	12.9	12.5	4	115	332	447	Do.
472	...do	7.0	2.04	2.4	6.4	15.7	0	57	417	474	Do.
473	...do	8.0	2.04	.5	3.4	9.3	0	30	238	268	Do.
475	...do	8.0	2.04	1.0	5.4	15.7	1	48	417	465	Do.
476	...do	8.0	2.04	0	6.9	13.7	1	61	364	425	Do.
477	...do	5.0	2.55	0	6.3	14.5	1	56	386	442	Do.
478	...do	5.0	2.55	0	1.2	10.9	2	11	290	301	Do.
479	...do	5.0	2.55	2.7	3.9	5.9	0	35	157	192	Do.
480	...do	6.0	2.21	0	6.8	21.7	2	61	576	637	Do.
481	...do	8.5	2.04	0	6.4	12.8	1	57	340	397	Do.
482	...do	8.0	2.04	0	4.9	11.3	3	43	301	344	Do.
485	...do	7.5	2.04	1.0	2.5	16.2	3	22	431	453	Do.
488	...do	8.0	2.04	2.0	3.9	14.7	0	35	391	426	Do.
491	...do	8.0	2.04	0	1.0	10.8	0	9	287	296	Do.
493	...do	4.5	2.38	1.8	8.9	18.6	3	79	495	574	Do.
275	Feb. 3	3.0	3.65	.8	3.1	4.1	1	28	109	137	Scattering.
280	...do	6.0	2.21	0	3.2	4.5	2	28	119	147	Do.
296	Feb. 4	6.5	2.12	0	5.5	4.2	1	4	112	116	Do.
299	...do	5.0	2.55	0	1.2	3.9	8	11	104	115	Do.
364	Feb. 10	7.0	2.04	0	4.4	3.9	10	39	104	143	Do.
414	Feb. 12	5.0	2.55	.4	3.5	5.1	4	31	136	167	Do.
415	...do	6.0	2.21	0	2.7	5.4	3	24	144	168	Do.
420	Feb. 15	4.5	2.80	0	2.8	4.6	4	25	122	147	Do.
428	...do	8.0	2.04	0	2.9	2.9	2	26	77	103	Do.
430	...do	6.0	2.21	0	6.3	5.4	6	56	143	199	Do.
469	Feb. 16	5.0	2.55	1.2	3.5	3.1	2	31	82	113	Do.
486	...do	5.5	2.38	1.3	2.5	4.6	0	22	122	144	Do.
487	...do	5.0	2.55	2.4	7.1	5.1	1	63	136	199	Do.
489	...do	8.0	2.04	1.5	10.8	5.4	0	96	144	240	Do.
490	...do	6.0	2.21	0	1.8	2.3	0	16	61	77	Do.
492	...do	6.0	2.21	0	15.4	4.1	10	137	109	246	Do.
432	Feb. 15	5.0	2.55	0	7.1	.8	5	63	21	84	Depleted.

12. BULKHEAD AND EAST HOLE BARS.

These two large, continuous reefs may, for the purposes of this discussion, be designated as one body. They lie in a broad, but gradually narrowing, band reaching in a southeast direction from the dredged channel or cut, immediately south of Cat Point Bar, to St. George Island. The bars have a length of nearly 3 miles, an average width of about three-fourths mile, and an approximate area of 1,379 acres. The northernmost portion is locally denominated Bulkhead Bar, the remaining part East Hole Bar. There appears to be no distinct line of separation between the beds, but there is a difference in the quality of the stock.

With the exception of a projection on the extreme west border and an indentation or bay at the southeast corner the outlines of the beds are fairly straight. The depth of water (mean low level) is from 5½ to 9 feet on the upper part and from 1½ to 5½ feet on the lower. The bottoms are composed of mud, or mud and sand, with some shell, and are raised above the adjacent territory from 1 to 5 feet. The beds appear to have progressed slightly westward during the last 20 years.

About 95 per cent of the total area of the beds has dense growth. The remaining portion, consisting of 57 acres situated off St. George Island, has scattering or very scattering growths and depleted bottoms. The oysters occur in clusters and as singles, generally of good shape, although at several stations the clustered raccoon type predominated, particularly on the denser and unworked areas. At the time of the examination the quality of the material varied from poor to good, the better grades being found along the upper and central parts of East Hole Bar. Mussels and barnacles were plentiful at several stations. Algæ were abundant especially near the south shore.

But very little oystering was being pursued on Bulkhead Bar during the survey. It was stated that the product from this bed is used more particularly for steam stock. It appears that this bar would be improved by more extensive fishing. From six to eight boats were engaged in the fishery on east Hole Bar and were obtaining a good yield and satisfactory prices.

More than 90 biological stations were made on these bars. The areas, details of examination, and other data are given in the following tables:

Oyster Growth on Bulkhead and East Hole Bars.

Character of oyster growth.	Area.	Oysters per acre.			Estimated content of oysters.
		Under 3 inches.	Over 3 inches.	Total.	
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense	1,322	120	789	909	1,201,698
Scattering	12	58	112	170	2,040
Very scattering	30	39	53	92	2,760
Depleted	15	13	13	26	390
Total	1,379	....	....	....	1,206,888

Details of Examination of Bulkhead and East Hole Bars.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
302	Feb. 4	6.5	2.12	0	14.6	22.2	9	130	580	710	Dense.
303	...do...	10.0	2.04	2.9	8.8	18.6	9	78	495	573	Do.
304	...do...	7.5	2.04	2.4	15.2	43.2	3	135	1,148	1,283	Do.
305	...do...	11.0	......	......	......	......	......	......	......	......	Do.
306	...do...	8.0	2.04	2.0	11.8	15.2	2	105	404	509	Do.
307	...do...	8.5	2.04	0	10.8	14.7	7	96	391	487	Do.
309	...do...	9.5	2.04	.5	9.8	22.1	5	87	587	674	Do.
310	...do...	9.0	2.04	2.0	6.9	22.1	4	61	587	648	Do.
311	...do...	9.0	2.04	0	15.2	40.6	4	135	1,080	1,215	Do.
312	...do...	8.5	2.04	0	24.5	26.5	5	218	704	922	Do.
313	...do...	8.0	2.04	0	6.9	24.5	12	61	652	713	Do.
314	...do...	5.5	2.38	0	10.5	34.4	12	93	914	1,007	Do.
315	...do...	5.5	2.38	0	21.4	44.2	7	191	1,173	1,364	Do.
316	...do...	8.5	2.04	0	18.6	42.7	5	166	1,135	1,301	Do.
317	...do...	7.5	2.04	0	31.8	53.4	12	283	1,419	1,702	Do.
318	Feb. 9	8.0	2.04	0	19.1	20.6	16	170	547	717	Do.
319	...do...	8.0	2.04	0	18.1	26.9	17	161	715	876	Do.
321	...do...	7.0	2.04	3.9	26.0	47.5	16	232	1,263	1,495	Do.
322	...do...	5.0	2.55	0	18.1	23.6	10	161	626	787	Do.
323	...do...	6.0	2.21	0	3.6	9.1	6	32	242	274	Do.
326	...do...	8.5	2.04	0	8.8	14.2	4	78	378	456	Do.
327	...do...	6.5	2.12	0	13.7	31.6	9	122	841	963	Do.
328	...do...	5.0	2.55	.4	19.2	25.9	12	171	687	858	Do.
329	...do...	10.5	2.04	.5	10.8	16.7	16	96	444	540	Do.
330	...do...	6.5	2.12	0	11.3	17.9	8	101	476	577	Do.
331	...do...	5.0	2.55	0	14.5	27.5	8	129	732	861	Do.
332	...do...	5.0	2.55	0	18.8	46.7	12	167	1,242	1,409	Do.
333	...do...	4.5	2.80	0	13.2	33.6	7	117	884	1,001	Do.
336	...do...	5.5	2.38	1.3	15.9	35.7	9	141	950	1,091	Do.
337	...do...	5.0	2.55	0	6.3	18.0	8	56	479	535	Do.
338	...do...	6.5	2.12	0	15.1	48.6	13	134	1,292	1,426	Do.
339	...do...	6.5	2.12	1.4	25.4	42.8	14	226	1,140	1,366	Do.
340	...do...	6.5	2.12	0	10.8	33.0	13	96	878	974	Do.
346	...do...	10.0	2.04	0	3.9	18.6	7	35	494	529	Do.
347	...do...	7.0	2.04	0	12.2	22.6	12	109	601	710	Do.
348	...do...	7.0	2.04	1.0	13.2	70.2	12	117	1,865	1,982	Do.
349	...do...	7.0	2.04	0	19.6	24.5	13	175	652	827	Do.
439	Feb. 15	7.5	2.04	0	12.2	29.9	3	109	795	904	Do.
440	...do...	6.5	2.12	0	8.0	42.5	3	71	1,130	1,201	Do.
441	...do...	6.5	2.12	0	6.1	29.3	5	54	779	833	Do.
442	...do...	6.0	2.21	.9	6.8	19.9	6	61	529	590	Do.
443	...do...	7.0	2.04	1.5	14.7	20.6	5	131	547	678	Do.
444	...do...	6.0	2.21	0	7.7	10.0	5	669	266	335	Do.
445	...do...	6.5	2.12	0	14.2	21.7	8	126	577	706	Do.
446	...do...	6.5	2.12	1.9	28.8	52.4	11	256	1,391	1,647	Do.
447	...do...	7.5	2.04	.5	11.6	17.2	10	103	457	560	Do.
448	...do...	10.0	2.04	0	6.4	15.2	2	57	404	461	Do.
451	...do...	8.5	2.04	0	12.3	17.2	7	110	457	567	Do.
452	...do...	9.5	2.04	0	7.4	47.1	2	66	1,252	1,318	Do.
453	...do...	8.0	2.04	0	11.8	28.4	4	105	755	860	Do.
454	...do...	9.0	2.04	0	14.7	91.2	3	131	2,425	2,556	Do.
455	...do...	8.5	2.04	0	11.3	42.2	5	96	975	1,071	Do.
456	...do...	10.5	2.04	0	6.9	11.8	2	59	272	331	Do.

DETAILS OF EXAMINATION OF BULKHEAD AND EAST HOLE BARS—Continued.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
460....	Feb. 15	10.0	2.04	0	15.7	28.9	3	140	796	936	Dense.
461....	...do.....	9.0	2.04	0	9.3	26.0	3	83	691	774	Do.
462....	...do.....	7.0	2.04	3.4	17.7	75.4	7	155	1,995	2,150	Do.
463....	...do.....	7.5	2.04	0	9.3	36.8	3	83	979	1,062	Do.
464....	...do.....	7.0	2.04	0	14.2	31.4	4	126	835	961	Do.
465....	...do.....	8.0	2.04	0	16.2	62.2	5	144	1,655	1,799	Do.
466....	...do.....	10.0	2.04	0	12.7	15.7	8	113	417	530	Do.
496....	Feb. 17	9.5	2.04	0	10.3	15.2	0	92	405	497	Do.
497....	...do.....	8.0	2.04	0	18.6	29.4	0	165	782	947	Do.
498....	...do.....	6.5	2.12	0	10.4	17.9	0	93	476	569	Do.
499....	...do.....	6.0	2.21	1.8	14.5	27.6	0	129	735	864	Do.
500....	...do.....	5.5	2.38	0	10.5	18.5	0	93	492	585	Do.
501....	...do.....	6.0	2.21	0	12.7	36.2	0	113	964	1,077	Do.
502....	...do.....	5.0	2.55	0	5.1	15.7	0	45	418	463	Do.
503....	...do.....	5.0	2.55	0	11.4	28.2	0	102	751	853	Do.
504....	...do.....	7.0	2.04	2.0	3.9	31.4	0	35	836	871	Do.
505....	...do.....	9.0	2.04	0	12.7	32.8	1	113	874	987	Do.
506....	...do.....	10.0	2.04	0	8.3	31.9	1	74	849	923	Do.
507....	...do.....	6.0	2.21	0	5.4	39.8	1	48	1,059	1,107	Do.
508....	...do.....	5.0	2.55	0	13.7	44.7	0	122	1,189	1,311	Do.
509....	...do.....	5.5	2.38	0	6.3	33.6	1	56	894	950	Do.
510....	...do.....	6.0	2.21	0	10.0	25.8	3	89	686	775	Do.
511....	...do.....	6.5	2.12	0	9.0	35.8	0	80	953	1,033	Do.
512....	...do.....	6.0	2.21	0	17.6	41.2	0	156	1,095	1,251	Do.
513....	...do.....	5.0	2.55	0	8.6	26.3	1	76	700	776	Do.
514....	...do.....	10.0	2.04	2.5	12.3	18.2	1	109	484	593	Do.
515....	...do.....	9.0	2.04	0	21.1	53.5	1	188	1,442	1,630	Do.
516....	...do.....	6.0	2.21	0	14.9	17.6	3	132	468	600	Do.
517....	...do.....	5.5	2.38	0	8.4	20.6	1	75	548	623	Do.
519....	...do.....	4.0	3.05	0	10.5	9.5	2	93	252	345	Do.
520....	...do.....	8.0	2.04	0	12.3	24.1	3	109	641	750	Do.
521....	...do.....	10.0	2.04	.5	5.9	14.2	4	53	378	431	Do.
523....	...do.....	4.0	3.05	.6	8.8	15.9	4	78	423	501	Do.
525....	...do.....	6.0	2.21	0	21.3	34.9	1	189	930	1,119	Do.
526....	...do.....	6.5	2.12	0	17.4	25.4	4	155	675	830	Do.
522....	...do.....	3.5	3.35	0	6.6	4.2	5	58	112	170	Scattering.
286....	Feb. 3	2.0	4.50	1.8	4.4	2.0	2	39	53	92	Very scattering.
518....	Feb. 17	7.0	2.04	0	1.5	.5	0	13	13	26	Depleted.

13. PATCHES EAST OF BULKHEAD AND EAST HOLE BARS.

There is a small patch of 3 acres just offshore of St. George Island and about three-fourths mile east of Bulkhead Point. It has a depth of water of 3½ feet and a sandy bottom with but little or no elevation. The patch has dense growth of clustered oysters, on which were many mussels and both red and green algæ. The oysters were fresh and not in good condition at the time of the investigation.

Another patch of 2 acres is situated about five-eighths mile due north of Bulkhead Point. The bottom is composed of mud, sand, and shells and is practically on a level with the adjacent grounds. The depth of water is 9 feet. The oysters are found in clusters and consist mostly of the raccoon or scissor-bill type. About 12 per cent were dead. Mussels and barnacles were noted.

The following tables show the data obtained from these patches:

OYSTER GROWTH ON PATCHES EAST OF BULKHEAD AND EAST HOLE.

Character of oyster growth.	Area.	Oysters per acre.			Estimated content of oysters.
		Under 3 inches.	Over 3 inches.	Total.	
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense	5	109	288	397	1,985

DETAILS OF EXAMINATION OF PATCHES EAST OF BULKHEAD AND EAST HOLE BARS.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
265	Feb. 3	3.5	3.35	0	13.7	9.5	1	122	263	385	Dense.
287	...do.....	10.5	2.04	4.4	10.8	11.7	5	96	312	408	Do.

14. PELICAN BAR (APALACHICOLA BAY).

This bar or reef is situated in Apalachicola Bay about 1 mile west of East Hole and immediately north of Signal Wharf. From shore it extends northeastward for about one-half mile, thence turns west by north and follows this direction for 1 mile. It has an average width of a little over 500 yards and an area of 298 acres. The dense area, with the exception of a small patch on the western margin, occupies the central portion of the bed and is practically surrounded by very scattering growth or depleted bottoms. The depth of water is from one-half foot to 5½ feet on the bar, the limits of which are but slightly elevated above the adjoining grounds. The bottom is hard sand with some mud and shells.

During the last 20 years the bed has grown in all directions to about six times its former size. The increase is especially noticeable on the south and west.

The oysters were found in clusters of rather good shape and size, although some stations revealed a number of scissor-bills. The quality ranged from poor to good. The better grades, as a rule, were taken on the dense growth. At the time of the examination only one or two boats were tonging on the bar. Mussels, barnacles, and algæ were observed at several points.

The following tables exhibit the results of the examination of this bed:

OYSTER GROWTH ON PELICAN BAR.

Character of oyster growth.	Area.	Oysters per acre.			Estimated content of oysters.
		Under 3 inches.	Over 3 inches.	Total.	
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense	91	116	583	699	63,609
Very scattering	110	58	52	110	12,100
Depleted	97	10	3	13	1,261
Total	298				76,970

DETAILS OF EXAMINATION OF PELICAN BAR.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
534	Feb. 18	5.0	2.55	0.4	18.0	20.4	3	160	543	703	Dense.
535	...do.....	7.0	2.04	0	13.2	12.7	2	117	338	455	Do.
557	Feb. 22	7.0	2.04	0	13.2	39.2	15	117	1,042	1,159	Do.
558	...do.....	7.0	2.04	0	14.2	31.4	17	126	835	961	Do.
559	...do.....	7.5	2.04	0	6.4	15.7	7	57	417	474	Do.
562	...do.....	6.0	2.21	.5	9.0	28.5	5	80	758	838	Do.
563	...do.....	5.0	2.55	2.0	16.5	21.6	14	147	575	722	Do.
566	...do.....	8.0	2.04	0	16.7	46.6	2	149	1,239	1,388	Do.
567	...do.....	6.5	2.12	0	17.5	22.2	3	156	591	747	Do.
568	...do.....	7.5	2.04	2.5	24.0	19.1	0	214	508	722	Do.
570	...do.....	8.0	2.04	0	17.2	30.4	0	153	809	962	Do.
571	...do.....	7.0	2.04	1.5	3.4	9.8	3	30	239	269	Do.
574	...do.....	7.0	2.04	1.0	8.3	18.1	2	74	481	555	Do.
575	...do.....	4.5	2.80	2.9	8.9	8.6	1	79	229	308	Do.
576	Feb. 24	5.0	2.55	0	9.8	14.5	3	87	386	473	Do.
585	Feb. 25	5.0	2.55	.4	12.2	12.5	1	109	332	441	Do.
560	Feb. 22	4.0	3.05	.7	8.5	3.3	6	76	88	164	Very scattering.
561	...do.....	4.0	3.05	0	5.2	1.6	1	46	42	88	Do.
564	...do.....	4.5	0	5.4	1.4	.2	2	48	37	85	Do.
577	Feb. 24	7.0	2.04	0	6.9	1.5	2	61	40	101	Do.
556	Feb. 22	8.0	2.04	.5	.5	0	5	4	0	4	Depleted.
565	...do.....	6.0	2.21	0	3.6	0	1	32	0	32	Do.
569	...do.....	9.0	2.04	0	.5	.5	1	4	13	17	Do.
573	...do.....	6.5	a 2.12								Do.

a 36 oysters, all dead.

15. PATCHES BETWEEN EAST HOLE AND PELICAN BARS.

These three small patches, less than a half-mile off St. George Island, are situated between East Hole and Pelican Bars. The combined area is 43 acres, the greater part of which has dense growth of clustered oysters of fair quality. The largest patch, somewhat crescent-shaped, measures about three-eighths mile in length by one-eighth mile in width and contains about 30 acres. The other patches are nearly circular in outline. The bottom is hard sand with mud and shells. No oystering was being conducted on these lumps at the time of the survey.

The general extent and condition of the patches are shown in the following tables:

OYSTER GROWTH ON PATCHES BETWEEN EAST HOLE AND PELICAN BARS.

Character of oyster growth.	Area.	Oysters per acre.			Estimated content of oysters.
		Under 3 inches.	Over 3 inches.	Total.	
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense	38	75	448	523	19,874
Scattering	5	60	100	160	800
Total	43				20,674

DETAILS OF EXAMINATION OF PATCHES BETWEEN EAST HOLE AND PELICAN BARS.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
352	Feb. 9	9.0	2.04	0	7.3	8.8	2	65	234	299	Dense.
579	Feb. 24	8.5	2.04	0	11.3	14.7	5	100	391	491	Do.
580	...do	6.0	2.21	0.5	7.7	19.5	4	69	518	587	Do.
581	...do	5.0	2.55	0	12.9	35.3	2	115	938	1,053	Do.
582	...do	6.0	2.21	0	2.7	5.9	4	24	157	181	Do.
533	Feb. 18	4.0	3.05	1.6	10.5	2.9	2	93	77	170	Scattering.
578	Feb. 24	4.5	2.80	0	2.9	4.6	2	26	122	148	Do.

16. EAST LUMPS.

These three unimportant lumps off East Bay, situated midway between Cat Point and Bulkhead Bars on the east and Norman Bar on the west, have a combined area of 224 acres. The largest and northernmost lump has a length in a north and south direction of about seven-eighths mile, a width of one-fourth mile, and an area of 144 acres, the greater part of which is covered with dense growth. It has a depth of water of 5½ to 6 feet and but very little or no elevation above the surrounding bottoms. On the edges of the bar there is black mud and more or less covered oysters.

The second lump has an area of 25 acres, a depth of water of 6 to 7 feet, and an elevation of about 1 foot along the northern limits. The extreme western portion has dense growth; otherwise it is very scattering.

The third or southernmost lump has an area of about 55 acres, a depth of water of 8 or 9 feet, and supports dense and very scattering growths and depleted bottoms.

Comparing the present chart with the one made 20 years ago by this Bureau, it is observed that the first two or northernmost lumps are but the remains of a long, narrow reef which had at that time scattering growths of oysters. It measured then about 3 miles in length by one-fourth mile in width. The third lump is comparatively new, having been built up on a hard sand bottom within recent years.

The oysters of these lumps are largely clusters of the raccoon or scissor-bill type and are covered with hundreds of small mussels and small barnacles. Some of the oysters are of good shape, but they are inclined to be flattish and generally of poor quality and flavor. The central part of the largest lump has a good, firm foundation, which would produce a fair marketable product if the clusters were broken up and culled; otherwise it does not appear to yield oysters of merchantable quality. This part of the bay is evidently filling in with mud and silt and is, therefore, hardly worth the labor necessary to obtain good oysters.

One Florida tub of mostly clustered and unculled oysters from these lumps gave the following results: Small oysters, 67; counts, 152; large, 180; dead, 13; shells, 30; total, 442.

The following tables furnish further data of a general character:

OYSTER GROWTH ON EAST LUMPS.

Character of oyster growth.	Area.	Oysters per acre.			Estimated content of oysters.
		Under 3 inches.	Over 3 inches.	Total.	
	Acres.	Bushels.	Bushels.	Bushels.	Bushels.
Dense	168	102	453	555	93,240
Scattering	4	18	77	95	380
Very scattering	24	44	54	98	2,352
Depleted	28				
Total	224				95,972

DETAILS OF EXAMINATION OF EAST LUMPS.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	Feet.	Sq. yds.					Bush.	Bush.	Bush.	
544	Feb. 18	7.0	2.04	0	11.8	13.2	2	105	351	456	Dense.
547	Feb. 22	8.0	2.04	0	8.8	19.6	6	78	521	599	Do.
548	...do	8.0	2.04	0	8.8	18.1	4	78	481	559	Do.
549	...do	8.0	2.04	0	2.9	9.8	4	26	261	287	Do.
550	...do	8.0	2.04	0	4.4	23.5	6	39	625	664	Do.
737	Mar. 9	7.0	2.04	0	16.7	25.0	7	148	665	813	Do.
738	...do	7.0	2.04	0	16.2	17.6	3	144	468	612	Do.
739	...do	7.0	2.04	0	15.7	11.8	2	139	314	453	Do.
740	...do	7.0	2.04	0	7.3	10.3	3	65	274	339	Do.
741	...do	7.5	2.04	0	5.4	12.2	3	48	324	372	Do.
742	...do	8.0	2.04	0	9.8	13.2	2	87	351	438	Do.
743	...do	7.5	2.04	0	9.8	5.9	1	87	157	244	Do.
744	...do	7.0	2.04	0	12.2	24.0	0	108	639	747	Do.
745	...do	7.0	2.04	0	6.9	7.8	0	61	207	268	Do.

DETAILS OF EXAMINATION OF EAST LUMPS—Continued.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
746....	Mar. 9	7.0	2.04	0	11.8	18.2	1	105	485	590	Dense.
747....	...do.....	7.5	2.04	0	6.4	26.4	6	57	703	760	Do.
748....	...do.....	7.0	2.04	0	13.2	17.2	1	117	457	574	Do.
749....	...do.....	7.0	2.04	0	19.1	26.0	4	170	692	862	Do.
750....	...do.....	7.0	2.04	0	20.1	19.6	2	178	521	699	Do.
751....	...do.....	7.0	2.04	0	26.4	12.2	0	235	301	536	Do.
752....	...do.....	7.0	2.04	0	23.6	18.6	1	210	460	670	Do.
553....	Feb. 22	11.0	2.04	0	4.4	10.8	4	39	287	326	Do.
753....	Mar. 9	8.0	2.04	0	7.8	18.1	1	69	446	515	Do.
754....	...do.....	8.5	2.04	0.5	8.8	16.2	1	78	400	478	Do.
756....	...do.....	10.0	2.04	0	7.4	20.6	3	66	509	575	Do.
757....	...do.....	10.5	2.04	0	10.3	23.6	2	91	582	673	Do.
760....	...do.....	10.0	2.04	0	15.2	30.4	5	135	750	885	Do.
361....	Feb. 10	6.0	2.21	0	2.0	2.9	2	18	77	95	Scattering.
755....	Mar. 9	8.5	2.04	0	2.9	2.4	0	26	59	85	Very scattering.
759....	...do.....	10.0	2.04	0	6.9	2.0	5	61	49	110	Do.
758....	...do.....	10.5	(a)	......	......	......	......	......	......	......	Depleted.

a Medium bottom.

17. NORMAN BAR.

This bar, which lies off East Bay, is composed of four small, productive patches having an aggregate area of about 45 acres. It is situated approximately 1 mile west of East Lumps and 2 miles east of the jetty. The three upper patches are raised about 1 foot above the neighboring floor and lie in 5½ to 6 feet of water. The lower or southernmost patch has about the same elevation, but is in slightly deeper water, being located near the channel. The bottom is sand and mud.

The three upper parts of the bar were formerly united into one long narrow bed, which extended farther northward and eastward than the present patches, but not so far to the south. The lower patch appears to have changed its shape somewhat and to have progressed both to the south and west.

The bed has dense growth throughout. The oysters are generally of good shape and occur in clusters with sharp edges. Not many mussels and barnacles were observed. On the southwest border of the upper patch the bottom was largely mud and black shells on which were growing raccoon oysters. At the time of the investigation the oysters were rather fresh, but fat and in good condition. This bar has not been worked much for the last two years, except during the rush season, when a few boats make quick trips with their catch to the market.

The growth and details of examination are given in the following tables:

OYSTER GROWTH ON NORMAN BAR.

Character of oyster growth.	Area.	Oysters per acre.			Estimated content of oysters.
		Under 3 inches.	Over 3 inches.	Total.	
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense	45	61	516	577	25,965

DETAILS OF EXAMINATION OF NORMAN BAR.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
653	Mar. 1	8.0	2.04	0	4.4	13.7	0	39	338	377	Dense.
654	...do	8.0	2.04	1.5	3.4	24.5	0	30	606	636	Do.
655	...do	7.5	2.04	2.9	7.8	32.4	7	70	800	870	Do.
657	...do	7.5	2.04	1.0	9.3	41.2	6	83	1,018	1,101	Do.
659	...do	8.5	2.04	0	3.9	12.2	12	35	302	337	Do.
660	...do	7.0	2.04	2.9	6.9	11.3	1	61	279	340	Do.
661	...do	6.5	2.12	0	8.0	26.9	6	71	664	735	Do.
662	...do	8.0	2.04	2.9	10.3	27.9	6	92	690	782	Do.
663	...do	7.0	2.04	0	4.9	22.1	4	44	546	590	Do.
664	...do	8.0	2.04	0	2.5	13.7	3	22	338	360	Do.
665	...do	7.0	2.04	9.3	0.3	9.8	6	83	242	325	Do.
666	...do	7.0	2.04	0	11.8	14.7	6	105	363	468	Do.

18. THIGPEN BAR.

This bar, consisting of two small patches, is situated about 1½ miles south of Apalachicola and five-eighths mile west of the jetty. It has a depth of water of 5½ to 6 feet and practically no elevation above the adjacent soft bottoms. The bed is composed principally of mud and some black shells, with underlying hard sand. During the last 20 years it has decreased in extent from a long continuous bar of 13 acres to about 4 acres. This is, perhaps, due to a deposit of silt from the recent dredgings in the channel along the jetty.

The bar has dense growth. The oysters occur in clusters and singles and are generally of good shape and size. They were found to be fat and of good flavor. Many mussels and some barnacles were noted. Very little or no fishing was being conducted on this bar at the time of the investigation.

A small patch of about 2 acres in extent, apparently the remnant of a larger area, is situated a short distance south of the jetty. Depth of water is about 6 feet. The bottom is hard and consists of mud and buried shells.

The annexed tables show the area and distribution of oyster growth on Thigpen Bar.

OYSTER GROWTH ON THIGPEN BAR.

Character of oyster growth.	Area.	Oysters per acre.			Estimated content of oysters.
		Under 3 inches.	Over 3 inches.	Total.	
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense	4	81	255	336	1,344

DETAILS OF EXAMINATION OF THIGPEN BAR.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
795	Mar. 15	5.0	2.55	0	9.0	8.2	1	80	214	294	Dense.
868	Mar. 19	6.0	2.21	0	8.1	11.8	1	82	297	379	Do.

19. WEST LUMP AND ADJACENT PATCH.

This bar, lying a short distance northwest of the center of Apalachicola Bay, is situated about 2 miles southwest of the entrance to the dredged channel at the jetty. It is somewhat scythe-shaped in outline, measures about three-fourths mile in length, and 300 yards in width, and is 74 acres in extent. The depth of water is from 4½ to 6 feet. The bottom is composed of mud, sand, and shells and is raised 1 to 2 feet above the neighboring grounds. The bed supports a dense growth, excepting where scattering oysters were found on the projecting arm of the northwest border. During the interval since the last survey the bar appears to have shifted its position very slightly to the southwest and has maintained its average length and breadth fairly well. However, the eastern extremity has broadened somewhat, and the projecting arm is of recent growth.

The oysters were in rather small clusters or singles of general good shape, and at the time of the investigation (March 15) were fat, becoming milky, and varied in quality from poor to good. Mussels and barnacles in small numbers were observed at most of the stations. This bar is fished principally for raw stock.

The small patch, about one-half mile north of the lump, has a length of about three-eighths mile, a width of 140 yards, and contains approximately 17 acres, nearly three-quarters of which has dense growth, the remainder being very scattering. It is the remnant of a long, slender bar that had a length of about 1¼ miles. The bottom, composed of mud and sand, with some black shells, has an elevation of about 1 foot. The depth of water is 5½ to 7 feet. The oysters are in clusters of good shape, although some were flattish and of the scissor-bill type. A number of the older shells were burrowed by the boring clam, *Martesia*. The oysters were fat and becoming milky. The best quality was found on the upper two-thirds of the patch. They are fished for raw stock.

The following tables give the data obtained from the lump and patch:

OYSTER GROWTH ON WEST LUMP AND ADJACENT PATCH.

Character of oyster growth.	Area.	Oysters per acre.			Estimated content of oysters.
		Under 3 inches.	Over 3 inches.	Total.	
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense	75	71	425	496	37,200
Scattering	11	29	126	155	1,705
Very scattering	5	0	62	62	310
Total	91				39,215

DETAILS OF EXAMINATION OF WEST LUMP AND ADJACENT PATCH.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
809	Mar. 15	6.5	2.12	1.9	11.3	17.5	8	96	731	827	Dense.
813	...do...	7.0	2.04	0	8.3	16.6	4	70	354	424	Do.
814	...do...	7.0	2.04	0	11.3	17.1	3	96	364	460	Do.
815	...do...	9.0	2.04	2.7	8.3	25.0	3	70	532	602	Do.
817	...do...	8.0	2.04	0	12.7	18.1	5	108	386	494	Do.
819	...do...	8.0	2.04	0	7.4	39.2	6	63	835	898	Do.
823	...do...	7.0	2.04	0	4.4	24.0	20	37	511	548	Do.
826	...do...	7.0	2.04	0	9.9	8.8	10	84	166	250	Do.
828	...do...	6.0	2.21	0	9.0	10.8	6	77	230	307	Do.
829	...do...	7.0	2.04	0	5.4	22.1	5	46	470	516	Do.
830	...do...	8.0	2.04	0	4.4	11.3	1	37	240	277	Do.
831	...do...	8.0	2.04	1.0	7.4	13.7	3	63	282	345	Do.
822	...do...	9.0	2.04	0	3.4	5.9	1	29	126	155	Scattering.
816	...do...	8.5	2.04	0	0	2.9	0	0	62	62	Very scattering.

20. PATCH OFF NEW INLET.

This small circular patch of 5 acres is situated about 3 miles due south of West Lump and one-half mile off St. George Island at Signal Scaffold. It has a depth of water of about 3½ feet and lies on a hard sand shelf, to the north of which is a soft mud bottom in 8 to 12 feet of water. This district was a few years ago in or near the channel of an inlet or pass called New Inlet, connecting Apalachicola Bay with the Gulf of Mexico. The inlet is now completely filled with sand.

The oysters were dense, of clear shell, and in good-shaped clusters. They were fat, salty, and milky (March 18). Green and brown algæ, a few sea shells, sand collars, sandworms, etc., were observed. Very little or no fishing was being carried on at this place. A station on the patch showed 35 bushels of seed and 196 bushels of marketable oysters per acre, making, all told, for the patch 175 bushels of seed and 980 bushels of marketable oysters.

21. HAGEN FLAT.

Hagen Flat, situated in the southwestern part of Apalachicola Bay, is about five-eighths mile east of St. Vincent Bar and nearly 3 miles north of St. George Island. It has a length, in an east and west direction, of about five-eighths mile, a maximum width of one-fourth mile, and an area of 62 acres. The depth of water ranges from 5½ to 6 feet along the southern termination to 7 feet at the northeastern limits. The bed is well elevated, being from 1 to 3 feet above the general level, and has a good solid foundation of sand and mud. We were able to penetrate the crust only about 5 or 6 inches with the testing pole.

During the last 20 years the bar appears to have changed its shape from a large Y and to have moved westward about one-fourth mile. It also has built up from a bed of dead shells to practically a dense growth throughout.

We found the oysters of this flat to be strong and vigorous, well-shaped, fat, of good flavor, but rather salty. They occur in both small and large clusters with sharp edges. One drill was taken, and but few dead oysters and mussels were noted. The bar is not fished extensively.

The following tables exhibit the growth of the oysters and details of examination:

OYSTER GROWTH ON HAGEN FLAT.

Character of oyster growth.	Area.	Oysters per acre. Under 3 inches.	Oysters per acre. Over 3 inches.	Oysters per acre. Total.	Estimated content of oysters.
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense	54	99	634	733	39,582
Scattering	8	25	94	119	952
Total	62				40,534

DETAILS OF EXAMINATION OF HAGEN FLAT.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard. Spat.	Culls.	Counts.	Shells per square yard.	Estimated quantity oysters per acre. Seed.	Market.	Total.	Character of oyster growth.
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
895	Mar. 19	9.0	2.04	0	9.9	23.1	3	84	492	576	Dense.
902	..do..	8.0	2.04	0	4.9	28.4	3	42	605	647	Do.
904	..do..	8.0	2.04	0.5	19.6	27.4	4	167	583	750	Do.
1040	Mar. 26	8.5	2.04	0	12.2	58.9	6	173	1,425	1,598	Do.
1041	..do..	7.0	2.04	0	2.0	6.9	3	28	167	195	Do.
1042	..do..	8.5	2.04	0	6.9	22.1	1	98	535	633	Do.
894	Mar. 19	10.0	2.04	0	2.9	4.4	3	25	94	119	Scattering.

22. GREEN POINT FLAT.

This roughly crescent-shaped flat of 170 acres, is located in the northwestern part of Apalachicola Bay, about 1½ miles south of Green Point and 2 miles east by north of St. Vincent Point. The approximate dimensions are 1 mile long by one-fourth mile wide. It has a depth of 5 to 6 feet at mean low tide. With the exception of a limited portion of the southeast border, which has an elevation of about 1 foot, the flat is practically on a level with the connecting barren grounds. The bottom is mud and sand on a hard sand foundation.

The bed has grown up within recent years on a hard to stiff bottom of the area stretching from Green Point to the head of St. Vincent Bar, and it appears that it would be greatly improved and produce a better grade of stock if it were planted extensively with shells in order to raise it above the general level of the contiguous bottoms.

The entire flat has dense growth. The oysters were found in large sharp-edged clusters, usually of a poor or scissor-bill type, with many attached mussels and some barnacles. The quality was generally poor and watery, although some oysters were fat and in good condition. From 2 to 10 dead or smothered oysters were noted at nearly every station, and at some places the cultch was black shells. This bar is oystered but very little.

The following tables present the conditions of this bar:

OYSTER GROWTH ON GREEN POINT FLAT.

Character of oyster growth.	Area.	Oysters per acre.			Estimated content of oysters.
		Under 3 inches.	Over 3 inches.	Total.	
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense	170	105	414	519	88,230

DETAILS OF EXAMINATION OF GREEN POINT FLAT.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
785	Mar. 10	7.5	2.04	0	2.4	14.7	4	28	391	419	Dense.
786	...do...	7.0	2.04	0	6.4	9.9	2	75	264	339	Do.
787	...do...	7.5	2.04	0	4.4	13.2	1	52	351	403	Do.
788	...do...	8.0	2.04	0	12.2	17.6	2	144	468	612	Do.
909	Mar. 19	7.0	2.04	0	8.8	21.1	5	104	561	665	Do.
910	...do...	7.0	2.04	0	11.3	13.7	2	132	364	496	Do.
911	...do...	8.0	2.04	0	9.3	17.6	3	110	468	578	Do.
944	Mar. 24	6.0	2.21	0	10.4	17.7	5	123	471	594	Do.
945	...do...	6.0	2.21	0	3.2	4.5	4	38	120	158	Do.
949	...do...	6.0	2.21	0	9.5	18.1	3	112	481	593	Do.
1080	Apr. 5	7.0	2.04	0.5	5.9	5.4	7	70	143	213	Do.
1081	...do...	7.0	2.04	0	5.4	7.4	10	64	197	261	Do.
1082	...do...	6.5	2.12	0	7.1	25.4	9	83	675	758	Do.
1083	...do...	7.0	2.04	0	12.2	14.2	17	144	378	522	Do.
1084	...do...	7.5	2.04	0	23.1	10.1	9	273	507	780	Do.
1085	...do...	6.5	2.12	0	10.8	29.7	25	127	790	917	Do.

23. LUMPS BETWEEN HAGEN AND GREEN POINT FLATS.

Six small lumps situated between Hagen and Green Point Flats, a distance of about 2½ miles, range in size from 1 to 8 acres, with an aggregate area of 25 acres. They have a depth of water from 6 to 7 feet and an elevation of about 1 foot. The bottom is sand and mud.

The northernmost lump is of recent origin and has dense growth. The character and quality of the oysters are about equal to those of Green Point Flat.

The oysters of the two lumps near Hagen Flat are of dense growth and are about on a par with the product of that flat. These lumps appear to be progressing slowly westward.

Of the three intenvening lumps, two have dense and one very scattering growth. At the time of the investigation the oysters were fat, in good condition, of good shape, and in rather small clusters. Very few mussels were noted. These lumps are the remnants of an extended area of scattered oysters with some dense growth.

The area and details of examination of the six lumps are given in the following tables:

OYSTER GROWTH ON LUMPS BETWEEN HAGEN AND GREEN POINT FLATS.

Character of oyster growth.	Area.	Oysters per acre.			Estimated content of oysters.
		Under 3 inches.	Over 3 inches.	Total.	
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense	22	56	468	524	11,528
Very scattering	3	6	26	32	96
Total	25				11,624

DETAILS OF EXAMINATION OF LUMPS BETWEEN HAGEN AND GREEN POINT FLATS.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
887	Mar. 19	9.0	2.04	0	0.5	7.8	1	6	208	214	Dense.
890	...do	7.5	2.04	0	1.0	23.6	5	9	502	511	Do.
891	...do	9.0	2.04	0	8.8	23.1	2	75	492	567	Do.
892	...do	8.5	2.04	0	19.1	20.1	0	162	428	590	Do.
906	...do	8.5	2.04	0	5.4	16.2	2	46	345	391	Do.
914	...do	9.0	2.04	0	4.9	19.6	2	42	417	459	Do.
915	...do	9.0	2.04	0	6.4	41.6	0	54	886	940	Do.
889	...do	8.0	2.04	0	.5	1.0	2	6	26	32	Very scattering.

24. ST. VINCENT BAR.

This interesting bar or reef is located in the southwestern part of Apalachicola Bay, about 3 miles from West Pass. It begins with a fringe of very scattering growth of oysters at St. Vincent Point near the northeast limits of St. Vincent Island, extends eastward for something more than a mile, then turns abruptly southward and continues in that direction for about 4 miles. It is within 1¼ miles of St. George Island, in the vicinity of Cape St. George Lighthouse. The average width is slightly less than one-half mile. The area is approximately 1,414 acres, of which about 41 per cent is dense growth, 27 per cent very scattering, and about 15 per cent each of scattering growth and depleted bottoms. The depth of the main bar at mean low water is about 2 to 4 feet on the western border and 6 to 8 feet on the eastern border, while on the northwestern portion it is from 3 to 6 feet, with parts exposed and others awash at low tide. The adjacent bottoms on the western side are 3 to 4 feet deeper than the bar and 1 to 2 feet deeper on the eastern side. The west portion is, therefore, rather steep, while on the east a more gradual incline is found. The southern extremity, which is about a half mile from the ship channel, has an elevation from 5 to 9 feet. The northern limits have little or no elevation. The bed has a good foundation and is composed of sand and shells, with some mud along the eastern side. The west portion is very compact and solid.

This bar is fortunate in its elevation and situation with reference to West Pass and the currents, in that during the fluctuation of the tides it has a rapid change of water. On the other hand, however, its position is unfortunate during violent storms, for the long continuance of salt water or a deposit of sediment or sand may smother the oysters.

With the exception of its detachment from Silva Bar, the reef has maintained its general shape and position in the bay during the last 20 years. During this period, however, it has become wider by approximately 300 yards, the northeastern portion has extended eastward, and the other sections have broadened principally to the westward. The lower two-thirds of the bar has recovered, to a considerable extent, from a bed of dead oysters or depleted bottom to a fair or good producer.

It is interesting to note that this bar has been depleted a number of times by storms or overfishing and has always recovered satisfactorily.

Inasmuch as the bar was showing signs of depletion, it was closed to the public by order of the Florida Shell Fish Commissioner during the latter half of the 1914–15 oyster season. It was closed, also, for the season 1912–13.

The oysters were found in small clusters or singles of good shape. During the survey they were, for the most part, fat, salty, of good flavor, and from good to excellent quality. Very few detrimental factors, such as mussels, barnacles, coral, and algæ, were noted, although two dead drills, some black shells, and slimy mud were observed at some stations along the eastern limits of the bar.

Seventy-nine biological stations were made on this bar, the data of which follow:

OYSTER GROWTH ON ST. VINCENT BAR.

Character of oyster growth.	Area.	Oysters per acre.			Estimated content of oysters.
		Under 3 inches.	Over 3 inches.	Total.	
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense	585	68	378	446	260,910
Scattering	218	27	113	140	30,520
Very scattering	391	16	50	66	25,806
Depleted	220	29	17	46	10,120
Total	1,414	....	....	....	327,356

DETAILS OF EXAMINATION OF ST. VINCENT BAR.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
957	Mar. 24	7.5	2.04	0	3.9	8.8	2	55	213	268	Dense.
958	...do...	7.0	2.04	0	2.0	10.3	5	28	250	278	Do.
959	...do...	7.0	2.04	0	3.9	11.8	1	55	286	341	Do.
960	...do...	6.0	2.21	0	2.3	27.2	7	33	659	692	Do.
961	...do...	6.0	2.21	0	0.9	10.4	4	13	252	265	Do.
962	...do...	4.0	3.05	0	4.9	14.4	6	69	349	418	Do.
963	...do...	4.5	2.80	0	2.5	7.9	5	36	191	227	Do.
964	...do...	7.5	2.04	0.5	3.4	6.9	0	48	167	215	Do.
966	Mar. 25	8.0	2.04	0	1.0	6.4	2	14	155	169	Do.
968	...do...	5.0	2.55	0	6.9	14.2	7	98	344	442	Do.
969	...do...	4.5	2.80	0	16.1	38.8	9	229	940	1,169	Do.
970	...do...	5.5	2.38	0	6.3	27.3	0	89	670	759	Do.
985	...do...	6.5	2.12	0	1.9	17.4	5	27	421	448	Do.
986	...do...	6.5	2.12	0	4.2	11.3	3	60	273	333	Do.
987	...do...	7.0	2.04	0	1.5	21.6	3	21	522	543	Do.
988	...do...	7.0	2.04	0	1.5	18.6	2	21	449	470	Do.
989	...do...	7.0	2.04	0	6.4	21.1	2	91	510	601	Do.
990	...do...	7.0	2.04	0	4.9	10.8	2	70	261	331	Do.
991	...do...	7.0	2.04	0	13.2	33.8	5	187	817	1,004	Do.
992	...do...	6.0	2.21	.5	3.2	19.6	3	45	474	519	Do.
993	...do...	5.0	2.55	0	.4	10.9	1	6	264	270	Do.
994	...do...	5.0	2.55	1.0	1.2	11.4	8	17	276	293	Do.
1001	...do...	4.0	3.05	0	6.9	17.1	10	98	414	512	Do.
1002	...do...	4.5	2.80	0	2.5	9.3	5	35	225	260	Do.
1004	...do...	5.0	2.55	.4	2.0	23.9	4	28	578	606	Do.
1009	...do...	4.0	3.05	0	10.1	15.7	2	143	379	522	Do.
1015	Mar. 26	7.0	2.04	0	17.1	22.6	15	242	546	788	Do.
1016	...do...	5.0	2.55	0	9.4	32.2	10	137	778	915	Do.
1018	...do...	3.0	3.65	0	5.5	8.2	14	78	198	276	Do.
1019	...do...	7.0	2.04	0	7.4	7.4	5	105	179	284	Do.
1020	...do...	4.0	3.05	.7	6.6	12.5	3	94	302	396	Do.
1022	...do...	7.0	2.04	0	3.0	6.4	3	55	154	209	Do.
1024	...do...	4.5	2.80	0	2.5	13.3	5	35	322	357	Do.
1027	...do...	5.0	2.55	0	3.1	14.1	10	44	341	385	Do.
1031	...do...	5.0	2.55	.8	2.4	18.0	8	34	436	470	Do.
1032	...do...	4.0	3.05	0	2.6	6.6	7	37	160	197	Do.
1035	...do...	5.0	2.55	0	2.7	12.9	6	38	311	349	Do.
1038	...do...	5.0	2.55	0	5.5	16.1	6	78	389	467	Do.
1048	...do...	7.0	2.04	0	1.5	6.9	0	21	167	188	Do.
1064	Mar. 27	5.0	2.55	0	4.3	8.2	4	61	198	259	Do.
1110	Apr. 6	6.0	2.21	0	5.2	25.0	8	74	605	679	Do.
1208	Apr. 8	4.0	3.05	0	8.8	14.7	16	94	447	541	Do.
956	Mar. 24	8.0	2.04	0	0	5.4	2	0	131	131	Scattering.
965	Mar. 25	8.5	2.04	0	1.0	4.4	5	14	107	121	Do.
971	...do...	8.0	2.04	0	1.0	5.4	3	14	131	145	Do.
975	...do...	8.0	2.04	0	1.0	3.9	2	14	94	108	Do.
976	...do...	8.0	2.04	0	1.5	4.4	3	21	107	128	Do.
1003	...do...	4.5	2.80	0	2.2	3.6	2	31	87	118	Do.
1007	...do...	6.0	2.21	.5	3.2	5.0	2	45	143	188	Do.

DETAILS OF EXAMINATION OF ST. VINCENT BAR—Continued.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
1017...	Mar. 26	7.0	2.04	0	1.0	3.9	13	14	94	108	Scattering.
1021...	...do.....	7.5	2.04	0	4.4	3.4	6	62	82	144	Do.
1023...	...do.....	4.5	2.80	0	1.8	3.2	11	26	77	103	Do.
1028...	...do.....	6.5	2.12	0	1.8	5.7	2	26	138	164	Do.
1030...	...do.....	7.0	2.04	0	1.5	5.9	5	21	143	164	Do.
1037...	...do.....	7.0	2.04	0	.5	3.9	5	7	94	101	Do.
1043...	...do.....	4.5	2.80	0.7	1.8	5.5	6	26	133	159	Do.
1044...	...do.....	7.0	2.04	0	1.5	5.9	2	21	143	164	Do.
1211...	Apr. 8	7.5	2.04	0	8.3	3.4	0	89	103	192	Do.
967....	Mar. 25	8.0	2.04	0	0	2.0	5	0	48	48	Very scattering.
973....	...do.....	8.5	2.04	0	0	1.5	4	0	36	36	Do.
974....	...do.....	8.0	2.04	0	1.5	2.4	3	21	58	79	Do.
983....	...do.....	8.0	2.04	0	.5	2.0	3	7	48	55	Do.
984....	...do.....	7.5	2.04	0	.5	2.9	2	7	70	77	Do.
1000...	...do.....	4.0	3.05	0	1.0	1.3	3	14	31	45	Do.
1005...	...do.....	7.0	2.04	0	2.0	2.0	0	28	48	76	Do.
1006...	...do.....	7.0	2.04	1.0	4.4	2.9	2	62	70	132	Do.
1008...	...do.....	6.0	2.21	.5	2.3	2.3	1	33	56	89	Do.
1025...	Mar. 26	8.0	2.04	0	.5	2.0	2	7	48	55	Do.
1029...	...do.....	7.5	2.04	0	.5	2.9	1	7	70	77	Do.
1034...	...do.....	7.5	2.04	0	0	1.5	2	0	36	36	Do.
1039...	...do.....	8.0	2.04	0	1.0	2.0	1	14	48	62	Do.
1118...	Apr. 6	6.0	2.21	0	.9	2.3	1	12	56	68	Do.
1119...	...do.....	6.0	2.21	0	2.7	1.3	1	38	31	69	Do.
1209...	Apr. 8	7.0	2.04	0	.5	1.5	0	5	45	50	Do.
972....	Mar. 25	8.5	2.04	0	0	1.0	5	0	24	24	Depleted.
978....	...do.....	8.0	2.04	.5	1.5	1.0	0	21	24	45	Do.
1026...	Mar. 26	7.0	2.04	1.5	6.9	1.0	5	84	24	108	Do.
1109...	Apr. 6	7.5	2.04	0	2.0	0	5	28	0	28	Do.
1111...	...do.....	7.0	2.04	0	1.0	.5	1	14	12	26	Do.

25. MIDDLE BAR.

This roughly cordate-shaped bed is of recent growth and is situated on the boundary between Apalachicola Bay and St. Vincent Sound and midway between Green Point Flat and Silva Bar. It has a length of about 750 yards, an average width of 300 yards, and contains approximately 48 acres. The depth at mean low water on the bar and on the adjoining territory is from 4 to 5 feet. The bottom is hard sand with some mud.

The oysters were found dense throughout and in small to medium-sized clusters with sharp edges. They were of good shape and ranged in quality from watery to good. Some black shells, mussels, small barnacles, and a few dead oysters were noted. But very little tonging was being conducted on the bar during the survey.

The following tables show the general conditions of this bed:

OYSTER GROWTH ON MIDDLE BAR.

Character of oyster growth.	Area.	Oysters per acre.			Estimated content of oysters.
		Under 3 inches.	Over 3 inches.	Total.	
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense..	48	49	396	445	21,300

DETAILS OF EXAMINATION OF MIDDLE BAR.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
1097...	Apr. 5	6.0	2.21	0	3.6	11.8	3	42	314	356	Dense.
1174...	Apr. 7	6.5	2.12	0	8.0	18.9	7	86	574	660	Do.
1177...	...do.....	6.5	2.12	0	1.9	9.9	2	20	301	321	Do.

26. SILVA BAR.

Formerly Silva and St. Vincent Bars constituted one continuous oyster reef without a distinct line of demarcation, but within the last two decades a decided severance occurred, so that the two are now separated by a stretch of barren bottoms of about one-fourth mile in extent. It appears that Silva Bar has, during this interval, moved westward about one-fourth mile.

This bar, oblong in shape, lies partly in Apalachicola Bay and partly in St. Vincent Sound and is about midway between Green and St. Vincent Points. It measures about three-fourths mile in length by 350 yards in width and has an approximate extent of 100 acres, 69 per cent of which supports very scattering growth of oysters. It lies on about the general level of the contiguous areas and has a depth at mean low water of 5 to 6 feet. The medium-hard bottom is composed of sand and mud.

The oysters are in small to large irregular clusters and shapely singles. At the time of the examination they were fat and in good condition, but were becoming milky. A number of mussels and small barnacles were taken while tonging. At one station near the southwest border, which has very scattering growth, black shells buried in mud and green algæ or sea lettuce were found. At this place the oysters were in only fair condition. Fishing was not carried on extensively on this bar during the survey.

The following tables exhibit the condition of this bed:

OYSTER GROWTH ON SILVA BAR.

Character of oyster growth.	Area.	Oysters per acre.			Estimated content of oysters.
		Under 3 inches.	Over 3 inches.	Total.	
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense........................	23	39	318	357	8,211
Scattering........................	8	60	138	198	1,584
Very scattering........................	69	13	57	70	4,830
Total........................	100	....	....	....	14,625

DETAILS OF EXAMINATION OF SILVA BAR.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
1178...	Apr. 7	6.5	2.12	0	8.5	8.0	5	91	243	334	Dense.
1179...	...do.....	7.0	2.04	0	0	9.3	1	0	283	283	Do.
1206...	Apr. 8	5.5	2.38	0	2.3	14.1	3	25	420	454	Do.
1107...	Apr. 6	6.5	2.12	0.9	4.2	5.7	2	60	138	198	Scattering.
1105...	...do.....	6.0	2.21	0	.9	2.3	0	12	56	68	Very scattering.
1108...	...do.....	7.0	2.04	0	1.0	2.4	2	14	58	72	Do.

27. FISH HAWK BAR.

It very seldom happens that an oyster reef of any considerable extent remains unknown to the tongers and dealers in a region that is extensively fished. Such, however, was the case with this bar, which was found untouched in its natural condition. It has, apparently, developed on a favorable bottom since the survey made by the Bureau in 1895–96, as it was not mentioned or recorded on the chart of that report. On account of its good size and the excellent quality of the product, the bar is named in honor of the U. S. Fisheries steamer *Fish Hawk*, which was detailed for the survey of these waters and has long been associated with oyster investigations.

The bar, ovate in outline, is located in the extreme western limits of Apalachicola Bay, about 1 mile south of St. Vincent Point and 2 miles north-northeast of West Pass. It measures about five-eighths by one-fourth mile and has an approximate area of 90 acres. The depth at mean low water is 2 to 5 feet, and the elevation on the east and south borders is about 1 foot. The bottom is firm and composed of sand, mud, and scrap shells, and supports about 30 per cent each of dense and scattering growths, 14 per cent very scattering, and 23 per cent depleted bottoms.

Though of small size, the oysters are of good shape and occur as singles or in clusters of two or three. At the time of the investigation they were fat, of good flavor, salty, and in prime condition. It appears that they would serve admirably for shell or barrel stock. Disregarding the nearness to West Pass and the rather high salinity of the waters, no detrimental conditions other than three medium-sized drills and many very small barnacles were observed.

The character of the oyster growth, area, and details of examination of Fish Hawk Bar are given in the following tables:

OYSTER GROWTH ON FISH HAWK BAR.

Character of oyster growth.	Area.	Oysters per acre.			Estimated content of oysters.
		Under 3 inches.	Over 3 inches.	Total.	
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense	29	272	248	520	15,080
Scattering	27	176	92	268	7,236
Very scattering	13	131	36	167	2,171
Depleted	21	141	12	153	3,213
Total	90	....	....	....	27,700

DETAILS OF EXAMINATION OF FISH HAWK BAR.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
1075...	Mar. 27	5.0	2.55	0	25.9	13.7	9	231	332	563	Dense.
1087...	Apr. 5	5.5	2.38	0	26.9	15.5	4	239	375	614	Do.
1088...	...do.....	6.0	2.21	0	42.1	8.6	6	375	208	583	Do.
1089...	...do.....	5.5	2.38	0	32.4	8.4	2	288	203	491	Do.
1090...	...do.....	6.0	2.21	0	36.6	8.1	5	326	196	522	Do.
1094...	...do.....	6.0	2.21	0	19.5	7.2	2	173	174	347	Do.
1073...	Mar. 27	6.5	2.12	0	9.9	3.3	2	88	80	168	Scattering.
1074...	...do.....	6.0	2.21	0	15.8	3.2	1	141	77	218	Do.
1086...	Apr. 5	5.0	2.55	0	38.0	5.5	0	338	133	471	Do.
1093...	...do.....	6.5	2.12	0	15.5	3.3	2	138	80	218	Do.
1072...	Mar. 27	7.0	2.04	0	14.7	1.5	5	131	36	167	Very scattering.
1092...	Apr. 5	6.0	2.21	0	15.8	.5	5	141	12	153	Depleted.

28. PATCH NEAR FISH HAWK BAR.

There is a small dense patch of recent growth situated about one-fourth mile northeast of Fish Hawk Bar. It is nearly circular in outline, having a diameter slightly over 200 yards and an area of 9 acres. The patch has a depth at mean low water of 5 feet and an elevation from a few inches to about 1 foot. The bottom is firm mud and sand. The oysters are in small clusters and of good shape, although some scissor-bills were taken at a tonging station. An examination showed an average of about 168 bushels of seed and 373 bushels of market oysters per acre.

29. PATCH OFF SHEEPHEAD BAYOU (ST. VINCENT SOUND).

A small, very scattering patch of 6 acres is situated along the northeast shore of St. Vincent Island, about midway between Paradise and St. Vincent Points. Depth of water is 2 feet; bottom is of sand. The oysters are large and occur in scattering clusters, more or less covered with sea lettuce and green algæ. Some were partly buried in the sand. At the time of the survey they were fat and milky. Many small mussels and a few barnacles were taken. An examination of the patch showed an average of 6 bushels of seed and 55 bushels of market oysters per acre and a total of 366 bushels for the entire area.

30. PARADISE POINT BAR.

This somewhat rectangular-shaped bar of 74 acres is situated in the southeast section of St. Vincent Sound, off Paradise Point. Near the center a dense oval area of 11 acres is found, which is completely surrounded by a broad skirting of depleted bottoms of 63 acres. The depth ranges from 4½ to 6 feet at mean low water. The bottom, principally of sand with some mud, is hard and has but little elevation. The oysters are of good size and in small scattering bunches. When this part of the sound was surveyed the oysters were fat and becoming milky. The oysters are usually taken by nipping. Many mussels and some barnacles were noted.

The following tables give the results obtained on this bar:

OYSTER GROWTH ON PARADISE POINT BAR.

Character of oyster growth.	Area.	Oysters per acre.			Estimated content of oysters.
		Under 3 inches.	Over 3 inches.	Total.	
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense	11	191	158	349	3,839
Depleted	63	2	9	11	693
Total	74				4,532

DETAILS OF EXAMINATION OF PARADISE POINT BAR.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
1152	Apr. 7	5.5	2.38	0	0	5.0	1	0	152	152	Dense.
1213	Apr. 8	6.0	2.21		35.7	5.4	16	383	164	547	Do.
1149	Apr. 7	7.0	2.04	0	.5	1.0	1	5	30	35	Depleted.
1173	do	5.5	2.38	0	.4	.8	0	4	24	28	Do.
1151	do	5.0					1				Do.
1212	Apr. 8	0.5	(a)				0				Do.
1214	do	6.0					1				Do.
1215	do	6.5					1				Do.

a Hard mud.

31. PARADISE FLAT AND ADJACENT LUMP.

This very irregular flat is located off the north shore of St. Vincent Island and slightly east of the center of the sound. It has a length in a northeast-southwest direction of about 1 mile, an average width of 800 yards, and, including the small lump to the northeast, contains an approximate area of 299 acres. Depth of water is 2 to 4½ feet at mean low tide. The elevation, particularly along the northern limits, varies from a few inches to about 1 foot. The bottom is sand or sand

and mud with occasional buried shells. The bar exhibits all phases of oyster growth from dense areas to depleted bottoms, these two alone embracing about 30 per cent each of the entire bed, while the scattering growth includes about 21 per cent and the very scattering about 17 per cent.

The oysters are large, heavy shelled, of good shape, and occur in small to large clusters. When examined they were fat, in good condition, but becoming milky. Many mussels, some barnacles, and considerable sea lettuce were observed. The oysters are usually taken by nipping or hogging.

Two small patches of very scattering growth southwest of this bed were outlined but were not examined in detail. They are shown on the chart.

The following tables show the character and details of examination of the flat and adjacent lump:

OYSTER GROWTH ON PARADISE FLAT AND ADJACENT LUMP.

Character of oyster growth.	Area.	Oysters per acre.			Estimated content of oysters.
		Under 3 inches.	Over 3 inches.	Total.	
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense	93	28	337	365	33,945
Scattering	63	9	101	110	6,930
Very scattering	53	9	37	46	2,438
Depleted	90	2	0	2	180
Total	299	....	....	....	43,493

DETAILS OF EXAMINATION OF PARADISE FLAT AND ADJACENT LUMP.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
1181	Apr. 8	6.0	2.21	0	1.8	6.8	2	19	207	226	Dense.
1185	...do...	5.0	2.55	0	1.6	5.9	3	17	180	197	Do.
1195	...do...	6.5	2.12	0	.5	15.1	4	5	495	500	Do.
1197	...do...	5.0	2.55	0	0	5.5	1	0	167	167	Do.
1198	...do...	5.0	2.55	0	1.1	5.5	1	12	167	179	Do.
1203	...do...	5.0	2.55	0	2.7	5.9	3	29	180	209	Do.
1296	Apr. 14	4.0	3.05	0	2.9	8.2	5	31	249	280	Do.
1300	...do...	5.0	2.55	0	.8	10.9	1	9	332	341	Do.
1301	...do...	6.5	2.12	0	15.1	39.2	10	162	1,192	1,354	Do.
1302	...do...	4.5	2.80	0	0	6.5	6	0	198	198	Do.
1190	Apr. 8	6.0	2.21	0	.5	2.7	1	5	82	87	Scattering.
1196	...do...	5.5	2.38	0	.5	2.8	5	5	85	90	Do.
1201	...do...	3.5	3.35	0	0	2.9	1	0	88	88	Do.
1294	Apr. 14	3.5	3.35	0	.3	3.6	1	3	110	113	Do.
1297	...do...	5.0	2.55	0	2.4	4.3	39	26	131	157	Do.
1299	...do...	4.5	2.80	0	1.1	3.6	1	12	110	122	Do.
1182	Apr. 8	6.5	2.12	0	0	.9	0	0	27	27	Very scattering.
1186	...do...	4.0	3.05	0	.3	1.3	1	3	40	43	Do.
1188	...do...	4.0	3.05	0	3.6	1.9	11	38	58	.96	Do.
1199	...do...	4.5	2.80	0	0	1.1	0	0	33	33	Do.
1295	Apr. 14	3.5	3.35	0	.6	.9	2	6	27	33	Do.
1200	Apr. 8	4.0	3.05	0	.3	0	2	3	0	3	Depleted.
1202	...do...	4.0	[a] 3.05	0	0	0	0	0	0	0	Do.

[a] Scrap shells.

32. HOPPE FLAT.

This body of oysters, forming a broad skirting along the north shore of St. Vincent Sound, begins near Signal Hoppe and extends westward for about 1⅝ miles. Its breadth is about 400 yards, and, exclusive of the private claim located within the eastern limits, contains about 151 acres. Depth of water is from 1 to 4 feet, with inshore parts becoming dry or awash at low tide. The bottom is firm and composed of sand, mud, and scraps. A few buried shells were observed in the central section of the bar. The elevation on the outer border is about 1 foot. Both the east and west ends of the bed, comprising about 110 acres, bear scattering growths of oysters; the central portion of 32 acres, very scattering; and the tongue or projection, an area of 9 acres, dense growth.

The oysters are large, occur usually in small clusters, and were found fat and in good condition, but milky. Many mussels, some barnacles, and considerable sea lettuce were taken, especially on the scattering growth.

The following tables point out the character of oyster growth and examination of this bed:

OYSTER GROWTH ON HOPPE FLAT.

Character of oyster growth.	Area.	Oysters per acre.			Estimated content of oysters.
		Under 3 inches.	Over 3 inches.	Total.	
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense	9	171	790	961	8,649
Scattering	110	22	117	139	15,290
Very scattering	32	11	67	78	2,496
Total	151				26,435

DETAILS OF EXAMINATION OF HOPPE FLAT.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
1237	Apr. 12	2.0	4.50	0	16.0	26.0	0	171	790	961	Dense.
1216	...do	3.5	3.35	0	2.7	4.8	3	39	145	185	Scattering.
1232	...do	4.5	2.80	0	.7	4.0	6	7	121	128	Do.
1233	...do	2.0	4.50	0	2.9	3.1	2	31	94	125	Do.
1236	...do	4.5	2.80	0	1.1	3.6	3	12	109	121	Do.
1231	...do	4.5	2.80	0	1.0	2.2	5	11	67	78	Very scattering.

33. HOPPE OR TEN-MILE BAR.

This small dense area of 9 acres is situated near the center of St. Vincent Sound and lies equidistant from Paradise Flat and Bayou Bar on the south and Hoppe Flat on the north. At mean low water it has a depth of about 3½ feet. The rather firm bed consists of blue mud and sand and is surrounded by a soft bottom. A station off the north end of the bar revealed a penetration of 11 feet with the testing pole.

The oysters are good shaped and in small clusters. At the time of the investigation they were fresh, fat, and milky. An examination of this bar showed about 24 bushels of oysters under 3 inches and 155 bushels of large ones per acre.

34. SUTERS LUMPS.

Situated between Bayou Bar and Hoppe Flat are three small lumps totaling 7 acres. Two have dense and the other very scattering growths of oysters. Those patches were not examined in detail, but their location is indicated on the chart.

35. BAYOU BAR.

Beginning with a skirting of very scattering growth of oysters along the north shore of St. Vincent Island just east of the entrance to Big Bayou, this bar ranges northward for upward of a half mile, then bears to the east for about three-fourths mile in three tolerably well-defined arms. Its greatest width is approximately 500 yards, and its extent is about 177 acres. The depth of water at mean low tide is from 2 feet inshore to about 4 feet at the northern margin. The bed is only fairly well raised above the immediate floor and will hardly average 6 inches for its entire perimeter. The bottom is hard and consists principally of sand and mud with some scraps. The dense area lying to the eastward comprises about 60 per cent; scattering growth, in two small sections, 13 per cent; and very scattering, the connecting link between the main body and the island shore, about 26 per cent of the bar.

The oysters are very large and occur singly or in small clusters. When inspected they were fat, fresh, milky, and growing rapidly. Mussels, barnacles, and sea lettuce were found at nearly every station.

The acreage, character of growth, and details of examination are shown in the following tables:

OYSTER GROWTH ON BAYOU BAR.

Character of oyster growth.	Area.	Oysters per acre.			Estimated content of oysters.
		Under 3 inches.	Over 3 inches.	Total.	
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense	106	16	235	251	26,606
Scattering	24	7	94	101	2,424
Very scattering	47	0	73	73	3,431
Total	177				32,461

DETAILS OF EXAMINATION OF BAYOU BAR.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
1220...	Apr. 12	4.5	2.80	0	1.5	9.5	4	16	289	305	Dense.
1293...	Apr. 14	4.0	3.05	0	2.9	7.2	3	31	219	250	Do.
1303...	...do.....	4.5	2.80	0	0	6.5	6	0	198	198	Do.
1229...	Apr. 12	4.0	3.05	0	.7	3.3	4	7	100	107	Scattering.
1304...	Apr. 14	4.0	3.05	0	.7	2.9	1	7	88	95	Do.
1292...	...do.....	3.5	3.35	0	0	2.4	1	0	73	73	Very scattering.

That portion of the north shore of St. Vincent Island reaching from Big Bayou to St. Vincent Point, a distance of about 5 miles, has a firm bottom generally and usually clear and comparatively shallow water, with here and there scattering bunches of good oysters. When practicable, these grounds and adjacent bars are fished by nipping or by wading. It was stated that the work is often pursued by day in a flatboat or light-draft vessel, the product then taken to near-by oyster boats and culled at night; and also that under favorable conditions two men can gather from 12 to 15 barrels of oysters per day by these methods.

36. PATCHES OFF BIG BAYOU.

A small circular patch of dense growth of oysters is situated about three-fourths mile north of Big Bayou. This patch contains about 3 acres, the bottom is hard and fairly well raised above the neighboring grounds, and the depth is about 3 feet at mean low water. The oysters were good shaped, in small clusters, and were fat, fresh, and milky. An examination showed 10 bushels of seed and 228 bushels of marketable product per acre.

A small area about midway between the above patch and Big Bayou had a bottom composed of mud and dead shells; depth of water, about 4 feet.

A lump of limited extent and bearing very scattering growth is located about one-half mile west of the above area and 200 yards offshore; depth of water, 3 feet. No examination was made on this lump, but its position is indicated on the chart.

37. HALF MOON BAR.

This bed of 122 acres lies off the mainland or northern shore of St. Vincent Sound and 1 mile northwest of Bayou Bar. Its length in an east and west direction is about 1¼ miles, and its greatest width is about 400 yards; depth of water, 2 to 3½ feet. The bottom varies from hard to medium, the eastern portion is largely sand, and the remainder is mud and sand. Some stations showed a slight deposit of yellow mud on top.

The oysters are, for the most part, large, deep, and occur in small clusters or as singles. The dense growth, comprising about 61 per cent of the total area, occupies the western portion of the bar. The scattering growth and depleted bottoms, of about 17 and 21 per cent, respectively, are found at the eastern section. At the time of the inspection the oysters were fat, fresh, and milky. Sea lettuce was observed at some stations.

The acreage, character of growth, and details of examination are shown in the following tables:

OYSTER GROWTH ON HALF MOON BAR.

Character of oyster growth.	Area.	Oysters per acre.			Estimated content of oysters.
		Under 3 inches.	Over 3 inches.	Total.	
	Acres.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Dense	75	26	262	288	21,600
Scattering	21	7	109	116	2,436
Depleted	26	0	12	12	312
Total	122				24,348

DETAILS OF EXAMINATION OF HALF MOON BAR.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
1250	Apr. 12	5.5	2.38	0	2.1	6.3	4	22	192	214	Dense.
1254	...do	4.5	2.80	0	2.9	10.9	1	31	332	363	Do.
1251	...do	5.0	2.55	0	0.8	3.9	0	9	118	127	Scattering.
1253	...do	4.5	2.80	0	0.4	3.3	2	4	100	104	Do.
1252	...do	4.5	2.80	0	0	.4	0	0	12	12	Depleted.

38. SHELL BANK BAR.

This long sinuous bar begins in the shallow water along the north shore of the sound near Signal Tree and extends south and southeast for about 1¼ miles. The greater part is very narrow, the crest or top of which consists of small bars dry or awash at low tide. The easternmost extremity broadens to a nearly circular outline with a breadth of about one-fourth mile. The entire area is about 129 acres. It is separated from Picoline Bar by a channel known locally as Big Gully, which has a depth of 26 to 29 feet. The hard, clean bottom is composed principally of sand, shell gravel, and shells, and depth of water ranges from a few inches to about 6 feet.

The oysters are large, of good shape, generally deep, and occur in small clusters or as singles. When examined they were fat and milky. Very few mussels and barnacles were noted, although some of the older shells contained a number of the boring clam *Martesia*.

An average of five stations made on this bar gave the following results: 34 bushels of oysters under 3 inches and 358 bushels over 3 inches per acre. The bar has dense growth throughout.

DETAILS OF EXAMINATION OF SHELL BANK BAR.

Station.	Date of examination.	Depth of water.	Area covered.	Oysters caught per square yard.			Shells per square yard.	Estimated quantity oysters per acre.			Character of oyster growth.
				Spat.	Culls.	Counts.		Seed.	Market.	Total.	
	1915.	*Feet.*	*Sq. yds.*					*Bush.*	*Bush.*	*Bush.*	
1255...	Apr. 12	6.5	2.12	0	4.7	11.8	3	50	358	408	Dense.
1256...	...do.....	7.5	2.04	0	2.4	5.4	19	26	164	190	Do.
1260...	...do.....	5.0	2.55	0	4.3	18.4	11	46	559	605	Do.
1288...	Apr. 13	1.5	1.0	0	2.0	13.0	20	21	395	416	Do.
1306...	Apr. 14	6.5	2.12	0	2.4	10.4	14	25	316	341	Do.

39. PICOLINE BAR.

Picoline Bar is situated in the southwestern section of St. Vincent Sound, about 3 miles east of Indian Pass. No detailed examination was made on this bar, but its position is shown on the chart. It consists principally of shallow reefs extending northward from St. Vincent Island to the Big Gully. Both on the east and west it is delimited by private claims. The present limits are about one-half mile in length by 300 yards in width, having an approximate area of 48 acres. The margins along the northeast and northwest portions have a depth of about 4 feet and a hard bottom of sand and scrap shells, but no oysters. The top has dense growth. Formerly this bar was a bed of dead oysters.

40. CEDAR SHELL BANK BAR.

This consists of two shallow bars reaching southward from the mainland, about 2 miles east of Indian Pass. The western and upper third of the eastern extensions bear dense growth, consisting mostly of clusters of the shallow-bar type and generally of scrawny appearance. However, some singles are of fine shape.

A station made by wading on the lower end of the west reef revealed a hard bottom, with 14 small oysters, 21 from 3 to 4 inches in length, and 98 large ones, and 10 shells per square yard. Sea lettuce and a few mussels were observed. When examined the oysters were fat and milky.

The lower two-thirds of the east reef supports scattering growth. A station near the center of this section, in a depth of 3 feet and on a medium-hard bottom, gave the following results: 0.3 culls, 3.6

counts, and 1 shell per square yard. On this part of the bar the oysters were mostly good-shaped singles; they were fat and milky. The bar contains about 48 acres.

REVIEW OF THE NATURAL OYSTER BEDS.

The entire water area surveyed, from signals Marsh and Spartan to Indian Pass, contains about 130 square miles. In this district there were found and definitely located about 40 productive oyster bars, having an extent of about 7,135 acres, or 11.1 square miles, or nearly one-twelfth of the area surveyed.

In St. George Sound the ratio of beds to the part surveyed is, approximately, 1 to 6; in Apalachicola Bay the ratio is about 1 to 19, and in St. Vincent Sound it is about 1 to 10. Of the three bodies of water it is therefore evident that St. George Sound is the most advantageously situated as far as acreage of oyster beds is concerned and Apalachicola Bay the least so.

In St. George Sound the beds are rather indiscriminately located, but the larger ones are found along the western margin. The best beds are Porter, East Hole, and parts of Platform Bars.

In Apalachicola Bay the major portion of the beds are crowded in the western limits, where excellent stock is found, and in St. Vincent Sound the beds are for the most part situated along the southeastern shore and central portions.

About two-thirds of the total area of oyster bottom is classed as dense growth, the remaining part is about equally divided among scattering, very scattering growths, and depleted bottoms. Dense growth occupies somewhat more than 80 per cent of the oyster area in St. George Sound and about 50 per cent each in Apalachicola Bay and St. Vincent Sound. Scattering growth covers approximately 5 per cent, 11 per cent, and 21 per cent in the three bodies of water, respectively, while the per cent of surface for very scattering is about 6, 23, and 13, and for depleted bottoms it is about 5, 14, and 17, respectively.

The chart which accompanies this report shows the location and character of the beds, and the following table classifies the growth for each of the larger beds and for groups of the smaller patches.

SUMMARIZED STATEMENT OF AREAS OF MARKET OYSTERS ON PUBLIC BEDS.

Name of bed.	Character of oyster growth.				Total.
	Dense.	Scattering.	Very scattering.	Depleted.	
ST. GEORGE SOUND.	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*
1. Goose Island Bar	24		126		150
2. Silvia Bar	57	4	8		69
3. Drum Bar	81			30	111
4. Sand Flat	20	20			40
5. Pelican Bar	69	17	6	5	97
6. North Lump		5		5	10
7. Green Point Bar and adjacent patch	21	9	17	10	57
8. Platform Bar	332		5	2	339
9. Porter Bar	114	9	25	112	260
10. Peanut Patch	123				123
11. Cat Point Bar	686	102		6	794
12. Bulkhead and East Hole Bars	1,322	12	30	15	1,379
13. Patches east of Bulkhead and East Hole Bars	5				5
APALACHICOLA BAY.					
14. Pelican Bar	91		110	97	298
15. Patches between East Hole and Pelican Bars	38	5			43
16. East Lumps	168	4	24	28	224
17. Norman Bar	45				45
18. Thigpen Bar	4				4
19. West Lump and adjacent patch	75	11	5		91
20. Patch off New Inlet	5				5
21. Hagen Flat	54	8			62
22. Green Point Flat	170				170
23. Lumps between Hagen and Green Point Flats	22		3		25
24. St. Vincent Bar	585	218	391	220	1,414
25. Middle Bar	48				48
26. Silva Bar	23	8	69		100
27. Fish Hawk Bar	29	27	13	21	90
28. Patch near Fish Hawk Bar	9				9
ST. VINCENT SOUND.					
29. Patch off Sheephead Bayou			6		6
30. Paradise Point Bar	11			63	74
31. Paradise Flat and adjacent lump	93	63	53	90	299
32. Hoppe Flat	9	110	32		151
33. Hoppe or Ten-Mile Bar	9				9
34. Suters Lumps	5		2		7
35. Bayou Bar	106	24	47		177
36. Patches off Big Bayou	3				3
37. Half Moon Bar	75	21		26	122
38. Shell Bank Bar	129				129
39. Picoline Bar	48				48
40. Cedar Shell Bank Bar	39	9			48
Total	4,747	686	972	730	7,135

The following table shows the character of oyster growth and yield in standard United States bushels for the various bars. The classification, as is explained on page 11, is based on the relative abundance of oysters over 3 inches long, which is assumed to be the minimum size that could be used for market purposes. The smaller oysters, while recorded and elsewhere discussed, do not enter in any way into the classification. Neither does the term "dense" mean a continuous cover of massed oysters. It is used to express the condition where oysters in excess of 150 bushels per acre are found on the bottom, lying on the mud or sand, either as a continuous growth or in separated clusters.

It may be stated that, as a rule, only those oysters having a length of 4 inches or over were taken to market by the tongers; those under that length were considered as culls. The unit of measure used by those engaged in the industry is the Florida tub, or so-called "bushel," which contains about 2.2 bushels. If based on these data—the Florida bushel and 4-inch oyster—the yield per acre and per bar would be materially less than that determined according to the classification and measurements mentioned above.

The table shows an average of 368 bushels of marketable oysters per acre for the entire area of oyster beds in the district and an average of about 525 bushels per acre for the dense growth. Exclusive, however, of Bulkhead and East Hole Bars, the average for the entire oyster area drops to 274 bushels.

SUMMARIZED CONTENT OF MARKET OYSTERS ON PUBLIC BEDS.

Name of bed.	Character of oyster growth.				Total.
	Dense.	Scattering.	Very scattering.	Depleted.	
ST. GEORGE SOUND.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
1. Goose Island Bar	8,592		7,308		15,900
2. Silvia Bar	19,209	416	536		20,161
3. Drum Bar	27,216			360	27,576
4. Sand Flat	4,620	2,300			6,920
5. Pelican Bar	31,257	2,210	276	105	33,848
6. North Lump		725			725
7. Green Point Bar and adjacent patch	4,074	1,188	1,139	200	6,601
8. Platform Bar	222,772		90		222,862
9. Porter Bar	28,272	1,026	1,175	2,800	33,273
10. Peanut Patch	67,281				67,281
11. Cat Point Bar	324,478	11,028		126	336,232
12. Bulkhead and East Hole Bars	1,043,058	1,344	1,590	195	1,046,187
13. Patches east of Bulkhead and East Hole Bars	1,440				1,440
APALACHICOLA BAY.					
14. Pelican Bar	53,053		5,720	291	59,064
15. Patches between East Hole and Pelican Bars	17,024	500			17,524
16. East Lumps	76,104	308	1,296		77,708
17. Norman Bar	23,220				23,220
18. Thigpen Bar	1,020				1,020
19. West Lump and adjacent patch	31,875	1,386	310		33,571
20. Patch off New Inlet	980				980
21. Hagen Flat	34,236	752			34,988
22. Green Point Flat	70,380				70,380
23. Lumps between Hagen and Green Point Flats	10,296		78		10,374
24. St. Vincent Bar	221,130	24,634	19,550	3,740	269,054
25. Middle Bar	19,008				19,008
26. Silva Bar	7,314	1,104	3,933		12,351
27. Fish Hawk Bar	7,192	2,484	468	252	10,396
28. Patch near Fish Hawk Bar	3,357				3,357
ST. VINCENT SOUND.					
29. Patch off Sheephead Bayou			330		330
30. Paradise Point Bar	1,738			567	2,305
31. Paradise Flat and adjacent lump	31,341	6,363	1,961		39,665
32. Hoppe Flat	7,110	12,870	2,144		22,124
33. Hoppe or Ten-Mile Bar	1,395				1,395
34. Suters lumps [a]					
35. Bayou Bar	24,910	2,256	3,431		30,597
36. Patches off Big Bayou	684				684
37. Half Moon Bar	19,650	2,289		312	22,251
38. Shell Bank Bar	46,182				46,182
39. Picoline Bar [a]					
40. Cedar Shell Bank Bar [a]					
Total	2,491,468	75,783	51,335	8,948	2,627,534

[a] Detailed examination was not made over the entire bar.

With reference to quantity, the small oysters, or those under 3 inches long, are about one-fifth that of the market stock, but numerically they are about twice as numerous as the market stock.

SUMMARIZED CONTENT OF YOUNG OYSTERS ON PUBLIC BEDS.

Name of bed.	Character of oyster growth.				Total.
	Dense.	Scattering.	Very scattering.	Depleted.	
ST. GEORGE SOUND.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
1. Goose Island Bar	2,760		3,024		5,784
2. Silvia Bar	7,752	660	32		8,444
3. Drum Bar	8,748			960	9,708
4. Sand Flat	1,540	1,540			3,080
5. Pelican Bar	6,693	1,802	180	95	8,770
6. North Lump		405		35	440
7. Green Point Bar and adjacent patch	2,226	216	357	210	3,009
8. Platform Bar	36,852				36,852
9. Porter Bar	10,716	477	300	3,024	14,517
10. Peanut Patch	17,220				17,220
11. Cat Point Bar	53,508	4,080		378	57,966
12. Bulkhead and East Hole Bars	158,640	696	1,170	195	160,701
13. Patches east of Bulkhead and East Hole Bars	545				545
APALACHICOLA BAY.					
14. Pelican Bar	10,556		6,380	970	17,906
15. Patches between East Hole and Pelican Bars	2,850	300			3,150
16. East Lumps	17,136	72	1,056		18,264
17. Norman Bar	2,745				2,745
18. Thigpen Bar	324				324
19. West Lump and adjacent patch	5,325	319			5,644
20. Patch off New Inlet	175				175
21. Hagen Flat	5,346	200			5,546
22. Green Point Flat	17,850				17,850
23. Lumps between Hagen and Green Point Flats	1,232		18		1,250
24. St. Vincent Bar	39,780	5,886	6,256	6,380	58,302
25. Middle Bar	2,352				2,352
26. Silva Bar	897	480	897		2,274
27. Fish Hawk Bar	7,888	4,752	1,703	2,961	17,304
28. Patch near Fish Hawk Bar	1,512				1,512
ST. VINCENT SOUND.					
29. Patch off Sheephead Bayou			36		36
30. Paradise Point Bar	2,101			126	2,227
31. Paradise Flat and adjacent lump	2,604	567	477	180	3,828
32. Hoppe Flat	1,539	2,420	352		4,311
33. Hoppe or Ten-Mile Bar	216				216
34. Suters Lumps[a]					
35. Bayou Bar	1,696	168			1,864
36. Patches off Big Bayou	30				30
37. Half Moon Bar	1,950	147			2,097
38. Shell Bank Bar	4,386				4,386
39. Picoline Bar[a]					
40. Cedar Shell Bank Bar[a]					
Total	437,690	25,187	22,238	15,514	500,629

[a] Detailed examination was not made over the entire bar.

For some phase of the growth, from dense areas to depleted bottoms, small oysters were in numerical preponderance on only about 45 per cent of the beds. Of these the greater number were in St. George Sound. At the time of the survey spat for the season had not set, which, of course, would reduce the proportion of the young. On those beds, however, where large oysters predominated the small size were in sufficient numbers to perpetuate the beds under present conditions, unless depleted by physical accidents, such as storms, freezes, or deposits of silt and sand, all of which have occurred on some bars during the history of the local fishery.

Among the beds which appear to be the least provided with young stock are Platform Bar and Peanut Patch in St. George Sound; Norman, West Lump, Hagen Flat, Green Point Flat, Middle, and Silva Bars in Apalachicola Bay, and the greater number of bars in St. Vincent Sound.

From the table it appears that the following beds are extending their productive areas by improvement of the very scattering growths and depleted bottoms: Drum, Pelican, Green Point, Porter, Cat Point, Bulkhead, and East Hole Bars in St. George Sound, and Pelican, St. Vincent, and Fish Hawk Bars in Apalachicola Bay.

NUMBER OF OYSTERS UNDER THREE INCHES LONG FOR EACH ONE OVER THAT LENGTH ON THE SEVERAL BEDS.

Name of bed.	Character of oyster growth.			
	Dense.	Scattering.	Very scattering.	Depleted.
ST. GEORGE SOUND.				
1. Goose Island Bar	0.9	....	1.1	....
2. Silvia Bar	1.1	2.9	.7	....
3. Drum Bar	.9	....	....	7.5
4. Sand Flat	.9	1.8	....	....
5. Pelican Bar	.6	2.3	1.8	8.8
6. North Lump	....	1.6	....	(a)
7. Green Point Bar and adjacent patch	1.5	.5	1.8	2.8
8. Platform Bar	.5	....	(b)	....
9. Porter Bar	1.3	1.7	1.5	4.0
10. Peanut Patch	.8	....	....	....
11. Cat Point Bar	.5	1.2	....	8.9
12. Bulkhead and East Hole Bars	.4	1.6	3.1	3.0
13. Patches east of Bulkhead and East Hole Bars	1.4	....	....	....
APALACHICOLA BAY.				
14. Pelican Bar	.6	....	4.3	10.2
15. Patches between East Hole and Pelican Bars	.5	2.0	....	....
16. East Lumps	.6	.7	2.2	....
17. Norman Bar	.4	....	....	....
18. Thigpen Bar	.9	....	....	....
19. West Lump and adjacent patch	.5	.6	(b)	....
20. Patch off New Inlet	.4	....	....	....
21. Hagen Flat	.3	.7	....	....
22. Green Point Flat	.6	....	....	....
23. Lumps between Hagen and Green Point Flats	.3	....	.5	....
24. St. Vincent Bar	.3	.5	.6	3.8
25. Middle Bar	.3	....	....	....
26. Silva Bar	.3	.9	.4	....
27. Fish Hawk Bar	3.0	5.2	9.8	31.6
28. Patch near Fish Hawk Bar	.9	....	....	....
ST. VINCENT SOUND.				
29. Patch off Sheephead Bayou	....	....	.3	....
30. Paradise Point Bar	3.4	....	....	.5
31. Paradise Flat and adjacent lump	.2	.2	.7	(a)
32. Hoppe Flat	.6	.5	.5	....
33. Hoppe or Ten-Mile Bar	.4	....	....	....
34. Suters Lumps[c]	....	....	....	....
35. Bayou Bar	.2	.2	(b)	....
36. Patches off Big Bayou	.1	....	....	....
37. Half Moon Bar	.3	.2	....	(b)
38. Shell Bank Bar	.3	....	....	....
39. Picoline Bar[c]	....	....	....	....
40. Cedar Shell Bank Bar	.1	.1	....	....

[a] No large. [b] No small. [b] Detailed examination was not made over the entire bar.

BARREN BOTTOMS.

The area of barren bottoms—that is, those which are not naturally productive of oysters even in small quantities—vastly exceeds that of the natural beds, including in the latter those so-called depleted areas which bear practically nothing. These bottoms are barren, mainly because of one character in which they differ from the productive areas—namely, that they are devoid of shells or other objects lying on the surface. They consist of sand and mud of varying degrees of stability and consistency. Oysters, immediately after they develop from the egg, for a brief period swim or float freely in the water, settling to a fixed condition only after they reach a stage of considerable development.[a]

It is not necessary to give more detail to this subject other than to say that at the time at which they are undergoing fixation the oysters are very minute, and a slight film of mud or slime is sufficient to stifle them. During the spawning season these little organisms are present in the water in untold myriads and are precipitated to the bottom in a continuous gentle drizzle of tiny specks. If they fall on an oyster bed they find firm supports on the shells and oysters, attach themselves and grow, but if they fall on the mud or bare sand they die.

The natural beds have been slowly developed on bottom similar to that which surrounds them solely because through some agency there originally lodged on the mud or sand some hard objects to which the young oysters could safely cling. Oysters developing there and their shells scattered about by the waves furnished additional places for fixation of new generations of young, with the result that the original growth extended in area and its bed became a compact mass of shells and fragments, beneath which can still be found by excavation or probing the original bottom differing in no essential particular from the adjacent barren areas.

All that is required by the barren bottom in order that it may become productive is that its surface should be supplied with hard objects or cultch, either through natural agencies or by the hand of man. The capacity of the bottom to sustain material deposited on it and to maintain it in proper condition to serve as cultch depends largely on its stability and consistency. Moving sands gradually cover objects deposited on their surface and soft mud permits them to sink. It is therefore of prime importance for the oyster culturist to have information concerning the character of the bottom, and it was one of the purposes of the survey to supply it.

The methods and the instrument employed have been described in the introductory part of this report, and the results attained are shown graphically on the chart.

[a] For a more extended account see "Oysters and methods of oyster culture," by H. F. Moore, Bureau of Fisheries document no. 349, which may be obtained by application to the Bureau at Washington, D. C.

The symbols on the chart designating the character of the bottom do not show all of the places at which examinations were made, but only those which have been selected as representative of the general conditions obtaining in the vicinity. It may be assumed that between any two adjacent symbols of different significance the change in the character of the bottom is more or less gradual.

The large number of soundings and bottom testings made during the course of the survey furnish valuable data for the determination of the character of the floor of the entire district. About 119 square miles, or 91 per cent of the region, exclusive of the depleted grounds of or adjacent to the recognized oyster reefs, consist of unoystered areas.

Of the productive portion of St. George Sound the eastern half has for the most part a firm hard bottom suitable for the development of oyster beds. The depth of water in this section is about 9 feet at mean low level. In certain portions, however, as between Porter and Green Point Bars and for some distance to the eastward of the latter bar, the bottom varies in quality from very soft to stiff mud and is unfavorable for the planting of shells or other cultch. The western half of the sound, barring the shore line, has generally very soft bottoms. Between Porter and Cat Point Bars and south of Peanut Patch there are stretches having ooze. Hard or stiff mud bottoms are found east of Drum Bar, between Silvia and Porter Bars, and northeast of signal Bulkhead.

With the exception of the margins, the greater portion of Apalachicola Bay has many soft or ooze bottoms. At a station west of St. Vincent Bar the testing pole recorded a depth of 8 feet of mud. Good firm bottoms are found on a small area west of Cat Point Bar, an extended section (of which a part was a bed of dead shells when examined by the Bureau 20 years ago) west and northwest of Pelican Bar, a stretch off signal Scaffold, a portion south of Green Point, a stiff mud area east of St. Vincent Bar, and a series of small patches northeast of West Pass. Depth of water ranges from 5 to 10 feet.

The eastern half of St. Vincent Sound has rather soft bottoms, but the western division is hard, firm, and more or less covered with scrap shells.

The location of barren bottoms which appear to be suitable for the development and culture of oysters may be approximately determined by consulting the chart.

GENERAL PHYSICAL AND BIOLOGICAL CONDITIONS.

TIDES AND CURRENTS.

In order to reduce the great number of soundings made during the survey to approximate mean low-water level, four widely separated tide-gauge stations, consisting of plain staffs graduated in feet and tenths, were established and maintained for all or part of the time. One station was located at Cat Point (East Point, Fla.) from January 16 to April 9; the second station was at Apalachicola, Fla., from January 21 to April 15; the third on St. Vincent Island near West Pass from March 23 to April 16; the fourth at the camps along the north shore of St. Vincent Sound from April 2 to 20. The readings were made hourly from 8 a. m. to 5 p. m., excepting at the Apalachicola station, which was read every hour, day and night, from its establishment until the last of February, then the same as for the other stations for the remainder of the period.

At the Cat Point station the highest tide recorded was on February 23, when the water stood at 5.8 feet on the gauge, and the lowest was on January 29, when it fell to 1 foot, a maximum range of 4.8 feet. At Apalachicola on the same dates there was a range of 4.1 feet, but on February 1, from 3 to 4 a. m., the water reached a height of 6.8 feet, and on February 8, from 5 to 6 a. m., it stood at 2.4 feet, making a range of 4.4 feet. The West Pass station showed a maximum range of 1.8 feet and the camp stations about 2 feet. The mean range of tide was 1.5 feet for all stations, except West Pass, which was 1 foot.

The daily ebb and flow of the tide, though often augmented by high winds, is sufficiently strong to afford satisfactory currents for transporting food and oxygen to the oysters.

SALINITY AND TEMPERATURE OF THE WATER.

The connections or entrances at the eastern end of St. George Sound, West and Indian Passes, afford ample means for the commingling of the waters from the Gulf of Mexico with the fresh water brought down by the Carrabelle, Apalachicola, St. Marks, and other affluents. Throughout the entire district surveyed there was a marked range in the degree of salinity, which varied from almost fresh water suitable for drinking purposes to that nearly equal to open-sea water. At times, especially during ebb tide, together with freshets and favorable winds, the salinity was greatly reduced in certain sections. Early in the survey it was noted that comparatively fresh muddy water from East Bay overlapped the heavier clear salt water and extended for some distance east or west of that bay, depending largely on the direction of the wind before becoming thoroughly mixed. In this way the oyster beds are supplied with food, as it appears to be carried for many miles. If the direction of the currents be eastward, Cat Point and Porter Bars may have food-bearing waters spreading over them for some time before Bulkhead and East Hole Bars.

The character and quality of the oyster, as well as the presence or absence of certain enemies, are governed largely by the amount of salt in solution. This mollusk thrives best in brackish water, having a mean between fresh (specific gravity 1.000) and open-sea water (specific gravity about 1.025). Either extreme, if continued, is decidedly injurious, if not fatal. Waters of rather high salinity are more favorable for drills or conchs, while mussels thrive in waters of low salt content.

For the purpose of determining the general character of the waters, two separate but simultaneous series of observations of salinity and temperature were carefully made. From the *Fish Hawk* the work was performed by the quartermasters at 6 a. m., noon, and 6 p. m., daily throughout the survey.

The vessel was first anchored off Cat Point, remaining there until the latter part of February; then off Jetty Beacon for about one month; next, in southwestern part of Apalachicola Bay for about a week; and, finally, near the second anchorage until the completion of the survey. The biological party conducted the other series, which covered all parts of the region surveyed, including stations on the oyster bars and on unproductive grounds.

The water bottle, or apparatus used for collecting the samples, is so constructed that it secures a uniform amount of water in every case from the layer a few inches above the bottom of the sound, regardless of the depth. This instrument is illustrated and described in "Volumetric studies of the food and feeding of oysters," by H. F. Moore (Bulletin Bureau of Fisheries, vol. XXVIII, p. 1297–1308).

The following table furnishes a summary of the two series of observations. The boldface type shows the data and location of the *Fish Hawk;* the other type, that of the biological party.

SALINITY AND TEMPERATURE OBSERVATIONS IN ST. GEORGE SOUND, APALACHICOLA BAY, AND ST. VINCENT SOUND.

Locality.	Date.	Water temperature.			Specific gravity.		
		Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.
	1915.	°F.	°F.	°F.			
Fish Hawk, off Cat Point	Jan. 12–15	**59**	**48.2**	**53.2**	**1.0088**	**1.0026**	**1.0054**
Fish Hawk, off Cat Point	Jan. 16–23	**60.8**	**51.8**	**56.7**	**1.0098**	**1.0006**	**1.0058**
Eastern end of St. George Sound.	do	57.2	51.8	54.8	1.0190	1.0036	1.0113
Fish Hawk, off Cat Point	Jan. 24–31	**59**	**53.6**	**58**	**1.0097**	**1.0041**	**1.0062**
Vicinity of Porter and Platform Bars.	do	55.4	51.8	54.4	1.0088	1.0019	1.0056
Fish Hawk, off Cat Point	Feb. 1–5	**60.8**	**58.6**	**59.4**	**1.0089**	**1.0014**	**1.0045**
East of Cat Point and Bulkhead Bars.	do	60.8	53.6	56.3	1.0053	1.0004	1.0020
Fish Hawk, off Cat Point	Feb. 6–10	**60.8**	**53.6**	**56.9**	**1.0032**	**1.0010**	**1.0019**
Vicinity of East Hole, Cat Point, and East Bay.	do	54.5	50	52.9	1.0062	1.0001	1.0025
Fish Hawk, off Cat Point	Feb. 11–17	**60.8**	**54.5**	**56.9**	**1.0095**	**1.0025**	**1.0058**
Vicinity of Drum, Platform, and Cat Point Bars.	do	59.9	53.6	57.7	1.0139	1.0022	1.0070
Fish Hawk, off Cat Point	Feb. 18–22	**60.8**	**55.4**	**58**	**1.0220**	**1.0058**	**1.0158**
Vicinity of Pelican Bar, and east part of Apalachicola Bay.	do	58.1	57.2	57.4	1.0218	1.0097	1.0172

SALINITY AND TEMPERATURE OBSERVATIONS IN ST. GEORGE SOUND, APALACHICOLA BAY, AND ST. VINCENT SOUND—Continued.

Locality.	Date.	Water temperature.			Specific gravity.		
		Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.
	1915.	°F.	°F.	°F.			
Fish Hawk, off Jetty Beacon.	Feb. 23-28	**60.8**	**57.2**	**59.4**	**1.0220**	**1.0114**	**1.0176**
Eastern part of Apalachicola Bay.	do	59	56.3	57.5	1.0160	1.0117	1.0133
Fish Hawk, off Jetty Beacon.	Mar. 1-6	**60.8**	**53.6**	**57**	**1.0158**	**1.0069**	**1.0119**
Vicinity of Norman Bar, East Bay.	do	60.8	53.6	56.8	1.0152	1.0068	1.0097
Fish Hawk, off Jetty Beacon.	Mar. 7-15	**57.2**	**51.8**	**54.7**	**1.0189**	**1.0077**	**1.0185**
Vicinity of Apalachicola	do	57.2	55.4	56.6	1.0177	1.0038	1.0082
Fish Hawk, off Jetty Beacon.	Mar. 16-22	**60.8**	**53.6**	**57.2**	**1.0210**	**1.0119**	**1.0174**
Central part of Apalachicola Bay.	do	57.2	55.4	56.6	1.0228	1.0177	1.0209
Fish Hawk, at Lower Anchorage.	Mar. 23-28	**59**	**55.4**	**57**	**1.0242**	**1.0077**	**1.0188**
Western part of Apalachicola Bay.	do	62.6	55.4	60.3	1.0246	1.0149	1.0208
Fish Hawk, off Jetty Beacon.	Mar. 29-Apr. 5	**62.2**	**53.6**	**58.8**	**1.0198**	**1.0050**	**1.0120**
Western part of Apalachicola Bay.	do	59	57.2	58.1	1.0156	1.0118	1.0137
Fish Hawk, off Jetty Beacon.	Apr. 6-11	**68**	**53.6**	**59.4**	**1.0190**	**1.0109**	**1.0151**
Eastern part of St. Vincent Sound.	do	64.4	60.8	62.7	1.0204	1.0067	1.0115
Fish Hawk, off Jetty Beacon.	Apr. 12-15	**71.6**	**57.2**	**64.9**	**1.0188**	**1.0061**	**1.0121**
Central and western part of St. Vincent Sound.	do	76.1	68	71	1.0219	1.0074	1.0102

The table shows that the average water temperature in Apalachicola Bay, as determined by the observations taken on the *Fish Hawk*, ranged from 53.2° F. in the middle of January to 64.9° F. in the middle of April, a gradual increase of 11.7° during the interval. Also, the lowest temperature observed was 48.2° F., off Cat Point in January, and the highest 76.1° F., in rather shallow water at the western borders of St. Vincent Sound during the middle of April. showing a change of 27.9°.

During the early part of February a very low salinity observation (1.0001) was made near the eastern limits of Apalachicola Bay, and during the latter part of March, in the western part of the same body of water, an observation revealed a high salt content (1.0246). As has been mentioned, these extremes continue for very short periods only. The general average salinity is satisfactory and within the limits of safety.

OYSTER ENEMIES.

From statements of dealers and tongers, as well as from observation, it appears that the oyster in this locality has no aggressive enemies. Physical conditions, however, are often decidedly injurious to certain bars or localities. Storms may cause a shifting of sand or mud over the beds and stifle the mollusk, freshets may deposit a layer of mud, droughts may reduce greatly the food supply, and freezing weather accompanied by a low tide may prove very harmful.

The following information is furnished respecting certain enemies which are common in other parts of the Gulf coast:

Drills or conchs.—So few drills were found on the oyster beds that no damage whatever was noted, and they may be regarded as a negligible quantity in these waters. The few that were taken were found, for the most part, in the western extremity of Apalachicola Bay, in the vicinity of West Pass, where the salinity naturally attains a high degree for a part of the time at least. Under the description of the various beds, mention is made of the places and number of drills taken. It is commonly supposed by oystermen that the drill secretes an acid by which it perforates the oyster shells by solution, but in reality the holes are made mechanically by means of a rasplike tongue, which is protruded from the mouth.

Mussels (*Mytilus hamalus*).—This species, which was found on the oyster bars, is distinct from the large edible sea mussel of the Atlantic coast and, also, the fresh-water mussel used for the manufacture of buttons and novelties. So far as is known, it has no present economic use, but doubtless it would make a good fertilizer. Although this mollusk is classed as an oyster enemy, it is not one in the sense of preying on this more valuable shellfish. It is injurious in that it eats the same kind of food as the oyster, and, therefore, lessens the food supply; and its more prolific growth enables it to cover the oyster, which interferes with its development, and eventually, may stifle or starve it.

Mussels were found in varying quantities on practically all of the oyster beds. They were found in rather larger numbers on the reefs in the vicinity of East Bay, where the salinity of the water is reduced by reason of the proximity of the large affluents, and, also, on the beds in the southeastern section of St. Vincent Sound. They were only fairly abundant on the eastern beds, and least so at the western ends of both Apalachicola Bay and St. Vincent Sound.

Drumfish (*Pogonias cromis*).—The black drum was not observed during the survey, nor was it learned that it had ever caused destruction of the oysters of this region. It is enumerated here in the list of enemies, because it may appear suddenly on any part of the coast and is reported to have destroyed oysters on the beds of Alabama. It destroys oysters by crushing them between the stout grinding teeth or bones with which its mouth is furnished.

Minor enemies and pests.—Among the minor but objectionable enemies observed during the survey may be mentioned the following: Barnacles, although generally small, were plentiful on some beds. They roughen the shells and crowd the oyster, but do comparatively little harm. The little clam *Martesia* was found more particularly in the larger and older shells, which were weakened by the boring, but the inner cavity was seldom penetrated. At a few stations a coral growth was observed on the oysters. Marine algæ were noted growing luxuriantly on the clusters at a number of stations, usually near the inner limits of the beds.

SPAWNING.

The conditions of spawning probably do not differ from those generally obtaining on the Gulf coast, and it is therefore not necessary to discuss the subject at any length. It will suffice to repeat what has been said in a previous report.[a]

The spawning of oysters consists, in brief, of the discharge of eggs from the female and spermatozoa from the male which meet and fuse in the surrounding water. The fertilized eggs develop into minute embryos, each furnished with a little brush of cilia or hairlike processes which vibrate in rhythm and propel it feebly through the water. After a time, varying with the temperature of the water, the embryos develop a tiny shell, which by its weight eventually precipitates them to the bottom, where, if they fall upon a suitable, clean, firm, support, they attach and grow into spat, but if not they speedily die. As their own powers of locomotion are inconsiderable, the wide distribution of the young oysters in their swimming stage is dependent upon the currents.

Oysters in the spawning condition are of a peculiar creamy color, with branching lines traced over the surfaces of the body. When they are cut the ripe genital products at once exude from the wound, but if the shell be opened carefully and a gentle pressure exerted upon the body they will be discharged from a definite opening lying below the muscle (usually called by the oystermen the "eye" or "heart") which extends between the two valves. This is the pore from which they flow in the normal process. Ripe oysters in the language of the oystermen are aptly described as "milky."

Spawning takes place, in the main, during spring and summer, in any given region, extending over a period of some months, depending upon the latitude and the climate. On the Gulf coast I have found during almost every month oysters which were apparently ripe, and from which there were obtained eggs which readily separated in the water and had every appearance of maturity. Whether such eggs would be extruded during the winter under natural conditions is doubtful, and if they were it is practically certain that they would not develop, as the experience of all investigators has shown that development is inhibited if the temperature of the water drops materially below 70°.

The oysters were first observed in "milk" in Apalachicola Bay on March 15, but owing to a decided fall in temperature the development

[a] Moore, H.F.: Oyster bottoms in Matagorda Bay. Bureau of Fisheries document no. 610, 1905.

of this condition was greatly retarded or ceased entirely for a period of about three weeks. By the middle of April, however, just as the survey was nearing completion, the oysters were becoming milky throughout the district. The stock was generally strong and vigorous and had every indication of a satisfactory productivity.

On the various reefs there were noted from time to time a number of spat, but they appeared to be those that failed for some reason to mature or develop properly the preceding year. These are usually called "runt oysters."

A freshet during the early spawning season may, in consequence of a deposit of mud and silt, have a serious effect on the spat as well as on the maternal oyster.

OYSTER CULTURE.

Although the State provides suitable regulations for leasing barren grounds for the purpose of oyster culture, the industry is carried on to a very limited extent by private enterprise. At the time of the survey there were but three claims, all situated in St. Vincent Sound, and having an area of 113.5 acres.

During the spring of 1914 the State planted several thousand barrels of oyster shells on the principal public bars from Green Point and Porter Bars in St. George Sound to Paradise Flat in St. Vincent Sound.

From the good average quality of the stock and the thickness and solidity of the shells, it appears that the waters furnish food and lime in quantities sufficient for the growth and development of the oysters, and also that a larger acreage could be maintained profitably without impairing or vitiating the public beds.

There have been pointed out under the discussion of barren bottoms different areas having good firm bottoms, apparently suitable for the establishment of safe and remunerative oyster beds. The western limit of St. Vincent Sound has a hard bottom generally and but few oysters. This latter condition may be due in part to the reduced width of the sound, its exposure to storms, and occasional strong currents, but probably to the high salinity of the water for periods longer than the oysters can endure with the best results. Before the planting of beds at places tentatively selected, it may be advisable to study the course of the currents, the action of storms on the bottoms, and the deposit of silt.

Bulkhead Bar, although it does not bear a very good grade of material, could be made to produce a much better quality of oysters, provided the beds were judiciously cultivated. As it now stands, it is too densely populated to yield stock that will command prices commensurate with the time and labor necessary to place it on the market.

RÉSUMÉ, CONCLUSIONS, AND RECOMMENDATIONS.

Following is a summary of the results of the survey, with the conclusions and recommendations based on them:

1. The survey covered the western portion of St. George Sound and all of Apalachicola Bay and St. Vincent Sound; approximate area, 130 square miles.

2. The area of the oyster beds is 7,135 acres, or 11.1 square miles, of which about two-thirds support dense growth.

3. It is estimated that during the season 1914–15 the contents of the beds were 2,627,534 bushels over 3 inches long and 500,629 bushels of smaller ones, based on the standard bushel, which is less than one-half the volume of the Florida oyster tub, or so-called "bushel."

4. Bulkhead and East Hole Bars taken together contain less than one-fifth of the total oyster area but nearly one-half of the oyster content. On Bulkhead Bar many of the denser stations revealed a crowded condition of closely clustered raccoon oysters.

5. The yield for the entire district for 1914–15 was about 40 per cent less than for the preceding season, due to the demand, for the supply was sufficient to meet a much larger requirement.

6. The oysters of these waters have no aggressive enemies, and no diseases were observed. Physical phenomena, however, have greatly damaged many of the bars.

7. St. Vincent Bar, which was showing sign of depletion, was closed during the latter half of the 1914–15 season by order of the State shellfish commissioner. Porter Bar, which has suffered depletion by storms, should be carefully guarded by the State authorities that it is not overfished; this also applies to the important bars in St. Vincent Sound.

8. About 91 per cent of the total area of the district is composed of barren bottoms, the greater part of which is unsuited for oyster beds. Several favorable regions for oyster culture have already been pointed out. It appears that the natural development of patches and new beds, such as the Fish Hawk Bar, as well as the recovery of old beds after having been depleted by storms, freshets, or freezes, show good conditions and possibilities for oyster culture.

9. The permanent triangulation points established by the United States Coast and Geodetic Survey, together with the few established by this Bureau, will be of great value and should be used in determining the exact location of future leased bottoms for oyster culture. A strict compliance with this recommendation will guarantee accuracy in the surveys, obviate disputes, and secure an honest and correct assessment of rentals.

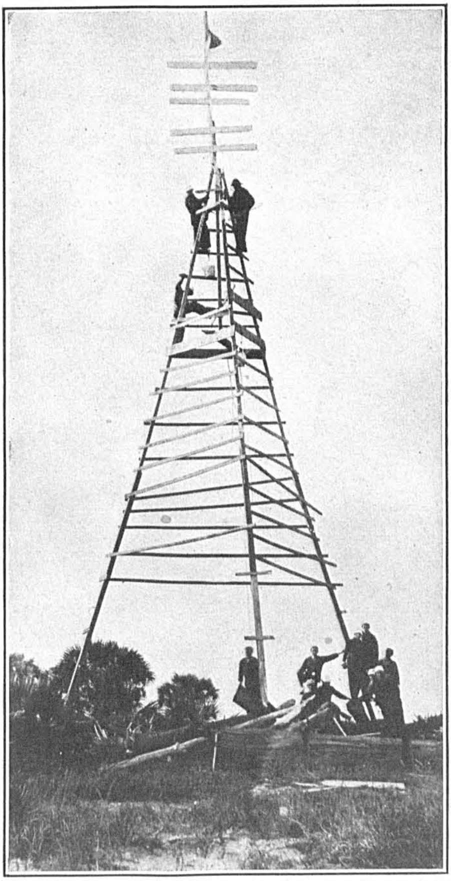

FIG. 1.—SIGNAL AT ST. VINCENT POINT.

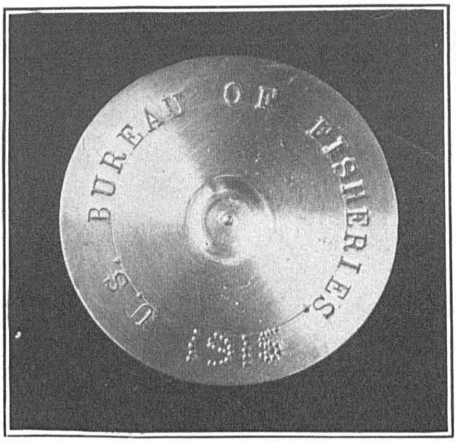

FIG. 2.—BRASS DISK IN TOP OF CEMENT MONUMENTS.

FIG. 3.—OYSTER FROM PORTER BAR.

(Natural size.)

FIG. 4.—CLUSTER FROM CAT POINT BAR.

(Slightly reduced.)

FIG. 5.—CLUSTER FROM BULKHEAD AND EAST HOLE BARS.

(Five-sixth natural size.)

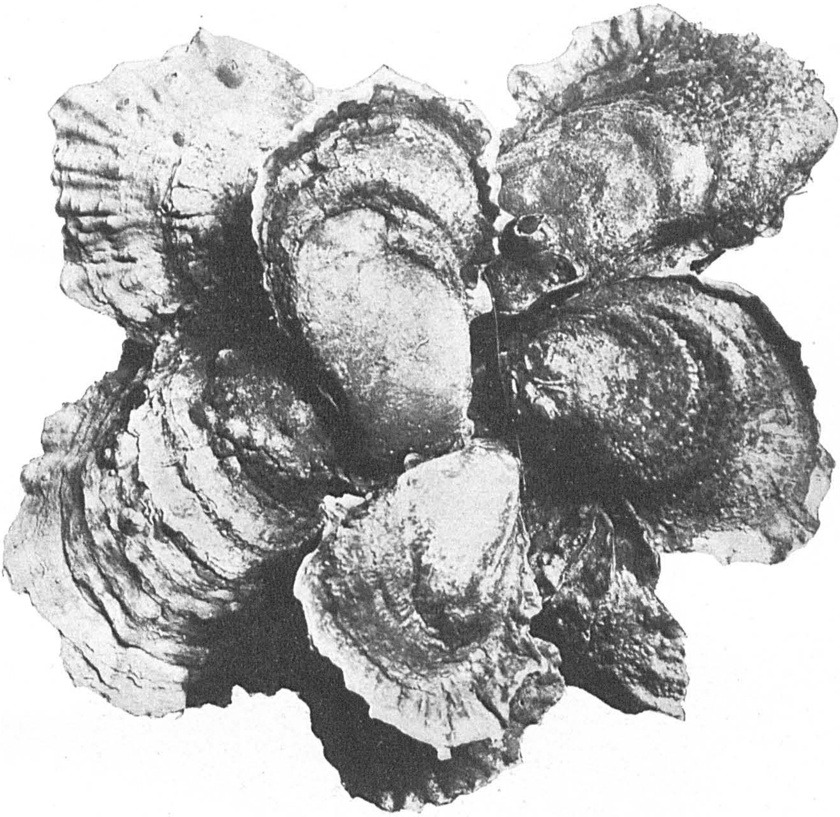

FIG. 6.—CLUSTER FROM ST. VINCENT BAR.

(Reduced ½.)

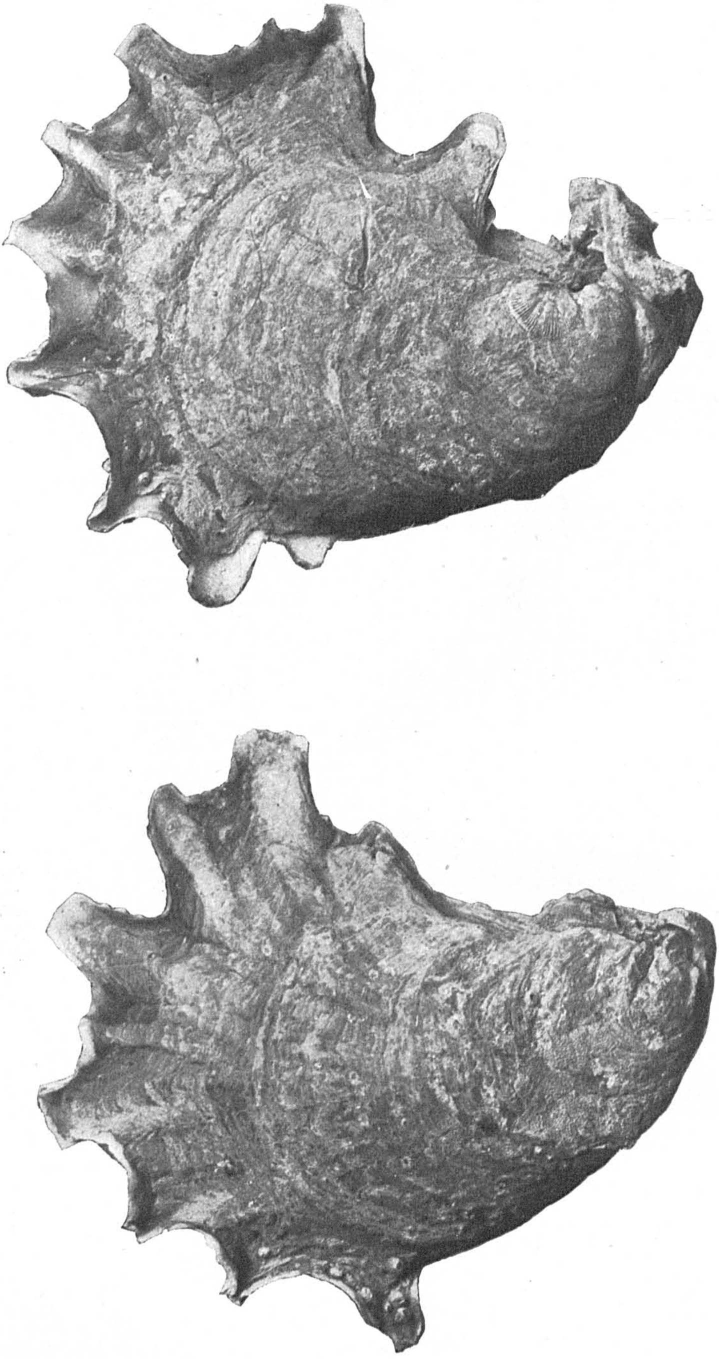

FIG. 7.—OYSTERS FROM FISH HAWK BAR.
(Slightly enlarged.)

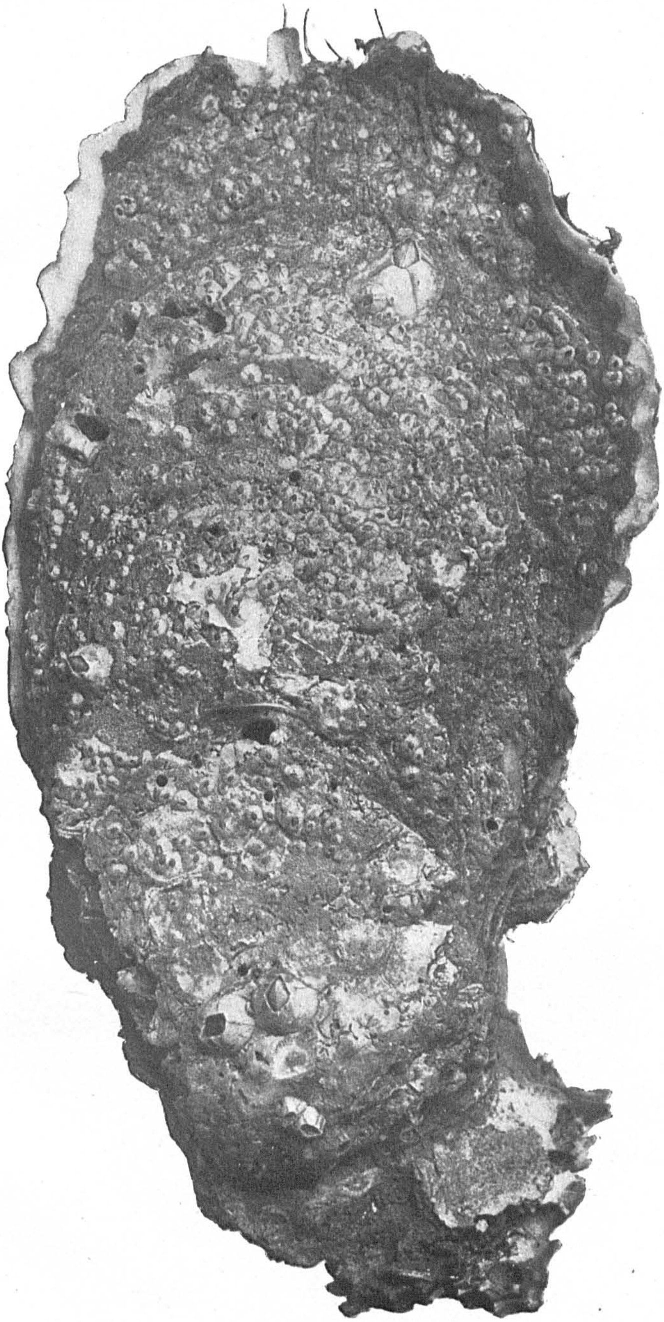

FIG. 8.—OYSTER FROM BIG BAYOU BAR.

(Natural size.)

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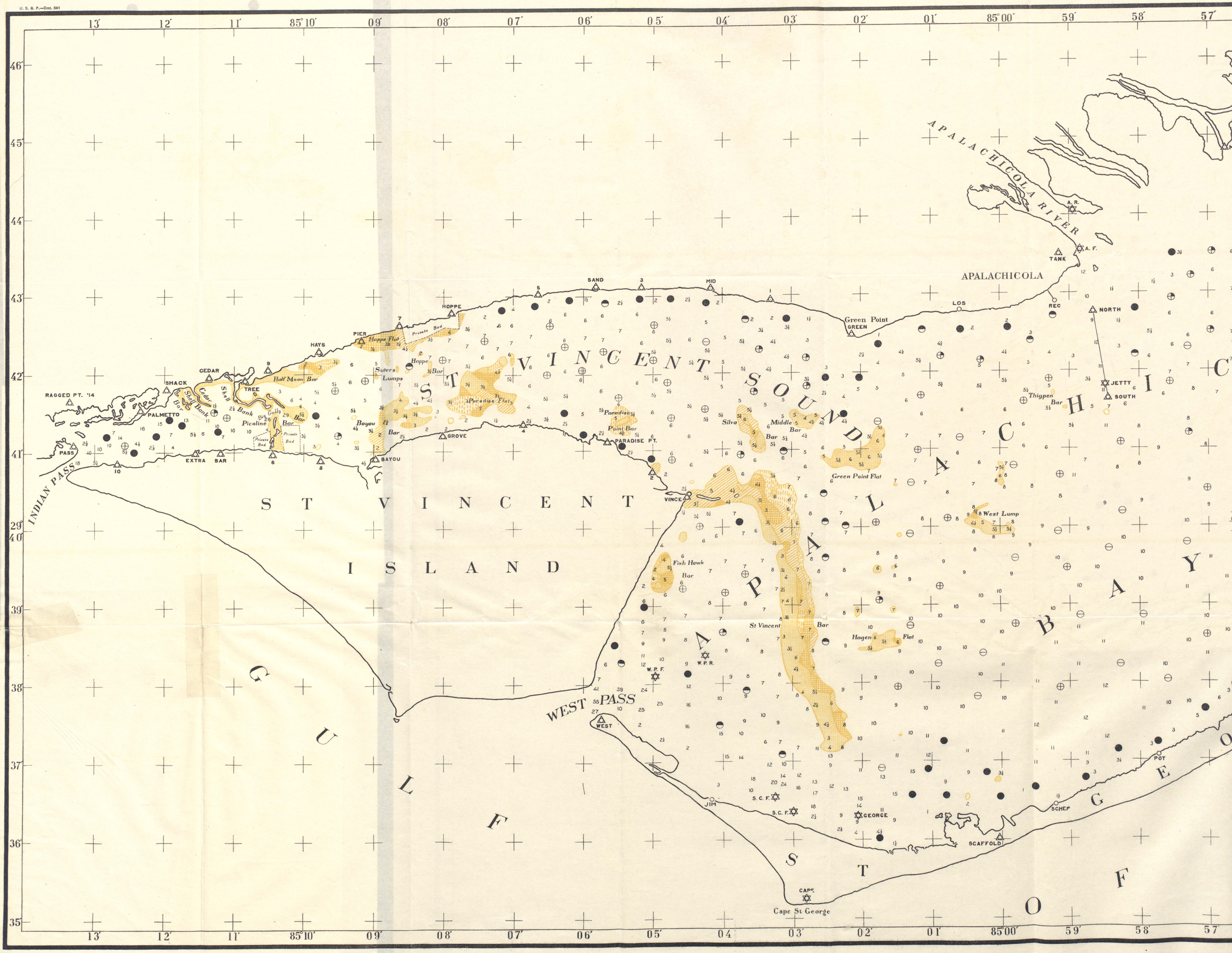

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SHACK
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PALMETTO
TREE
Half Moon Bar
Cedar Bar
Shell Bank
Big Gully Bar
Picoline Bar
Private Bed
Suters Lumps
Paradise Flats
Bayou Bar
PASS
INDIAN PASS
EXTRA
BAR
GROVE
BAYOU
Paradise Point Bar
PARADISE PT.
Silva
Middle Bar
Green Point Flat
West Lump
ST VINCENT SOUND
APALACHICOLA BAY
VINCE
ST VINCENT ISLAND
Fish Hawk Bar
St Vincent Bar
Hagen Flat
W. P. R.
W. P. F.
WEST PASS
WEST
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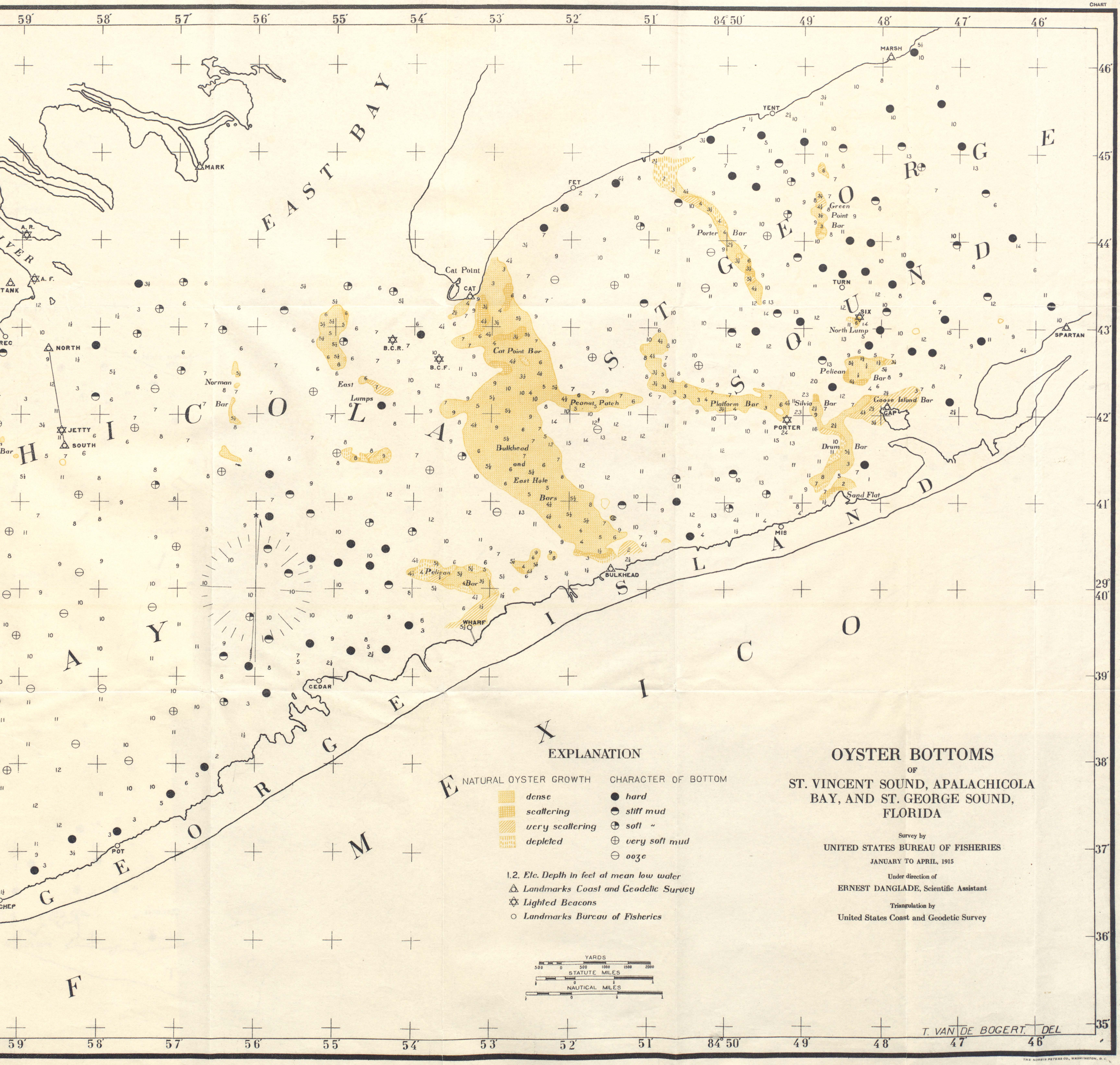

THE NORRIS PETERS CO., WASHINGTON, D.C.

FISHING IN THE PRIAMUR DISTRICT OF SIBERIA

By John K. Caldwell

American Consul at Vladivostok, Siberia

Appendix VI to the Report of the U. S. Commissioner of Fisheries for 1916

6111°—17——44

CONTENTS.

FISHING IN THE PRIAMUR DISTRICT OF SIBERIA.[a]

By JOHN K. CALDWELL, *American Consul at Vladivostok, Siberia.*

INTRODUCTION.

Fishing is probably the most important industry in the Russian Far East. It is the only industry in the district which not only attempts to supply the local market but exports to the European Russian and foreign markets.

The fishing industry is entirely under the control of the Russian Government and is a State property, with the exception of a few fishing stations belonging to the city of Nikolaievsk on the Amur, which are run by the municipality of that city, and also a few places on the seacoast and in the rivers, donated to local tribes of aborigines.

In the Maritime, Kamchatka, and Amur Provinces fishing is controlled by the Khabarovsk office of the Department of Domains. Administratively the waters are divided into two classes: (1) Waters allotted exclusively to Russian subjects, and (2) waters open to Japanese fishermen by virtue of the Russo-Japanese Fishing Convention of 1907. The first class comprises rivers and their estuaries, lakes, gulfs, bays, and harbors; the waters opened to foreign fishing comprise chiefly open seacoasts. Up to the present no foreigners other than Japanese have made any attempt to obtain such fishing rights.

Very little is known as yet as to the value of the fishing places, for practically no study has been made of the Priamur waters. The works of Braginoff and Soldatoff, ichthyologists attached to the Khabarovsk office of the Department of Domains, merely pave the way for a more extensive study. Some practical knowledge of the value of certain fishing places exists, undoubtedly, among private fishermen, principally Japanese, but it is not general knowledge. Therefore the Department of Domains has no way of exploiting various fishing stations other than by allotting them to the highest bidder at public sale, and even then being very careful to allot them first for a very short period—from one to three years. After a strict watch

[a] The investigation on which this report is based was requested by the Bureau of Fisheries. It is now published because of the value of the information to American fishing interests, particularly those of the Pacific coast.

of the amount of the catch, some idea of the value of the station is formed and it is allotted for a longer period—five years or more.

Naturally under such circumstances this industry can not attain proper development. The fishermen are not better informed than the Government as to the value of the stations sought at the public tenders; often they over or under value them, and owing to their limited knowledge, either overstock the stations with men, salt, barrels, provisions, etc., and through a small catch suffer heavy losses or insufficiently supply the stations and, therefore, are unable to take advantage of a good run of fish. On the other hand, the short terms of the contracts make it impossible to equip the stations properly. Lack of equipment for preparing the fish, except in the crudest way, has resulted until very recent times in inferior products at most of the stations, but some of the Russian fishing stations in Kamchatka are exceptions. In order to encourage the Russian fishing in Kamchatka and Tchukotski peninsular waters and in the Okhotsk Sea, and to counterbalance the Japanese predominance in these waters, in 1913 the head administration of the Agricultural and Land Organization gave to Denbigh & Biritch on a long lease a fishing station on the Kamchatka River (eastern shore of Kamchatka), and to S. Grushetsky & Co., one on the Bolshaya River (western shore of Kamchatka). In addition to the usual conditions of the lease (payment of royalty, the prohibition of foreign labor, etc.), each of these firms was to build a fish hatchery in the vicinity of its station, the capacity of which was to be 3,000,000 salmon per annum. Each of the above lessees was to release 500,000 fish in 1914, 1,000,000 in 1915, and 3,000,000 yearly from 1916 until the expiration of its lease. Owing to technical difficulties, the release of the first lot of fish was postponed until 1915.

By a normal development of this condition, which may become a law, each commercial fisherman will be compelled to release a much larger number of young fish than his catch. The larger interests will have their own hatcheries, where doubtless the smaller ones can buy their quota.

TRANSPORTATION DIFFICULTIES.

The closing of the coasting trade to foreigners deprived the fishermen of the possibility of making use of the cheap freight rates of foreign steamers, and has made them entirely dependent upon the Volunteer Fleet, which has a monopoly as a public carrier.

The Volunteer Fleet is complying strictly with all the obligations imposed by the terms of its contract with the Government. It is making the stipulated number of voyages with the stipulated number of vessels, but as a matter of fact the number of steamers is not sufficient for the trade. According to section 3 of the contract, the Volunteer Fleet is obliged to put on the line not less than four steamers having a carrying capacity of not less than 1,000 tons each and adapted for northern navigation. Each steamer must have accommodations for not less than 20 cabin and 100 deck passengers, and regardless of the fact that the number of steamers has doubled, it is not sufficient for the entire satisfaction of the fishermen's needs, thereby causing heavy losses.

On account of the limited number of vessels, the Volunteer Fleet is forced to make long round trips to distant points with calls at many side ports. When leaving Vladivostok the vessels take on sufficient coal and water for the round trip. This occupies two-thirds of the carrying capacity and leaves very little space for cargo. These long trips force the greater number of the fishermen to ship men and provisions one and one-half months before they are required, and to hold their product a month after the catch is over. Owing to the long time that goods are on the way, the fishermen are obliged to salt their products very heavily, which tends to lower their price on the Russian market. Consequently, the fishermen are obliged to depend on the Japanese market. The high charges of the Volunteer Fleet for loading and discharging, and charges for c. o. d. delivery (2 per cent), add 14 to 15 cents per pood of 36.1128 pounds to the cost of fish products from Kamchatka. It is claimed that so long as the Volunteer Fleet continues to be the only steamship company serving the fishing industry, there is not much hope of a healthy and normal development of the fisheries. Also, the element of risk to the average fisherman is so great and so hard to calculate, that the fishing industry, which in Japan represents a safe commercial undertaking, in Russia becomes a game of chance.

Under present conditions the fishermen are subjected to the following risks: (1) Late arrival at the stations with men and provisions; (2) inability to ship prepared products; (3) enforced pay of workmen for overtime spent at the stations; (4) impossibility of obtaining additional salt and barrels if the catch is excessive, and of replacing men in case of strikes, for most of the stations are visited by steamers only twice each season.

From the time the fisherman arrives at the station, until his departure, he is without communication with the outside world. Although a telegraph line was built over a year ago along the shores of Kamchatka, it is not in operation owing to the lack of operators and other difficulties.

COMPARATIVE COST OF OUTFITTING RUSSIAN AND JAPANESE FISHING STATIONS.

In order to emphasize the unfavorable conditions under which the Russian fishermen have to compete with the Japanese, the Chamber of Commerce committee gives comparative tables showing the cost of equipping an average Russian fishing station, catching about 60,000 fish and employing 30 men, and a Japanese sea-coast station of similar size.

RUSSIAN STATIONS IN KAMCHATKA.

30 men for 5 months, at $20 per month	$3,000.00
Return passage for them at $8.75 per man	262.50
Freight on 35 tons of provisions and equipment	200.00
Freight on 1,800 sacks salt (90 tons)	405.00
Freight on 155 tons prepared fish	1,284.50
Royalty on 155 tons	229.50
Land rental	37.00
Commission expenses	313.00
1,800 sacks of salt at 65 cents	1,170.00
Nets	350.00
Boats	50.00
Dories (native type)	300.00
Incidentals	100.00
Total	7,701.50

It must be mentioned that there are very few experienced workmen, salters and caviar makers. Those who have had experience during past years have settled along the coast and have their own undertakings; therefore the fishermen are obliged to hire unreliable men. There are no fishery schools in the country, and the lack of instructors and good foremen is felt more and more each year.

The absence of credit institutions, which would make loans on fish, and the high rate of interest charged by private banks are also felt very much.

The Russians have no fishing fleet, but the Japanese possess a large deep-water fleet. According to the figures for 1910, there were 7,302 Japanese fishing sailboats, 49 fishing steamers, and 396 large fishing boats of European type, in addition to a large number of commercial vessels, which gave the Japanese a choice of vessels for the transportation of their products. Moreover, competition has kept freight rates low. Several small fishermen could charter a steamer on joint account, and in order to evade the rule prohibiting foreign steamers from navigating between stations, several stations could be rented in the name of one man and later subleased to the real owners.

In 1913 a Japanese steamer of 1,500 tons, having a speed of 9 knots, consuming from 15 to 20 tons of coal a day, could be chartered for about $100 a day. The chartering of such a steamer for 30 days, taking 20 days for the return trip (Hakodate-Kamchatka) and 10 lay days, would have cost:

Voyage, 30 days, at $100	$3,000
Coal, 20 days' steaming, 400 tons, at $3 per ton	1,200
Coal, 10 lay days, 100 tons, at $3 per ton	300
Other expenses, maximum figures	250
Total	4,750

Such a steamer would carry about 1,500 tons of cargo per voyage, and therefore the freight would be only about $3.17 per ton.

If the steamer was chartered on the basis that it pays all expenses, the cost in 1911 would have been:

	Charter cost per day.
500 tons	$88 to $100
2,000 tons	138 to 150
2,330 tons	160

This would have been the cost when chartered by the day, but a monthly charter would have been at least 10 per cent less; a charter for the whole season, especially if made early—say, in March—might have been had at as much as a 30 per cent reduction.

In this way the cost of transporting fish from Kamchatka to Japan was one-third less than to Vladivostok. The cost of transporting workmen from Hakodate to Kamchatka was about $1.50 per man, one-fourth of what it cost for Russian workmen from Vladivostok. The same difference will be observed in regard to the cost of workmen. A Japanese workman costs a little over $50 per season, viz: Wages, $25; food, etc., $19.50; and commission on catch, $8.50. Also, there is never a shortage of men in Japan.

The cost of a Japanese fishing station would be:

Wages for season, 30 men, at $25 per season	$750.00
Commission on catch	250.00
Chartering schooner 5 months, at $250 per month	1,250.00
Food for 30 men, at $19.50 each per season	585.00
Passports, $1.75 each for 30 men	52.50
Rent of fishing station	500.00
Nets and dories (same as Russian)	800.00
1,800 sacks of salt, at 65 cents per sack	1,170.00
Total	5,357.50

Herewith is given a comparison of the working conditions of Russian and Japanese fishermen in Kamchatka:

Russian Fishery.	Japanese Fishery.
1. The Russian fishing fleet is represented by 4 motor schooners and 3 steamers.	1. The Japanese fishing fleet has 7,302 sailing vessels, Japanese type, 396 foreign type, and 49 steamers.
2. No Russian steamers are open for charter, and in the present state of the local industry even a subsidized purchase of steamers is not profitable.	2. There are a great number of vessels in Japan, and the strong competition makes it easy to charter them on time or for the season.
3. Russian fishermen are bound by the schedule of the Volunteer Fleet, are unable to increase their stock of provisions, etc., at will, and at times run the risk of not arriving in time or not being able to ship the prepared product.	3. Having a schooner or steamer at his disposal, the Japanese fisherman is always able to communicate with Hakodate, and runs no risk of not having his goods transported.
4. Delivery of fish cargoes, including discharging expenses, costs $8.40 to $10.50 a ton.	4. The delivery of all cargo costs the Japanese not over $3 a ton.
5. Transporting workmen from Vladivostok and return costs $8.65 each.	5. Transporting Japanese workmen costs $3 each.
6. Wages per season for workmen (5 months) amount to about $100 per man.	6. Wages per season for workmen are about $33.50 per man.
7. Equipping and running a station to catch 60,000 fish costs about $7,701.50.	7. Outfitting and running a station to catch 60,000 fish costs about $5,357.50.
8. Delivery of product to Vladivostok costs about $8.40 per ton.	8. Delivery of product to Hakodate does not cost more than $3 per ton.

REGULATIONS GOVERNING FISHERIES.

The method of leasing fishing stations for exploitation, as well as the regulations for exploiting, vary according to the local conditions.

On the Amur River, within the limits of the Nikolaievsk, Mariinsk, and Khabarovsk districts, fishing stations are leased at public tender, written or oral. The placing of outfits for catching sturgeon only is permitted, except during the closed period, from the time the ice on the river breaks up to June 15–28, upon payment of a special ticket tax. For this purpose the supervisors of the districts make up a list of applicants for each district, and present it for ratification to the Priamur Department of Domains, after which public tenders are held in each district at the place of residence of the supervisor. Some of the stations are leased for long terms and some for one year.

No foreign workmen are allowed at the stations located on the Amur River. In the estuary of the Amur River foreign subjects are allowed to prepare the fish only, but not to catch them; the latter is to be done exclusively by Russian subjects. Fishing is carried on only by means of "zaezdka," a special kind of hedge made of poles with a trap arrangement at the end, or by means of throw nets.

Arrangements with hooks are permitted for catching sturgeon. The length of the net and hedge is established for each station and depends upon the width of the river. All other conditions are of a secondary nature

The right to fish along the seacoast of the whole Russian Far East is open to Japanese subjects on an equal basis with Russians, by virtue of the Russo-Japanese Convention of 1907, which was concluded for a term of 12 years; the stations applied for, after being ratified by the Priamur Department of Domains, are sold at public tender, usually during February and March. The convention excludes certain bays and gulfs, in which fishing rights are granted only to Russian subjects. There is no restriction as to the nationality of the laborers employed at the sea fishing stations or as to the method of preparing the fish products, except that the manufacture of fertilizer from salmon is not permitted. The use of vessels under foreign flags is allowed. Throw nets can be used, but they are being replaced by permanent nets, the usual type of which are called "tateami."

In the bays and gulfs excluded by the Russo-Japanese Fishing Convention (Peter the Great Bay, Imperial Harbor, Vanina Bay, Avatchina Bay and several others), as well as in the rivers in the Okhotsk-Kamchatka district, the Priamur Department of Domains may, in accordance with an order of the Agricultural Department, grant fishing rights without public tender to trustworthy persons, first for one season, after which, if the business has been established on a firm basis, for a term of 12 years, under the control of the Minister of Agriculture and Land Organization (law of June 21, 1910, pertaining to river fishing stations).

A rental charge of 5 kopecks (2½ cents) per pood of 36.1128 pounds of prepared product is made, and an unalterable condition in such leases is that the lessee is obliged to use exclusively Russian laborers and sailing vessels under the Russian flag. The use of foreign steam vessels is not prohibited by the administration. Throw nets not longer than the width of the river at the place of catching are allowed as are also set nets, the "zaezdka" of the Amur type, which consist of a barrier placed across the river from the shore to deep water and end in a trap. In Peter the Great Bay, in addition to the above, set nets and large drag nets are permitted.

The length of the "zaezdka" can not be more than half of the channel width; in reality a large part of the channel of the river where "zaezdka" are used is kept free to permit the passage of fish up the river. All other minor conditions of the lease are covered in the contract.

The catching of sea kale, crabs, shrimps, and trepang is now almost exclusively carried on in Peter the Great Bay and the neighboring coast; it is concentrated in the hands of small fishermen who obtain special tickets for this purpose from the supervisor of the southwestern district.

THE FISHING INDUSTRY IN 1913.

Along the extensive coast line of the Priamur district many varieties of commercially valuable fish are found. The northern waters of Tchukotski and Kamchatka produce mostly salmon varieties, the principal of which are gorbusha, known in Alaska as humpback or pink salmon; keta, the Alaskan chum, or dog salmon; kisutch, the Alaskan coho, or silver salmon; tchavitchcha, the Alaskan king, or chinook salmon; krasnaya, the Alaskan sockeye, blueback, or red salmon, and golets, known in Alaska as Dolly Varden trout.

Dolly Varden trout are occasionally caught, when they happen to run with the salmon.

Undoubtedly there are other kinds of fish in these waters, for in years past American whalers visited the cod banks of Kamchatka, but at present there is no cod fishing. Practically no attention is paid to any but the salmon, the principal reason for this being the almost total absence of local population and supplies, compelling the fishermen to obtain laborers and all supplies from distant places. As soon as the run of the principal fish is over the station is closed, the men sent away, and no one is left to watch later runs or to study the possibilities. Also the early winters would prevent late shipping of fish if any were caught, and the catch would have to be held until the arrival of the first steamer in the spring.

The waters of the Priamur district are subdivided into several sections. Following is given a short description of the characteristics of each.

NIKOLAIEVSK DISTRICT.

This district comprises the whole lower part of the Amur River from the village Zimmermanovka down to the mouth of the river, about 300 miles; the River Amgun, 200 miles; the Amur estuary, about 150 miles on the mainland and about 130 miles on the coast of Sakhalin Island and about 865 miles of the coast line on the southwestern shore of the Okhotsk Sea.

In addition to the regular fish-catching stations there are the salting stations, which do not catch but only buy and handle fish, caviar, etc., from other fishermen, mostly local peasants, natives, and industrial fishermen. These salting stations, as will be seen from the following table, are quite numerous.

According to official figures for 1913 the number of fishing stations of all kinds in this region was as follows:

Kind of station.	Number of stations.	Term of lease.	Annual rental.
Government stations:			
Catching	23	Long term	$109,012.00
	7	One year	10,677.00
Salting	47	Long term	19,742.10
	34	One year	20,967.00
Total	111		160,398.10
Municipal stations:			
Catching	14	Long term	56,282.10
	13	One year	28,692.00
Salting		Long term	
	1	One year	125.00
Total	28		85,099.10
Grand total	139		245,497.20

In addition to the above stations 53 Russian villages and over 122 native settlements participated in the fishing industry.

In 1913 the run of humpback salmon, which began in the estuary on June 16 and in the river June 18 or 19, lasted during the whole season; this species was also found in the autumn chum run. The run was above the average and almost equal to the run of 1912. At the Government stations below Nikolaievsk 2,845,687 fish were caught, at the municipal stations 2,731,546, and at the Government stations above Nikolaievsk 111,000, while only 1,780,561 fish were caught by the local population. The summer and autumn runs of chum salmon were very irregular, especially the autumn run, which was divided into four separate runs, the last of which was so unexpected that many fishermen had already closed their stations for the season before it appeared.

The Nikolaievsk district was formerly the chief source of supply of fish to Japan, and the great majority of Nikolaievsk fishermen were largely dependent upon Japan, not only for a market but also for working capital. The Japanese, however, finally offered such low prices for the fish and made the credit conditions so unfavorable that the fishermen were compelled to look for another outlet for their product. Such an outlet was found in European Russia, and the secret of success of this new departure of the business was salmon caviar.

Only a few years ago salmon caviar was almost an inedible product; it was carelessly prepared, crumpled, and poorly packed. About six or seven years ago the Volga River black caviar dealers became interested in the Amur salmon caviar and began to experiment with it. They introduced cleaner and more careful methods of washing and a better method of packing it, with satisfactory results. The caviar was thoroughly tested, stood transportation, and gradually came to be one of the most valuable by-products of the fishing industry, commanding a much higher price than the fish itself.

The newcomers also changed the method of salting fish, and instead of producing crude briny fish prepared with inferior salt from Japan they carefully selected the fish and thoroughly washed and mildly salted them with the best salt. The resulting product, called "semga," is similar to European cured salmon. The best qualities stand the railway transportation to European Russia, where they command a very high price.

The Government met the fishermen halfway by lowering the freight rates and by extending more liberal credits through the Government bank, as is shown in the following extract from an order of the Government bank regarding loans to fishermen, against promissory notes with one signature for working capital:

With a view to extending credit to the fishermen of the far east the Government bank has found it possible to allow the issuance of loans to the fishermen for working capital against the following guaranties:

1. Fishing equipment; mortgages on fishing property and buildings.
2. Real estate, situated outside the fishing station, or a sold warranty.

All applications of fishermen are to be submitted, in accordance with clauses 30 and 65 of the bank's by-laws, for approval of the discount and loan committee of the branch, and forwarded to the council of the bank for ratification.

Further, in view of the fact that the property which is to serve as a guaranty for the loan is situated on land rented from the Government, and taking into consideration the special conditions of the rental of these lands, the bank has found it necessary to establish, in agreement with the Department of Land Organization and Agriculture, the following regulations:

1. Credits will be opened only after an investigation of the financial standing of the fisherman, made with the assistance of a local representative of the Priamur branch of the Department of Domains.
2. Credits will be in accordance with the verified appraisement of the fishing property made by the Priamur branch of the Department of Domains.
3. When opening a credit against goods, a special notarial application to the Department of Domains is to be made by the borrower, stating that he gives the Department of Domains the right to cancel his rent contract at the first demand of the Government bank, and to use money deposited and sums due to him for the property, for the purpose of paying his debts to the bank.
4. The application mentioned in paragraph 3 is to contain a clause by which the borrower agrees not to remove any buildings at the fishing stations, nor to turn them over to another person without having obtained the required permit from the bank.
5. The application mentioned in paragraph 3 is to be turned over by the bank to the Priamur branch of the Department of Domains with the request that the bank be assured that the conditions of the application will be carried out by the Department of Domains.

The Japanese, realizing their mistake, have put up a strong fight for the Nikolaievsk district. As late as 1913 the Japanese firm P. N. Shimada, at Nikolaievsk, offered the Nikolaievsk fishermen the following prices for fish prepared in Japanese style: Summer humpback salmon $1.25, summer chum salmon $3.50, and autumn chum salmon $7 per 100 fish, the salt to be supplied free by Shimada. This proposal did not meet with much success.

The following tables show by species the catch of salmon in the Nikolaievsk district and the quantity prepared for the Russian market, 1909 to 1913:

Years.	Catch.			Prepared for Russian market.			
	Humpback.	Chum.		Humpback.	Chum.		Caviar.
		Summer run.	Autumn run.		Summer run.	Autumn run.	
	Number.	*Number.*	*Number.*	*Number.*	*Number.*	*Number.*	*Tons.*
1909	2,209,433	9,574,285	4,858,099	145,373	877,423	1,398,416	1,040
1910	5,076,286	12,536,174	5,814,498	1,005,274	2,497,165	1,975,033	1,397
1911	2,621,449	10,749,482	4,686,236	523,338	2,197,168	2,424,890	1,123
1912	5,822,729	7,199,309	3,669,073	1,154,913	4,009,574	2,886,869	1,171
1913	5,688,233	7,985,579	4,324,187	4,806,629	6,608,804	3,212,499	1,107

The number of salmon—fresh, salted, and frozen—delivered to Japanese buyers, 1909 to 1914, was, by species, as follows:

Years.	Fresh and salted.			Frozen.	
	Humpback.	Chum, summer run.	Chum, autumn run.	Humpback and chum, summer run.	Chum, autumn run.
1909	2,029,200	8,733,623	3,510,847	48,463	157,081
1910	4,071,012	10,039,101	3,195,506	15,000	343,959
1911	2,081,625	8,025,216	2,368,798	105,328	129,801
1912	4,686,016	3,295,603	780,303	102,000	120,000
1913	881,604	1,231,775	953,688	118,000	158,000

In 1913 in the Nikolaievsk district salmon were prepared for the Russian and other than Japanese markets, as follows:

	Humpback.	Chum, summer run.	Chum, autumn run.
	Tons.	*Tons.*	*Tons.*
Salted	5,920	16,794	14,918
Smoked	284	5	8
Canned	15	41	527

These figures show the small quantity of fish that is canned in this district. Some experts claim that the Amur salmon is not suitable for canning purposes. In the whole district there is only one canning factory, that of W. J. Miller, the 1913 output of which is shown in the following table:

	Quantity.		Value per case.
	Cases.	*Cans.*	
Humpback and chum salmon:			
Natural, round cans	600	28,800	$3.90
In jelly, round cans	58	3,480	6.00
In tomatoes, oval cans	64	3,200	9.00
Pickled, oval cans	132	6,600	9.00
In tomatoes, round cans	486	24,300	7.00
Pickled, round cans	41	2,050	7.00
In tomatoes, round ½ cans	237	23,700	10.00
Pickled, round ½ cans	70	7,000	10.00
Total	1,688	99,130	....
Caviar	53	4,420	20.40
Sturgeon:			
In tomatoes and pickled, square ¼ cans	60	6,000	18.00
In tomatoes and pickled, square ½ cans	15	750	16.00
Total	75	6,750	....

In 1913, by the steamer *Broadmore* the following frozen fish were shipped: Chum salmon (summer run), 118,000, at $6.25 per 100 fish, and chum salmon (autumn run), 108,000, at $12.50 per hundred. Also, 50,000 fish were taken up the river in a refrigerating barge.

SAKHALIN DISTRICT.

This district includes the entire coast line of Sakhalin Island with the exception of that facing the Amur estuary, which belongs to the Nikolaievsk district. It is the smallest district and is now of no great importance. Before the Russo-Japanese War it was the most important district so far as herring fishing was concerned. The richest local fishermen, Semenoff, Denbigh, Biritch, and others, made their fortunes here.

The 1913 catch was not good, due to storms and a poor run of herring, the principal fish of the district. The catch was as follows:

Years.	Chum salmon.	Humpback salmon.	Herring.
1911	31,000	288,000	12,640,000
1912	16,000	126,000	14,036,000
1913	38,000	183,000	4,483,000

The product prepared amounted to 1,212 tons in 1911, 1,068 tons in 1912, and only 690 tons in 1913.

In 1913 there were 14 stations on the island, of which 2 fish-catching and 2 fish-salting stations were in nonconventional waters, and 10 in conventional waters, 5 of the latter belonging to Russian and 5 to Japanese fishermen.

The catch in 1913 was made into the following products:

	Tons.
Fish, salted Russian method	79
Caviar, Russian method	22
Fish, dry-salted for Japanese market	274
Herring fertilizer	274
Fish oil	38
Caviar for Japanese market	3
Total	690

OKHOTSK-KAMCHATKA DISTRICT.

The northern waters of the Priamur, including the above-named district, are still dominated by Japanese fishermen. The Russo-Japanese Fishing Convention of 1907 opened the doors of this district to them, and in these waters they are far better equipped than the Russian fishermen. A fair knowledge of the fishing grounds was already at the disposal of Japanese fishermen, because Japanese schooners were in the habit of visiting and fishing in these waters long before such rights were explicitly granted to them. They also had at their command a large force of good, experienced, and cheap labor, a large sailing fleet, cheap credits, and ready markets at home.

The Russians, on the contrary, were very much handicapped; the waters were entirely unknown to them; they had no workmen, no fleet, no credit, no capital, and no market but the Japanese. Naturally, under such circumstances, the Russians had to begin in a very moderate way and principally at places outside the conventional area, in rivers and closed bays which were visited by the Volunteer Fleet steamers. Further development of Russian fishing in these waters could progress but slowly. Some progress was made, but the full "Russification" of the industry in these waters is a question for the remote future.

Since 1907 the progress of Japanese fishing can be seen in the increased number of fishing stations, the larger number of workmen at the stations, and the replacement of the sailing fleet by steamers. The present general appearance of the Japanese fishing station is just the same as in the past—temporary bamboo structures covered with matting, and the method of salting is the dry-salting process under the open sky, without washing the fish. Only at places where there is a good run of red, or sockeye, salmon is there an increase of canned products, which are prepared merely with salt and without spices, and a correspondingly better equipment of the outfits.

The bulk of the products prepared by the Japanese is sold in Japan and China. Of the canned salmon some is consumed in Japan and some is exported to England; no goods are prepared for the Russian market.

Russian fishing in the Okhotsk-Kamchatka district is, as previously stated, concentrated in the nonconventional waters, bays, and harbors, which are rented exclusively to Russian subjects on condition that they employ only Russian workmen and ships.

Since 1907 quite a change is noticeable in the position of Russian fisheries in these waters. During the first years the Russians prepared fish almost exclusively by the Japanese method of dry salting, only caviar being prepared for the Russian market. The number of salting stations, where Russian caviar makers buy raw caviar from Japanese fishermen and prepare it for the Russian markets, is still growing. Three well-equipped Russian fish-canning factories have been built, two on the river and one on the coast.

This region covers the coast line of the northern part of the Okhotsk Sea from Port Ayan to Penjin Promontory, about 1,620 miles. Regardless of occasional good catches, the Okhotsk shores are considered poor in fishery resources, and the natives are often unable to catch enough fish to provide for themselves and their dogs during the winter. In order to establish a reserve area and to guarantee the future stock of fish in this region, clause 11 of the fishing law of June 11, 1911, has been put in force since 1913, and the following waters have been closed for fishing: Uliya and Urak Rivers, 2⅔ miles along the shore each way from the mouth of the rivers; Okhota and Kukhtui, being two outlets of the same river, 3⅓ miles to the west from Okhota River and 3⅓ miles to the east from Kukhtui River, as well as the territory between, about 2⅓ miles; Kola, Tau, Yana, Arman, Ola, Yama, Takhyama, Nayakhan, and Gizhiga Rivers, 2⅔ miles on both sides of the mouth of each river.

The run of chum salmon in 1913 was of average proportions. It began July 14 and was heaviest between August 2 and 27; single fish were caught as late as early September. The run of humpback salmon was good. The catch was effected along the coast at seven fishing stations, six Japanese and one Russian. The number of salmon caught in 1913, compared with the two preceding years, was as follows:

	Chum.	Humpback.	Sockeye.
1911 (4 stations)	641,000	....	38,000
1912 (4 stations)	730,000	16,000	9,000
1913 (7 stations)	679,948	204,014	....

The product prepared amounted to 1,729 tons in 1911, 1,891 tons in 1912, and 2,005 tons in 1913. Of the 1913 product 1,928 tons were dry salted for the Japanese market, and 71 tons of Russian caviar and 6 tons of Japanese caviar were prepared.

At the river stations, outside of conventional waters, nine fishing stations and six salting stations were in operation in 1913, the catch amounting to 555,102 chum salmon, 41,252 humpback salmon, 3,198 coho salmon, and 17,035 Dolly Varden trout, from which there were prepared 534 tons of fish and 136 tons of caviar for the Russian market and 772 tons of fish for the Japanese market, a total product of 1,442 tons.

The catch in the entire district in 1913 consisted of 1,235,050 chum salmon, 245,266 humpback salmon, 3,198 coho salmon, and 17,035 Dolly Varden trout, and the product prepared amounted to 534 tons of fish and 207 tons of caviar for the Russian market and 2,700 tons of fish and 6 tons of caviar for the Japanese market.

The output for the entire Okhotsk district for the years 1911 to 1913 was 2,426 tons in 1911, 322 tons in 1912, and 3,447 tons in 1913.

West Kamchatka district.—This district includes the coast line from the Sopotchnaya River down to the southern Osernof shore fishing stations, a distance of about 335 miles. Kamchatka is very interesting between the middle of July and the last of August, the season for the red and pink salmon. On the west coast the Osernaya River is the only stream that the red salmon inhabit in any quantities. All fishing is done with a device called "kaku-ami," which consists of a main net and a fence net. The main net is 70 fathoms long and the fence net is 120 fathoms long. The fence net extends outward so as to guide the fish toward the main net. This device is set near the seashore in 10 fathoms of water, where the salmon run. When the fish are caught, the main net is hauled up by a boat and the fish are transferred to a bag net called "waku-ami," used for landing the fish.

In 1913 there were 152 fishing stations in this district of which only 9 were leased by Russians and 143 by Japanese. In 1912 there were 133 of such stations. At the public tenders for 1913 the Russians obtained 19 stations but transferred 10 of them to Japanese, after having made an arrangement with them in regard to the caviar.

One hundred and forty-eight stations were operated while 4 were idle. A certain growth of interest is noticed in the fishing in these waters, especially in the northern part of the district, but principally by Japanese fishermen. The stations are gradually moving toward the north, and the present empty coast lying between the Rivers Palana and Sopotchnaya will soon be occupied by fishermen. The increase in the number of stations will be seen from the following figures: 1910, 102 stations; 1911, 139 stations; 1912, 133 stations, and 1913, 148 stations. These figures do not include 15 river stations belonging to Russians, of which only 13 were operated in 1913.

The rental has also increased with the increase in the number of stations. In 1912 the highest price paid for one station was $2,540, and the average price per station was $1,094. In 1913 the highest price was $3,333 and the average $1,390. In 1912 the total sum collected by the Government from the stations was $113,348 and in 1913, $175,674.

In this district there are also the following rivers where fishing is prohibited: Tigil River, 2⅔ miles to the north and south of its mouth; Oblukovina, 3 miles on both sides of its mouth; Kolpokara, 4⅓ miles to the north and 3 miles to the south of its mouth; Vorovskaya, 3 miles on both sides of its mouth; Kol, 3 miles on both sides of its mouth; Kikchik, 3 miles to the north and 1⅔ miles south; Bolshaya, 5⅓ miles north and 2⅔ miles south; Goliguina and Opala, 3 miles north of Opala and 3 miles south of Goliguina and the territory between them; and Osernaya, 3 miles to the north and 1⅔ miles to the south.

Formerly only sailing vessels served the stations in this district; later steamers made their appearance, and now a combination of steamers and sailing craft is growing in general use, the latter working as auxiliaries, feeding the steamers. The improvement in transportation is indicated in the following table of percentages:

	1910	1911	1912	1913
Japanese schooners	80	67.6	54.9	42.6
Japanese steamers	15	20.9	20.3	18.2
Auxiliary schooners	5	11.5	24.8	39.2

The 1913 catch was not good; heavy storms kept the schools of fish from approaching the shore, and often prevented any fishing. The total catch was as follows:

	King salmon.	Chum salmon.	Humpback salmon.	Sockeye salmon.	Coho salmon.	Dolly Varden trout.
Coast stations:	*Number.*	*Number.*	*Number.*	*Number.*	*Number.*	*Number.*
Russian (8)	95	191,873	1,340,685	25,447	1,198	....
Japanese (140)	5,216	3,902,646	24,160,762	1,269,176	67,076	....
River stations: Russian (13)	4,196	373,812	1,842,090	226,653	33,195	99,690
Total	9,507	4,468,331	27,343,537	1,521,276	101,469	99,690

The output at the coast stations in 1913 amounted to 37,604 tons of fish, of which 1,030 tons, chiefly sockeyes, were canned, and the balance was Japanese dry-salted. There were prepared 1,134 tons of caviar, 102 tons according to the Japanese method, and the balance by Russian method.

A comparison of this catch with previous years is given below:

	1909	1910	1911	1912	1913
Number of stations	109	102	139	133	148
Output ....tons	15,518	23,857	48,322	24,559	37,604

The catch of the river stations was utilized as follows:

	Tons.
Fish prepared for Russian market	2,846
Fish canned for European market	105
Fish dry-salted for Japanese market	840
Fish fertilizer	4
Caviar, Russian method	215
	4,010

The catch on the river stations in 1912 and 1913 was as follows:

	King salmon.	Chum salmon.	Hump-back salmon.	Sockeye salmon.	Coho salmon.	Dolly Varden trout.
	Number.	*Number.*	*Number.*	*Number.*	*Number.*	*Number.*
1912, 12 stations	3,000	246,000	930,000	480,000	33,000	71,000
1913, 13 stations	4,196	373,812	1,842,090	226,658	38,195	99,690

The fish from this district are gradually attracting the attention of buyers. The improvements in the equipment of fishing stations warrant preparing a better product and thereby diminish the dependency of the district upon the Japanese market.

In 1913 Schelohoff Bros., of Astrakhan, Suvoroff & Sons, of Odessa, Yasikoff, of Petrograd, and Kapeikin, a large Siberian fish dealer, made liberal advances of money to the fishermen in order that they might prepare the catch in accordance with the Russian method, and some of them commissioned their own specialists to superintend the preparation. It is only natural that under such conditions the district will gradually become independent of Japanese buyers. In 1911, out of 3,595 tons of fish products, 2,095 tons, or 58 per cent, were shipped to Japan; in 1912, of 2,831 tons, 835 tons, or 30 per cent; whereas in 1913, of 4,010 tons, only 845 tons, or 21 per cent, were shipped to Japan.

There were 12 canneries in the district in 1913, of which 2 were river stations, viz, Eckerman's on Polana River and Maynard's on Kolpokava River. The best canneries are well equipped with modern machinery and are run by a Japanese firm, which is backed by an English concern.

In 1913 the canneries on the coast produced 41,186 cases of canned salmon, and 4,208 cases were packed at river stations.

The largest cannery is located on the Osernaya River. The shore property is valued at $100,000. There are 120 white, 30 Japanese, and 40 Korean employees. The company runs one transporting vessel of 2,200 tons valued at $150,000, one power fishing boat of 400 tons valued at $20,000, and eight lighters. The apparatus consists of two 250-foot haul or beach seines. In 1915 the catch was 60,000 sockeye, 500,000 humpback, and 75,000 chum salmon. The product was 5,200 cases (48 one-pound flat cans per case) of sockeyes valued at $40,000, 19,800 cases of humpbacks worth $120,000, and 4,000 cases of chums worth $24,000. Also 5,000 pounds of dry-salted humpbacks were prepared, as well as 7,200 pounds of salmon fertilizer worth $72. This plant was built in 1914. The buildings are of steel shipped from England; the machinery is all American. One net is operated by the company and one by local inhabitants known as "colonists."

The Osernaya River is a natural place to find red, or sockeye, salmon, but owing to the Japanese concessions higher up the coast very few reds now reach the river.

Another plant is operated on the Bolsheresk River, the shore property being valued at $5,000. This plant employs 200 whites and 50 Japanese and uses two 250-foot haul or beach seines. The product in 1915 was 700,000 pounds of pickled sockeye salmon. The concession at present is used for salting only, but the erection of a cannery for humpback salmon is being discussed. No reds are found in the river, but there is an abundance of humpbacks.

A Japanese firm has a cannery 5 miles north of the Osernaya River, employing 400 Japanese; the land plant is valued at $35,000. The plant has one transporting vessel worth $1,500, six lighters worth $1,000, and three 5,000-foot floating traps valued at $5,000. This cannery was built in 1913. The building is of wood and was constructed first in Hakodate, taken apart, and reassembled in Kamchatka. The machinery is American made. In 1914 the can-making machines were removed to Hakodate, and the cans are now made there. The company has three coast concessions, one at the cannery and one on either side. They put up 27,000 cases of sockeyes in 1913 and 15,000 cases in 1914. The product in 1915 was 20,000 cases (48 half-pound flat cans per case) of sockeyes, worth $100,000; 18,000 cases (48 one-pound flat cans per case) of sockeyes, worth $126,000, and 15,000 cases (48 one-pound flat cans per case) of humpbacks, worth $60,000. They also dry-salt a considerable quantity of humpbacks.

Farther up the coast there is another cannery which makes its cans and does all work by hand. Beyond this plant there seem to be no sockeye salmon along the west coast of Kamchatka.

East Kamchatka district.—This district covers the coast line of the eastern Kamchatka and Anadir Peninsulas, about 1,843 miles. The majority of the fishing stations are concentrated around Karaguinsky (Count Litka) Bay, in the straits from the Malo-Voyam River to Kitchigin River, about 135 miles long, and in the region of Kamchatka River.

The area closed to fishing in this district consists of the shore line, 7 miles to the west and 2⅔ miles to the east of the mouth of Kamchatka River.

The run of fish in 1913 was retarded very much by late ice, which remained until the end of June and in some places as late even as July. However, the run of fish, especially of chum salmon, was good. At some places (Pankara and Russakova Rivers) large schools of fish, averaging 1½ to 2 miles wide, appeared early in August, but the stations were closed. The Anadir River had a good run. There were hardly any runs of sockeye and coho salmon between the Kitchigin and Yki Rivers, and a rather small run in the region of the Kamchatka River, which is of special importance on account of the canneries.

In 1912 at 10 coast fishing stations 700,000 sockeyes and 250,000 cohos were caught, while in 1913, at nine stations only 393,000 sockeyes and 95,000 cohos were taken.

The catch of salmon at the coast stations for the years 1911 to 1913 was as follows:

	King.	Chum.	Humpback.	Sockeye.	Coho.
	Number.	*Number.*	*Number.*	*Number.*	*Number.*
1911, 38 stations	8,000	3,085,000	1,627,000	750,000	218,000
1912, 54 stations	29,000	3,414,000	497,000	745,000	249,000
1913, 61 stations	30,167	6,464,224	2,623,997	399,207	98,043

The output amounted to 11,399 tons in 1911, 11,467 tons in 1912, and 21,192 tons in 1913. Of the 1913 product 250 tons of fish were salted according to the Russian method, 19,076 tons dry-salted by the Japanese method, 1,030 tons were canned, 700 tons of caviar were prepared for the Russian market, and 136 tons for the Japanese market. Twenty-five cases of crabs were also canned.

At the river stations, 28 in number, of which 26 were operated in 1913, the catch in that year was 1,315 king salmon, 1,055,045 chum salmon, 647,595 humpback salmon, 460,494 sockeye salmon, 54,780 coho salmon, 18,671 Dolly Varden trout, and 88,740 herring. Products prepared amounted to 1,405 tons of fish, Russian salted, 611 tons canned, 2,261 tons Japanese dry-salted, and 198 tons of Russian caviar, a total of 4,475 tons.

The grand total of the 1913 catch in this district was:

	King salmon.	Chum salmon.	Humpback salmon.	Sockeye salmon.	Coho salmon.	Dolly Varden trout.	Herring.
	Number.	*Number.*	*Number.*	*Number.*	*Number.*	*Number.*	*Number.*
In conventional waters	30,167	6,464,224	2,623,997	399,207	98,043	....	....
Outside conventional waters	1,315	1,055,045	647,595	460,494	54,780	18,671	88,740
Total	31,482	7,519,269	3,271,592	859,701	152,823	18,671	88,740

The total output of prepared products was 25,668 tons, divided as follows: Fish, Russian salted, 1,655 tons; fish, canned, 1,641 tons; fish, Japanese dry-salted, 21,337 tons; Russian caviar, 898 tons, and

Japanese caviar, 137 tons. The total output in 1912 was 15,663 tons, and in 1911, 16,388 tons.

All canning factories in this district are located in the neighborhood of the Kamchatka River. One belongs to the Russian firm, Denbigh & Co., and the others to Japanese. Denbigh & Co. operate two excellently equipped power canning plants with American modern machinery, and during 1913, 1914, and 1915 they packed salmon as follows:

Years.	Sockeye.	Coho.	Chum.	Humpback.	King.	Total.
	Cases.	*Cases.*	*Cases.*	*Cases.*	*Cases.*	*Cases.*
1913	33,000	10,000	18,000			61,000
1914	41,203	11,253	19,103			71,559
1915	36,763	26,176	39,426	1,441	20	103,826

SOUTHWESTERN DISTRICT.

This district covers the waters from the southern boundary of the Amur River estuary (the line between Capes Lazaref and Pogibi) down to the Chosen frontier, including Vanina Bay, Imperial Harbor, Peter the Great Bay, and other bays. The total length of the shore line is about 1,350 miles.

This district may be divided into two principal parts: The northern, from Lazaref-Pogibi line to Cape Povorotni, which, with the exception of various bays, includes the conventional waters; and the southern part, composed of Peter the Great Bay and Posiet Bay, both of which are excluded from the conventional waters.

In the northern part the fishing stations are rented on the public-tender basis, and the great majority of the station owners and workmen are Japanese. Chum and humpback salmon are caught to some extent, especially the latter, but the principal fish is herring. The spring herring is made into fertilizer by the Japanese, and some fish oil is extracted. During the past three to five years the Tartar Straits fishermen have begun to salt herring in a very crude way, and the product commands a rather low price. The principal group of herring-fishing stations begins to the north of Imperial Harbor, about Datta Bay, and continues 50 to 60 miles to the south.

In the southern part there is a wider range in the varieties caught, viz: Crabs, shrimps, oysters, trepang, and sea kale. In this section fishing is exclusively in the hands of Russian subjects, who fish during the entire year.

Peter the Great Bay chiefly supplies the Vladivostok market with fresh and frozen fish, crabs, shrimps, etc., and during the spring run of herring large quantities, fresh and mildly salted, are shipped to Chosen, Japan, and China. It supplies Vladivostok with herring, bass, carp, flounders, trout, and chum and humpback salmon.

In conventional waters the 1913 catch was smaller than in 1912 and 1911 and was about equal to that of 1910, which was considered a poor year, as will be seen from the following figures: 1910, 25,000,000 herring and 1,383 tons of fish fertilizer; 1911, 32,800,000 herring and 2,033 tons of fertilizer; 1912, 27,950,000 herring and 1,857 tons of fertilizer; 1913, 25,070,000 herring and 1,388 tons of fertilizer.

In excluded bays the run was somewhat better, and in St. Olga and Vanina Bays it was very good. The result of the catch of herring for the years 1910 to 1913 was: 1910, 1,375,000; 1911, 2,050,000; 1912, 3,477,000; 1913, 2,441,000.

The poor catch of 1911 and 1912 greatly diminished the fishing interest in Peter the Great Bay, and the number of fishing stations decreased from 44 in 1912 to 17 in 1913. The catch of 1913 was, comparatively speaking, good, especially the herring catch. The following figures show the herring catch in the years 1910 to 1913: 1910, 6,018,000; 1911, 4,476,000; 1912, 5,142,000; 1913, 10,391,000.

The catch of dorse was smaller than in 1912; that of smelt was better. About 400,000 crabs were caught; about 15,000 of these were sold fresh at Vladivostok, and a small frozen consignment was shipped to European Russia. The balance, about 125 tons, was dried for the Chinese market.

Shrimp fishing is very little developed; about 10 tons were caught in 1913. Sea kale was obtained to the extent of only 1,000 tons. Only 125,000 oysters were brought to Vladivostok, and 9 tons of trepang were prepared for the Chinese market. These figures do not include fish, etc., caught by local peasants.

The grand total for 1913 of the catch in this district was:

	Peter the Great and other bays excluded by the convention, but including the catch of 33 villages.	Conventional waters.		Peter the Great and other bays excluded by the convention, but including the catch of 33 villages.	Conventional waters.
Number of fish caught:			Products prepared—Con.		
Chum salmon	102,000	86,000	Fish, fertilizer..tons	162	1,388
Humpback salmon	213,000	445,000	Caviar, Japanese market..tons	....	5
Herring	15,849,000	25,070,000	Caviar, Russian market..tons	8	21
Dorse	933,000	....	Fish oil, Russian market..tons	81	85
Smelt	3,400,000	....	Fish for Russian market..tons	1,799	....
Mackerel	150,000	1,900	Fish for Chinese and Chosen markets..tons	1,167	....
Flounder	287,600	....	Crabs..do	125	....
Roach	79,000	....	Sea kale..do	1,866	....
Cod	46,000	....	Trepang..do	9	....
Trout	....	11,800	Shrimps..do	29	....
Sturgeon	155	....			
Others	761,000	467,000			
Products prepared:					
Fish, dry-salted for Japanese market..tons	....	533			

Import of herring at Shanghai.—According to the "Priamurskaya Vyedomosti," the agent of Commerce and Industry for China and Japan states that the Shanghai market is supplied with fish similar to herring, caught in Chinese waters, and the importation of herring depends upon the local catch of this fish, of which there is not enough to satisfy the demands. Large foreign firms import quantities of American and Japanese herring, the price varying from $2.37 to $2.84 per hundred pounds. The average weight of one herring is about 1 pound.

At the end of March or the beginning of April the catch of fish in Chinese waters begins, and therefore the prices on imported herring decrease. Toward warm weather the demand ceases altogether.

American herring, of an average weight of one-fourth pound, have a good market in Shanghai during autumn, winter, and spring, and they bring from $2.37 to $3.32 per hundred pounds.

All kinds of fish dried in the open air find a good market in Shanghai during the entire year. The prices range from $2.84 to $3.79 per hundred pounds, depending upon the kind of fish, the smaller sizes bringing better prices. The fish are packed in bales.

During recent years the Vladivostok fish dealers have made attempts to introduce their herring into China, but notwithstanding that their herring are better than the local or the American product the attempts have not been very successful. This is explained by the fact that the buyers of fish at Vladivostok do not live up to their contracts. There were instances where the boxes contained more Chinese cheap salt than fish. However, fish of good quality that have succeeded in reaching Shanghai have been well received, and consignments before the Chinese spring holidays have brought as much as $8.50 per hundred pounds.

Up to the present Russian fish dealers have been dealing through small commission agents, whose services were not satisfactory. Unfortunately, almost all of the Russian fishermen in Vladivostok are without sufficient capital to place the industry on a business basis. They have not the money to secure a large catch early enough in the spring to enable them to deliver it to the market before the Chinese holidays and before the local fish appear on the market. The principal run of herring occurs after the Chinese holidays, and therefore arrangements are needed to enable the fishermen to preserve the fish until the fall, when the market again becomes profitable.

AMUR RIVER.

The figures obtainable of the Amur River fishing are far less accurate than those of sea fishing. The control of this fishing is intrusted to Government foresters and not to special men, as in the sea-fishing districts; the foresters regard it as a secondary matter and give it scant attention. On the other hand, fish on the Amur are to a large extent replacing cereals for the local inhabitants, not only for natives but also for Russians, and for this reason as many free fishing stations are given to the inhabitants as are deemed necessary to insure their food supply. Owing to alleged abuse of this privilege and to the inadequate and lax control by the foresters, the several rules and regulations providing for close seasons for the most valuable fish and prohibiting the use of certain methods of capture can not, it appears, be enforced among the river fishermen.

The Amur River region is quite different from the northern waters. Here chum and humpback salmon are the principal fish, and two or three runs of each of these varieties occur annually. The Amur River fishing has a very far-reaching effect on the whole life of the Maritime and Amur Provinces. The principal fishing is concentrated in the northern part of the river and in its estuaries. The width of the river, the frequent storms during the runs, and the regulations governing the construction and size of the fishing gear all assist in allowing the fish to pass the innumerable fishing stations at the mouth of the river and its estuary and to reach the upper parts of the stream. The runs of fish up the river replace, in the Maritime Province, the harvest time in other sections of Russia. By far the greater part of the inhabitants along the river catch fish; they are eaten fresh and are salted, dried, and prepared in other ways for future consumption. In the diet of the peasants and natives of the Amur River system fish replaces grain. The natives prepare the fundamental food for their dogs from the fish heads and bones. In the Maritime Province the salmon ascend the Amur as far as the Ussuri River and its tributaries; in the Amur Province they often ascend as far as Blagovyestchensk.

Beyond Nikolaievsk only the surplus salmon are sold, the bulk of the catch being prepared for home consumption.

The lower part of the Amur River and its estuary is occupied by the largest, oldest, and best fishing stations, some of which are already fully equipped with proper quays, sheds, ice cellars, and even refrigerators, electric lights, and yard railroads. The longer a station exists the better it is studied and the greater its value becomes. In March, 1916, public tenders were held for some of the best stations, and the increase in their value can be seen from the following figures: In 1908 one of these stations was leased for $1,500; in 1912 the same lessee paid $3,000 for it, and last March (1916) it was leased by an outsider for $21,000. Another station, regarded as one of the best, was leased by the same man for 12 years at $2,500 per annum; this year the old lessee offered $48,000 for it, but was outbid by a new man, who offered $58,000 per annum.

The expensive outfitting of the fishing stations, regardless of the rent period, is due to the fact that, in order to encourage better equipment, the Government introduced a clause into the rules of the rental contracts and the public tender conditions by which, in cases where fishing stations changed hands, the new owner must buy all the equipment from the former owner at cost price. In case the parties do not agree to the valuation of the property, the Department of Domains is authorized to appraise it, which valuation is binding for both parties. The practice of the last three to four years shows very satisfactory results from these conditions, and since the introduction of this rule many fishing stations have been improved and equipped to a greater extent than in former years.

Sturgeon, perch, bass, carp, and many other fishes are caught at the Amur River stations, but the volume of their catch is not large, and the fish are consumed locally.

Fishing on the Amur River is divided into two districts—the Mariinsk, or the lower Amur district, and the Khabarovsk district.

Mariinsk district.—This district includes the area from the village Troitskoe to the village Sophiskoe, or a tract about 278 miles long. Of 147 fishing stations existing in this district in 1913, only 27 stations were commercial; the balance (120) were given free to 18 Russian and 49 native villages.

The result of the 1913 catch of salmon was as follows, the total being compared with the two preceding years:

	Humpback.	Chum.	
		Summer run.	Autumn run.
1913.	*Number.*	*Number.*	*Number.*
Russian peasants	....	44,400	480,321
Natives	....	650	330,884
Commercial fishing	....	32,410	174,401
Total	....	77,460	985,056
Total, 1912	450	117,700	1,033,559
Total, 1911	....	78,461	1,118,770

In addition to the fish prepared for home consumption, the local inhabitants put some of the products on the market, viz: Salted summer chums 73 tons, autumn chums 1,476 tons, and 68 tons of caviar. In addition to this, 116 tons of summer chums, 877 tons of autumn chums, and 62 tons of caviar were prepared by commercial fishermen.

Khabarovsk district.—This district includes the river line from the northern boundary of the Mariinsk district up the river to Khabarovsk, about 127 miles. The district is very similar to the Mariinsk district. In 1913 there were 39 free fishing stations in the district, allotted to 20 Russian and 19 native villages, and 3 commercial fishing stations.

According to official reports 278,514 fish were caught in 1913, i. e., 268,514 autumn chum salmon at the free stations and 10,000 at the commercial stations. About 154,000 fish were used for home consumption, the balance being sold fresh and salted in the neighboring markets.

Sturgeon fishing is greatly developed in this district; about 4,623 sturgeon, weighing over 34 tons, were registered in the 1913 catch, but the actual number is very much higher, as many fish were not registered. In addition to sturgeon, about 158 tons of pike, bream, carp, crucian carp, sheatfish, etc., were caught by the peasants.

SUMMARY OF CATCH IN 1913.

The total number of fish caught in the waters of the Russian Far East, and the quantity of product prepared there, in 1913, is as follows:

NUMBER OF FISH CAUGHT.

Districts.	Salmon.					Dolly Varden trout.	Herring.
	King.	Chum.	Humpback.	Sockeye.	Coho.		
Khabarovsk	....	278,514	....	....	....	....	....
Mariinsk	....	1,062,516	....	....	....	....	....
Nikolaievsk	....	18,262,373	7,468,794	....	....	....	12,600
Southwestern	....	138,750	657,981	....	1,915	11,824	40,919,600
Sakhalin	....	77,279	184,524	....	....	....	4,482,500
Okhotsk	....	1,235,050	245,266	....	3,198	17,035	....
West Kamchatka	9,507	4,468,331	27,343,537	1,521,276	101,471	104,750	100,000
East Kamchatka	31,482	7,519,272	3,271,592	859,701	152,823	18,671	88,740
Total	40,989	33,042,085	39,171,694	2,380,977	259,407	152,280	45,603,440

PRODUCTS PREPARED FOR MARKET.

Districts.	Salmon.		Herring.	
	For European market.	For Japanese market.	For European market.	For Japanese market.
	Tons.	*Tons.*	*Tons.*	*Tons.*
Khabarovsk	415	....	....	....
Mariinsk	2,672	....	....	....
Nikolaievsk	42,944	7,204	8	....
Southwestern	310	533	784	1,881
Sakhalin	101	277	38	274
Okhotsk	741	2,867	....	....
West Kamchatka	5,331	37,422	12	....
East Kamchatka	4,180	21,473	11	....
Total	56,694	69,776	848	2,155

MISCELLANEOUS FISHES PREPARED BY DISTRICTS.

Species.	Khabarovsk.	Nikolaievsk.	Southwestern.	West Kamchatka.	Total.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Sturgeon	34	113			147
Dorse			45		45
Mackerel			166		166
Smelt			50		50
Shrimp			29		29
Crab			125	5	130
Sea kale			1,867		1,867
Other	158	548	594		1,300
Total	192	661	2,876	5	3,734

JAPANESE INTEREST IN RUSSIAN FISHERIES.

EXPORTS FROM RUSSIAN FAR EASTERN WATERS TO JAPAN.

The "Vyestnik Finansof, Promyshlennosti i Torgovli" (Messenger of Finance, Industry and Commerce; No. 50, of Dec. 13 to 26, 1915) gives the following statistics of the exports of fish from the Priamur district to Japan from 1907 to 1913, inclusive, showing the per cent of increase or decrease in each year as compared with the preceding:

Years.	Quantity.	Value.	Increase (+) or decrease (−) compared with preceding year.	Years.	Quantity.	Value.	Increase (+) or decrease (−) compared with preceding year.
	Tons.		*Per cent.*		*Tons.*		*Per cent.*
1907	34,058	$1,421,398		1911	105,821	$3,614,077	+32.38
1908	40,944	1,867,690	+21	1912	65,513	3,046,623	−38.08
1909	61,225	2,419,442	+48	1913	92,270	3,460,260	+13.34
1910	71,572	2,690,072	+18				

According to the kind of fish or products, the exports of 1913 consisted of the following:

Product.	Quantity.	Value.	Product.	Quantity.	Value.
	Tons.			*Tons.*	
Chum salmon	38,481	$1,898,495	Caviar	436	$25,805
Humpback salmon	47,987	1,138,693	Other	228	10,964
Fertilizer	2,383	109,721	Total	92,270	3,460,260
Canned fish	2,025	257,947			
Herring	730	18,635			

The localities or districts from whence these goods were shipped were as follows:

Districts.	Quantity.	Value.	Districts.	Quantity.	Value.
	Tons.			*Tons.*	
Kamchatka	62,900	$2,889,734	Sakhalin	701	$30,647
Nikolaievsk	2,738	141,106	Maritime Province	3,410	139,168
Tamlevo	3,200	141,597	Total	75,601	3,460,233
Okhotsk	2,652	117,981			

These goods were shipped to various Japanese ports. The importance of these ports as fish markets may be seen from the following figures which give the amount of fish landed during the period 1911–1913, in percentages of the grand total of imports:

Ports.	1911	1912	1913	Ports.	1911	1912	1913
	Per cent.	*Per cent.*	*Per cent.*		*Per cent.*	*Per cent.*	*Per cent.*
Hakodate	64.9	68.4	73.75	Tsuruga	3.6	1.1	1.19
Yokohama	10.6	10.1	9.38	Aomari	1.1	1.4	.59
Ningata	7.9	8.3	7.84	Others	1.2	1.4	1.04
Otaru	5.9	5.2	3.29				
Fusiki	4.8	4.1	2.92		100	100	100

JAPANESE FISHING STATIONS.

The Japanese Advertiser of March 22, 1916, had the following in reference to Japanese fishing stations in the Russian far eastern waters:

Owing to the increased demand for tinned fish as provisions of war, the attention of industrial circles has been directed to fishing enterprises. The fishing along the coast provinces of Asiatic Russia has been made the object of much interest and competition among the Japanese and Russians. Though various knotty problems that impaired the interest of the Japanese have recently been settled in their favor by the lenient attitude of the Russian authorities, the Japanese have now been hard hit by the increase of the lease rate for the fishing zone. According to the statement of Mr. Matsuzaki, Director of the Marine Industry Bureau, the tender for the present year for the lease of fishing zones in the coast provinces has resulted in the loss of 26 zones for the Japanese side from that of last year. The quotations have risen remarkably, evidently because of the ever-increasing demand for preserved fish. For instance, a zone for which the Imperial Marine Goods Co., obtained the lease last year at 6,660 yen, has gone to a Russian concern at 21,000 yen. Another zone which a Japanese firm obtained at only 3,100 yen last year, has also gone to a Russian firm at 22,000 yen. The inability of the Japanese to bid higher may partly be ascribed to the shortage of ships and the rise in the charter rate, but the real reason is the Russian competition, caused by the prosperity in the trade in fish.

The fishing enterprise in the coast provinces has formerly been practically monopolized by Japanese. But the recent development in fishing has attracted the attention of Russian business men, and they have obtained the financial help of foreign capitalists interested and scored a success in the campaign. The fishing enterprise requires large and perfect tinning plants, but the Russians lack these plants, and it is easy to imagine that the foreign capitalists, having the plants at their disposal, have invested capital in backing the Russian fishermen. Mr. Matsuzaki has warned the Japanese fishing firms to beware of this new development.

The following is a table showing the number of fishing zones leased to Japanese and Russians for this and last year and the amounts of the leases:

Years.	Number of fishing zones.			Amount of lease.		
	Japanese.	Russian.	Total.	Japanese.	Russian.	Total.
				Yen.[a]	*Yen.*	*Yen.*
1915	231	34	265	702,244	143,118	845,362
1916	205	42	247	723,585	170,278	893,863

[a] A yen is equal to about $0.498.

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