REPORT OF THE DIVISION OF STATISTICS AND METHODS OF THE FISHERIES.

By HUGH M. SMITH, *Assistant in Charge.*

The work accomplished by the office and field forces of the Division of Statistics and Methods of the Fisheries during the year ending June 30, 1895, is outlined in the accompanying report. The subjects noticed are the general field investigations, certain special inquiries, reports issued, and a number of minor topics.

The available field force consisted of five regular agents and three office assistants who were detailed for field duty. In the special inquiry on the menhaden industry two temporary aids were employed for several months.

The regular appropriation for carrying on the field inquiries and other work of the division was $3,500. This sum was supplemented by an allotment of $110.02 from the general appropriation of the Commission. The cost of the field investigations was $3,243.50; salaries of temporary assistants aggregated $207, and incidental expenses amounted to $159.52.

THE GREAT LAKES.

In my previous report reference was made to the inauguration of a canvass of the fishing industry of the Great Lakes. The completion of this investigation was the principal field work carried on by the division during the year. Six agents were at one time or another employed in the field. The canvass was brought to a close in November. The assignment of agents to the various lakes was as follows: W. A. Wilcox and T. M. Cogswell to Lake Superior; Ansley Hall and C. H. Stevenson to Lake Michigan; W. A. Wilcox, T. M. Cogswell, and C. H. Stevenson to Lake Huron; W. A. Wilcox and T. M. Cogswell to Lake St. Clair, St. Clair and Detroit rivers; E. E. Race and Ansley Hall to Lake Erie; W. A. Wilcox and C. E. Ingersoll to Lake Ontario and St. Lawrence River.

The inquiries related primarily to the calendar year 1893, for which detailed statistics were obtained; but much information was also secured regarding the condition of the industry in the years intervening between the two investigations. The returns submitted by the field agents have been compiled, and the following data show the general results of the canvass.

EXTENT OF GREAT LAKES FISHERIES IN 1893.

The fishing industry of this region, as shown by the inquiries of this division, in 1893 gave employment to 10,180 persons, of whom 1,156 were engaged on vessels, 7,465 in shore and boat fishing, and 1,559 in various other capacities.

The aggregate investment in fishing property was $5,899,270. This represented 197 vessels, 3,853 boats, 104,988 gill nets, 3,743 pound and trap nets, 2,449 fyke nets, and 117 seines. The value of the vessels was $855,729; of boats, $299,041; of gill nets, $670,572; of pound and trap nets, $802,078; of fyke nets, $43,668; of seines, $10,735; other apparatus, $17,492. The shore and accessory property connected with the industry was worth $2,087,455; the cash capital was $1,112,500.

The catch amounted to 96,619,671 pounds of fish, having a first value of $2,270,618. The quantity and value of the yield of the principal species were as follows: Lake herring, 35,740,916 pounds, $536,238; other whitefishes, 10,327,093 pounds, $393,511; lake trout, 16,279,953 pounds, $603,789; sturgeon, 1,426,584 pounds, $50,438; pike and pike perch, 14,943,948 pounds, $410,103; yellow perch, 8,641,311 pounds, $130,970; suckers, 5,224,663 pounds, $58,607; black bass, 215,031 pounds, $12,395; catfish, 1,063,134 pounds, $31,525; carp, 659,347 pounds, $16,980.

The condition of the industry in each lake is given with some detail in the accompanying series of tables. Lake Michigan is shown to have had the most extensive fisheries in 1893; in the items of persons employed, value of apparatus and number of boats used, and value of catch, it surpassed any other lake; in the yield of whitefish, trout, yellow perch, and several other fish this lake holds the first rank. Lake Erie, which heretofore had ranked first in all major particulars, still precedes Lake Michigan in the total amount of capital invested and quantity of products taken; the catch of lake herring, black bass, carp, catfish, wall-eyed pike, saugers, and sturgeon is larger than any other lake. Lake Huron has the third position in the matter of fishing population and quantity and value of products, but is led by Lake Superior in investment. More suckers are taken in Huron than elsewhere, and in the yield of trout and catfish it has second place. The order of rank of the other lakes is Superior, St. Clair (and tributaries), and Ontario.

Table showing by lakes the number of persons employed in the fisheries of the Great Lakes in 1893.

How employed.	Superior.	Michigan.	Huron.	St. Clair.	Erie.	Ontario.	Total.
On vessels fishing	64	421	74	8	496	.....	1,063
On vessels transporting	26	15	8	.....	38	6	93
In shore fisheries	663	2,901	757	454	2,469	221	7,465
On shore, in fish-houses, etc	133	591	105	67	649	14	1,559
Total	916	3,928	944	529	3,622	241	10,180

Table showing by lakes the apparatus and capital employed in the fisheries of the Great Lakes in 1893.

Items.	Superior.		Michigan.		Huron.		St. Clair.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	13	$64,530	73	$273,970	11	$54,150	1	$7,000
Tonnage	300.13		1,331.09		193.43		11.23	
Outfit		15,502		49,044		14,259		2,645
Vessels transporting	3	40,500	5	9,400	4	2,150		
Tonnage	448.98		46.71		47.55			
Outfit		11,815		395		50		
Boats	431	34,005	1,471	74,617	505	31,345	210	6,728
Apparatus, vessel fisheries:								
Gill nets	2,847	37,840	30,932	238,856	2,304	30,713	380	4,260
Set lines			66	1,125				
Apparatus, shore fisheries:								
Gill nets	6,052	49,840	23,300	113,228	2,619	22,358		
Seines	14	500	28	2,520	1	75	20	3,025
Pound nets and trap nets	276	63,415	785	181,385	731	108,508	91	7,400
Fyke nets	11	120	1,458	17,970	195	3,348	60	1,590
Lines and spears		1,445		2,880		459		756
Crawfish traps			1,484	711				
Dip nets			969	5,177				
Shore property		150,512		778,719		193,785		135,672
Cash capital		59,000		313,500		42,500		71,000
Total		529,024		2,063,497		503,700		240,076

Items.	Erie.		Ontario.		Total	
	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	78	$252,800			176	$652,450
Tonnage	958.54				2,794.42	
Outfit		26,500				107,956
Vessels transporting	7	26,400	2	$2,300	21	80,750
Tonnage	139.56		21.58		704.38	
Outfit		1,570		743		14,573
Boats	1,061	145,027	175	7,319	3,853	299,041
Apparatus, vessel fisheries:						
Gill nets	20,584	98,566			57,047	410,235
Set lines					66	1,125
Apparatus, shore fisheries:						
Gill nets	14,785	66,117	1,185	8,794	47,941	260,337
Seines	47	4,440	7	175	117	10,735
Pound nets and trap nets	1,783	439,060	77	2,310	3,743	802,078
Fyke nets	586	19,250	139	1,300	2,449	43,668
Lines and spears		4,089		850		10,479
Crawfish traps					1,484	711
Dip nets					969	5,177
Shore property		808,517		20,250		2,087,455
Cash capital		614,500		12,000		1,112,500
Total		2,506,842		56,131		5,899,270

Table showing by lakes and species the yield of the fisheries of the Great Lakes in 1893.

Species.	Superior.		Michigan.		Huron.		St. Clair.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Bass	45	$5	45,393	$2,100	28,168	$997	29,631	$1,029
Carp			2,200	88			21,564	411
Catfish			77,439	1,761	109,476	2,246	29,510	1,144
Herring	660,272	7,701	11,198,717	217,430	2,758,628	47,462	140,112	1,821
Ling or lawyers	11,000	321	149,503	2,079				
Perch			3,451,563	66,203	1,758,470	15,000	704,992	10,931
Pike and pike perch	133,903	4,020	711,647	28,362	827,819	33,852	524,319	22,243
Sturgeon	62,052	1,167	311,780	8,570	79,553	2,045	54,106	2,197
Suckers	118,445	2,150	1,690,769	15,004	1,824,919	23,995	182,022	1,858
Trout	3,735,519	122,380	8,216,920	316,871	3,439,575	133,194	72,000	2,400
Trout, siscowet	606,603	18,675						
Whitefish, common	2,732,270	93,672	2,330,060	98,432	1,178,271	45,607	50,950	1,925
Whitefish, bluefin	36,818	1,326	1,608,130	45,126				
Whitefish, longjaw			382,178	10,273				
Whitefish, menominee			423,323	11,437	44,416	1,219		
Other fish			58,133	4,875	15,043	164	5,105	71
Total	8,096,927	252,107	30,747,755	828,611	12,064,338	306,381	1,814,311	46,030

Table showing by lakes and species the yield of the fisheries, etc.—Continued.

Species.	Erie.		Ontario.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Bass	312,188	$11,864	59,223	$2,405	474,648	$18,400
Carp	635,583	16,481			659,347	16,980
Catfish	776,993	23,609	69,716	2,765	1,063,134	31,525
Herring	20,931,076	260,268	52,111	1,466	35,740,916	530,238
Ling or lawyers	32,127	384			192,630	2,784
Perch	2,504,933	35,595	131,353	2,641	8,641,311	130,970
Pike and pike perch	12,529,515	312,769	216,745	8,317	14,943,948	410,163
Sturgeon	793,800	31,472	125,293	4,987	1,426,584	50,438
Suckers	1,360,857	14,855	47,651	745	5,224,663	58,607
Trout	203,132	9,994	6,204	275	15,673,350	585,114
Trout, siscowet					606,603	18,675
Whitefish, common	1,292,410	78,730	45,380	2,787	7,629,341	321,153
Whitefish, bluefin					1,734,948	46,452
Whitefish, longjaw			112,887	2,977	495,065	13,250
Whitefish, menominee					467,739	12,656
Other fish	*1,505,711	9,958	61,452	2,145	1,645,444	17,213
Total	42,968,325	805,979	928,015	31,510	96,619,671	2,270,618

* No weights shown for turtles and frogs.

COMPARATIVE STATISTICS OF THE GREAT LAKES FISHERIES.

The information collected in this canvass makes it possible to show by detailed statistics the extent of the Great Lakes fisheries at four different periods, viz, 1880, 1885, 1890, and 1893. In the following condensed table the prominent features of the fishing industry of this region are shown by lakes for each of the years named.

The aggregate statistics show that in 1893 more persons were employed in this branch than in 1880 or 1890, but less than in 1885; the capital invested was greater than in any previous year; the quantity of fish taken and the value of the catch were more than in 1880, but less than in 1885 or 1890.

Comparative table showing the extent of the fisheries of the Great Lakes in 1880, 1885, 1890, and 1893.

Lakes.	Persons employed.				Capital invested.			
	1880.	1885.	1890.	1893.	1880.	1885.	1890.	1893.
Superior	414	914	653	916	$81,380	$427,933	$366,682	$529,024
Michigan	1,578	3,379	2,877	3,928	651,135	1,757,831	1,437,224	2,063,497
Huron	470	892	726	944	103,730	385,349	408,858	503,700
St. Clair	356	272	611	529	40,580	251,081	219,145	240,076
Erie	1,620	4,298	4,482	3,622	515,100	1,562,138	2,816,302	2,506,842
Ontario	612	600	389	241	54,050	135,749	123,533	56,131
Total	5,050	10,355	9,738	10,180	1,345,975	4,520,081	5,362,744	5,899,270

Lakes.	Products.							
	1880.		1885.		1890.		1893.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Superior	3,816,625	$118,370	8,825,980	$291,523	6,115,992	$220,968	8,096,927	$252,107
Michigan	23,141,875	668,400	23,518,148	878,788	26,434,266	830,465	30,747,755	828,611
Huron	7,205,273	195,277	11,457,170	276,307	10,056,381	221,067	12,004,338	306,381
St. Clair	1,850,927	36,273	2,185,795	40,193	2,994,571	73,577	1,814,311	46,030
Erie	29,087,300	474,880	51,456,517	1,109,096	64,850,873	1,000,905	42,968,325	805,979
Ontario	3,640,000	159,700	2,398,466	95,869	3,446,448	124,786	928,015	31,510
Total	68,742,000	1,652,900	99,842,076	2,691,866	113,898,531	2,471,768	96,619,671	2,270,618

The figures giving the catch of the principal fishes show marked variations in the different years, and are very suggestive when interpreted in connection with the methods employed and the kinds and quantities of apparatus used. It appears that in 1880 the whitefish (*Coregonus clupeiformis*) constituted nearly one-third of the catch, and was by far the most important fish taken. Each subsequent year showed a marked decrease in the yield, until in 1893 the fish constituted little more than one-tenth of the output and was surpassed in quantity by several other species. In 1880 the lake herring (*Coregonus artedi*) ranked next to the whitefish in quantity; in 1885 it was the most abundant fish caught, and in 1890 and 1893 maintained the same position. The catch in 1890 was larger than in any other year, being nearly double that in 1885 and more than a third greater than in 1893. The sturgeon (*Acipenser rubicundus*) was more important in 1880 than in any subsequent year; from more than 7,500,000 pounds in 1880, the catch fell to less than 1,500,000 in 1893, this being one of the most noteworthy changes in abundance that has occurred in the fisheries of this region. The output of lake trout (*Salvelinus namaycush*) increased from 6,800,000 pounds in 1880 to nearly 16,300,000 pounds in 1893; the catch in the last three years for which figures are available has shown no marked change. No separate statistics for such fish as wall-eyed pike, yellow perch, pickerel, suckers, and black bass are at hand for all the years in question; the aggregate catch of these and all other species was about 17,000,000 pounds in 1880, and over 32,800,000 pounds in the subsequent years, the yield in 1893 being about 2,800,000 pounds less than in 1885 and 1890. The following table shows the fluctuations in the fish product of the Great Lakes in the four years named:

Comparison of the yield of the fisheries of the Great Lakes in 1880, 1885, 1890, and 1893.

Species.	1880.	1885.	1890.	1893.
	Pounds.	Pounds.	Pounds.	Pounds.
Herring	15,907,517	25,869,458	48,753,349	35,740,916
Sturgeon	7,557,383	7,147,642	4,289,759	1,426,584
Trout	6,804,600	12,586,665	12,890,441	16,279,953
Whitefish	21,463,900	18,344,004	12,401,335	10,327,093
Other fish	16,948,600	35,894,307	35,563,647	32,845,125
Total	68,742,000	99,842,076	113,898,531	96,619,671

The following table, based on the preceding, shows by percentages the different ranks occupied by the several species at different times. The decline of the whitefish and sturgeon and the rise of the lake herring, trout, and minor species are clearly exhibited.

Species.	1880.	1885.	1890.	1895.
Herring	23.23	25.91	42.80	36.99
Sturgeon	10.99	7.16	3.77	1.48
Trout	9.90	12.61	11.32	16.85
Whitefish	31.22	18.37	10.89	10.69
Other fish	24.66	35.95	31.22	33.99
Total	100.00	100.00	100.00	100.00

LAKE SUPERIOR.

The importance of the fisheries of this lake depends on the catch of lake trout and its deep-water variety, the siscowet. These fish in 1893 constituted 54 per cent of the quantity and 56 per cent of the value of the yield. The only other species of noteworthy consequence is the common whitefish. Superior is the only lake except Huron the fisheries of which have undergone a general advance since the last investigation. Further developments may be expected with the increase in population and transportation facilities.

The run of trout in 1893 was very good, and the catch largely exceeded that in 1890. The increase was in part due to the more general utilization of the siscowet, which had previously been neglected on account of its extreme fatness. The whitefish fishery seems to have reached its height in 1885; since that time the product of the fish has diminished, and in 1893 was smaller than in any of the previous years (except 1880) for which figures are available. The fishermen in 1893 devoted considerable attention to the capture of species almost wholly neglected ten years before, such as herring, suckers, and ling. In 1880 the catch of all species other than trout and whitefish was only 3 per cent of the product, while in 1893 it constituted 12 per cent. Sturgeon, while never specially abundant in this lake, are getting scarcer, and between 1885 and 1893 the catch decreased nearly two-thirds.

The following comparison shows the results of the Lake Superior fisheries during four years:

Comparison of the yield of the fisheries of Lake Superior in 1880, 1885, 1890, and 1893.

Species.	1880.	1885.	1890.	1893.
	Pounds.	Pounds.	Pounds.	Pounds.
Herring	34,000	324,680	199,121	660,272
Sturgeon	.....	182,760	47,482	62,052
Trout	1,464,750	3,488,177	2,613,378	4,342,122
Whitefish	2,257,000	4,571,947	3,213,176	2,769,088
Other fish	60,875	258,416	42,835	263,393
Total	3,816,625	8,825,980	6,115,992	8,096,927
Total value	$118,370	$291,523	$220,968	$252,107

LAKE MICHIGAN.

The most prominent features of the fishing industry of Lake Michigan are the large fleet of vessels engaged in the gill-net fishery, the extensive pound-net and shore gill-net fisheries, and the very large yield of lake trout.

The trout constituted more than one-fourth the total catch of all species, and its value was nearly two-fifths that of the aggregate output. More trout were taken in Lake Michigan in 1893 than in all the other lakes combined, and the value of the trout here caught was nearly one-seventh that of the entire lake fisheries. This fish was obtained in

slightly smaller quantities in 1893 than in 1890, but the run in the former year was much larger than in 1880 and 1885. The whitefish catch was about 11 per cent less in 1893 than in 1890. The common whitefish appears to be rapidly decreasing in this lake and its place is being supplied by other species of the same family, more especially the longjaw, the bluefin or blackfin, the menominee, and the herring or cisco. The latter underwent a noteworthy increase in commercial importance between 1890 and 1893, the output increasing 84 per cent (from about 6,000,000 pounds to over 11,000,000 pounds). Sturgeon were taken in only one-tenth the quantity in 1893 that they were in 1880. The diminution in abundance of this valuable fish in the past few years has also been marked in this lake as in other members of the chain.

The general condition of the Lake Michigan fisheries in 1893 was good as compared with 1890. The increase in the production was over 4,250,000 pounds, while the value of the catch decreased about $1,800; but, as has been shown, this was accompanied by a large increase in fishing population and apparatus. The following comparison shows the results of the fisheries of the lake during four years:

Comparison of the yield of the fisheries of Lake Michigan in 1880, 1885, 1890, and 1893.

Species.	1880.	1885.	1890.	1893.
	Pounds.	Pounds.	Pounds.	Pounds.
Herring	3,050,400	3,312,493	6,082,082	11,198,717
Sturgeon	3,839,600	1,406,678	946,897	311,780
Trout	2,659,450	6,431,298	8,364,167	8,216,920
Whitefish*	12,030,400	8,682,986	5,455,079	4,833,691
Other fish	1,562,025	3,684,693	5,586,041	6,186,647
Total	23,141,875	23,518,148	26,434,266	30,747,755
Total value	$668,400	$878,788	$830,465	$828,611

* Includes common whitefish, longjaws, blackfins, and menominees.

LAKE HURON.

The fisheries of Lake Huron in 1893 showed a larger general increase over 1890 than those of any other lake; the advance occurred in the fishing population, the quantity of apparatus used, the quantity and value of the catch. That the augmented yield was not due solely to the increases in fishermen and appliances but represented a development of latent resources is indicated by the fact that the average quantity and value of the catch per man and per apparatus was practically the same each year. This is in marked contrast with the conditions in some other parts of the Great Lakes basin where the maintenance of the yield has been due wholly to the employment of more persons and apparatus.

The principal changes in the condition of the fisheries of this lake in 1893, as compared with 1890, were the increased number of vessels used in fishing and transporting (7 in 1890, 15 in 1893), the more extensive employment of pound and trap nets (731 against 551), the marked increase in the yield of trout, amounting to 128 per cent, and the large

decrease in the sturgeon and pike catch. Whitefish, herring, and other species showed little variation in abundance. The average price of fish in 1893 was about half a cent per pound more than in 1890.

The product of this lake in each of the four years for which statistics are available was as follows:

Comparison of the yield of the fisheries of Lake Huron in 1880, 1885, 1890, and 1893.

Species.	1880.	1885.	1890.	1893.
	Pounds.	Pounds.	Pounds.	Pounds.
Herring	246,800	1,265,650	2,514,551	2,758,628
Sturgeon	204,000	215,500	365,718	79,553
Trout	2,084,500	2,539,780	1,505,619	3,439,575
Whitefish	2,700,778	1,425,380	1,004,094	1,222,687
Other fish	1,969,195	6,010,860	4,666,399	4,563,895
Total	7,205,273	11,457,170	10,056,381	12,064,338
Total value	$195,277	$276,397	$221,067	$306,381

LAKE ST. CLAIR.

At one time the fisheries of this lake and the rivers connected with it yielded comparatively large quantities of sturgeon, whitefish, and lake herring, but in 1893 the catch of all these fishes was very small, and such minor species as perch and suckers constituted a prominent part of the catch. As compared with 1890, the fisheries have undergone a decline in all principal items. The number of persons engaged in actual fishing dropped from 517 to 454. The number of pound nets, the principal form of apparatus, decreased from 34 to 27; this decrease, however, was more than compensated for by the employment of a large number (64) of trap nets similar to those fished in Lake Erie. Seines numbered 28 in 1890 and 20 in 1893. The total capital invested, however, was larger in the latter year, owing to the expansion of the wholesale trade. A comparative summary of the output of the Lake St. Clair, St. Clair River, and Detroit River fisheries in 1880, 1885, 1890, and 1893 is given:

Comparison of the yield of the fisheries of Lake St. Clair and tributaries in 1880, 1885, 1890, and 1893.

Species.	1880.	1885.	1890.	1893.
	Pounds.	Pounds.	Pounds.	Pounds.
Herring	250,700	1,208,150	490,334	140,112
Sturgeon	998,500	227,780	309,003	54,106
Trout			244,847	72,000
Whitefish	77,922	41,125	238,764	50,950
Other fish	523,805	708,740	1,711,623	1,497,143
Total	1,850,927	2,185,795	2,994,571	1,814,311
Total value	$36,273	$40,193	$73,577	$46,030

NOTE.—Included in the figures for 1890 is the catch of several vessels that belonged in this section but took fish in Lakes Huron and Erie, as follows: Lake Huron, 244,847 pounds of trout and 26,064 pounds of whitefish; Lake Erie, 29,243 pounds of perch, 297,934 pounds of herring, and 46,276 pounds of wall-eyed pike. In 1893 one vessel, similarly owned and operated, took the following fish, which are embraced in the above table: Lake Huron, 72,000 pounds of trout and 12,000 pounds of whitefish; Lake Erie, 130,787 pounds of herring.

LAKE ERIE.

In 1890 the fisheries of this lake surpassed in extent those of any other members of the chain, and in 1893, notwithstanding a serious decline in almost every important branch, they still maintained first position in the matter of capital invested and quantity of products taken.

The prominent features of the fishing industry of Lake Erie are the numerous fleet of fishing steamers; the extensive employment of gill nets in the vessel and boat fisheries; the large number of pound and trap nets operated; the enormous catch of herring, wall-eyed pike, saugers, and whitefish, and the extensive wholesale trade in fresh-water fish centered at Sandusky, Cleveland, Buffalo, and other cities on the lake.

In 1893 nearly half the product of the Lake Erie fisheries consisted of herring; the catch, amounting to over 20,900,000 pounds, was obtained chiefly with gill nets. In 1890 the output of this fish was 38,868,000 pounds, and in 1885 it was 19,355,000 pounds. The abundance of herring determines, in a large measure, the condition of the fisheries in a given year, and the rise and decline of the industry have depended chiefly on the catch of this fish, whose importance is illustrated in the accompanying comparative summary.

Ranking next to the herring in quantity and value is the blue pike, a fish taken in large numbers with both pound nets and gill nets. The aggregate catch in 1893—6,656,341 pounds, valued at $175,392—was less than in 1890, when 7,488,903 pounds, worth $148,201, were taken. An interesting point about this fish is that in 1893 the pound-net catch was very much larger and the gill-net yield much less than in 1890.

The whitefish output in 1890 was only two-thirds that in 1885; in 1893 it was only half that in 1890, the decline being more marked in the gill-net returns; in the pound-net fishery a decrease of 6 per cent in number of nets set was attended with a decrease of 49 per cent in catch, while in the gill-net fishery a decrease of 28 per cent in number of nets used resulted in a diminution in yield amounting to 19 per cent.

Among the other fishes of special prominence in this lake, sturgeon, catfish, perch, black bass, and wall-eyed pike showed a diminished abundance in 1893 as compared with 1890, while saugers, sheepshead, and carp were taken in larger quantities. Especially worthy of note is the output in 1893 of over 635,000 pounds of carp, valued at $16,481.

Comparative table showing the yield of the fisheries of Lake Erie in 1880, 1885, 1890, and 1893.

Species.	1880.	1885.	1890.	1893.
	Pounds.	Pounds.	Pounds.	Pounds.
Herring	11,774,400	19,354,900	38,868,283	20,931,076
Sturgeon	1,970,000	4,727,950	2,078,907	793,800
Trout	26,200	106,900	121,420	203,132
Whitefish	3,333,800	3,531,855	2,341,451	1,292,410
Other fish	11,982,900	23,734,912	21,440,812	19,747,907
Total	29,087,300	51,456,517	64,850,873	42,968,325
Total value	$474,880	$1,109,096	$1,000,905	$805,979

LAKE ONTARIO.

The condition of the Lake Ontario fisheries in 1893 was very poor, the decline noticed in previous reports continuing. In every important item a marked decrease has occurred, and general and special comparisons with previous years probably disclose more pronounced changes than have characterized the fisheries of any other body of water in the United States. While restrictive legislation has had some effect on the fisheries, there is little reason to doubt that the most potent factor in the decline has been the depletion of the lake's fishery resources. The following summary shows the catch of the principal fishes in 1880, 1885, 1890, and 1893, and is to be considered in conjunction with the comparative figures for persons employed and capital invested. The number of fishermen was 361 in 1890 and 221 in 1893. The decrease in the apparatus used in the two years was as follows: Gill nets, from 2,345 to 1,185; trap nets, from 288 to 77; fyke nets, from 684 to 139; seines, from 27 to 7; boats, from 373 to 175.

The yield of the Lake Ontario fisheries in 1893 was less than one-third that in 1890, two-fifths that in 1885, and one-fourth that in 1880. Between 1880 and 1893 the decrease in whitefish was 96 per cent; in trout, 99 per cent; in sturgeon, 77 per cent; in herring, 73 per cent; and in other fish, 31 per cent. In the three years intervening between the last two investigations the quantity and value of the catch decreased 73 per cent. The yield of trout and whitefish, which had already reached a remarkably low point in 1890, was further reduced 85 per cent and 69 per cent, respectively.

Comparative table showing the yield of the fisheries of Lake Ontario in 1880, 1885, 1890, and 1893.

Species.	1880.	1885.	1890.	1893.
	Pounds.	Pounds.	Pounds.	Pounds.
Herring (including longjaws)	611,217	403,585	598,978	164,998
Sturgeon	545,283	386,974	541,752	125,293
Trout	569,700	20,510	41,010	6,204
Whitefish	1,664,000	90,711	148,771	45,380
Other fish	849,800	1,496,686	2,115,937	586,140
Total	3,643,000	2,398,466	3,446,448	928,015
Total value	$159,700	$95,869	$124,786	$31,510

BISCAYNE BAY, FLORIDA.

In February, 1895, the writer visited this bay, located on the southern part of the east coast of Florida, for the purpose of gathering information as to its physical features, animal resources, and fisheries. The U. S. Commissioner of Fish and Fisheries had under consideration the establishment of a marine hatching and experiment station at some point on the Florida coast, and was desirous of ascertaining the advantages afforded by Biscayne Bay for fish-cultural and biological work, this region having been favorably mentioned in this connection. A report on the results of the examination was submitted to the Commissioner

on March 20, 1895; in it the topics considered are the geographical features, the animal resources, the commercial fishing, and the available sites for a station. Accompanying the report are an interesting account of sponge-cultural experiments in Biscayne Bay, furnished by Mr. Ralph M. Munroe, of Cocoanut Grove, and a report on an examination of the bay by Maj. T. H. Handbury, of the Engineer Corps, United States Army.

FISHERIES OF MINOR INTERIOR WATERS.

A canvass of the fishing industry of the interior waters was begun in February, 1895. This work had been contemplated for several years, but other demands on the division prevented the undertaking of the inquiry until this time. The season when the condition of the division affairs permitted the inauguration of this work necessitated the placing of the field force in the southern part of the country, and the lower section of the Mississippi Valley was selected. The investigation, which was carried on during the months of February, March, and part of April, was suspended in April on account of lack of funds, after the completion of the work in Louisiana and Alabama, and with a large part of the fishing in Arkansas, Mississippi, and Tennessee covered. The remaining territory in this region was canvassed early in the latter part of 1895, and it seems desirable to refer to the results of the completed investigation rather than consider only the work that was done in the fiscal year proper. The agents participating in this canvass were Messrs. Ansley Hall, W. A. Wilcox, E. F. Locke, and T. M. Cogswell. Mr. Hall covered the whole of Alabama and all of Mississippi and Tennessee, with the exceptions of those portions on or near the Mississippi River. Mr. Wilcox and Mr. Cogswell conjointly canvassed parts of Louisiana, Mississippi, Arkansas, and Tennessee. Mr. Locke's inquiries were restricted to Louisiana. The statistical data collected related to the calendar year 1894 and included all fishing that partook of an economic character.

The commercial fisheries of these States were found to have the following extent:

Persons engaged	3,294
Capital invested	$173,162
Pounds of products taken	16,678,722
Value of products taken	$519,118

The most prominent fishes of these States are buffalo-fish, catfish, and sheepshead, or fresh-water drum. The quantity and value of each of these were as follows: Buffalo-fish, 5,520,516 pounds, $111,848; catfish, 7,632,238 pounds, $232,494; sheepshead, 1,217,070 pounds, $38,216. From these figures it appears that these three fish constitute about seven-eighths the quantity and three-fourths the value of the entire yield of the fresh-water fisheries. A brief statement of the extent of the fishing found in each of these States will be given. In the report embodying the results of the investigation a full discussion of the history, methods, apparatus, etc., will appear.

LOUISIANA.

The fresh-water fisheries of Louisiana are more extensive than those of any of the other States bordering on the Gulf Coast or in the Lower Mississippi basin. The State is bountifully supplied with rivers, lakes, and bayous containing an abundance of fish. In addition to the Mississippi River, which traverses the southern half of the State and forms the eastern boundary of the northern part, and the Sabine River, which marks most of the western boundary, the Red, Atchafalaya, Ouachita, and Calcasieu are the most important streams. The principal lakes are Catahoula, Grand, Salvadore, Calcasieu, Bastineau, des Allemands, Maurepas, and Cross, besides Lakes Pontchartrain and Borgne, which are salt or brackish. The waters in which most of the fishing is done are the Atchafalaya River and tributary bayous, the Mississippi River, and the Red River. Considerable fishing is also done in the Ouachita, Sabine, and Nementou rivers, Lakes Calcasieu, Salvadore, and des Allemands, and in Bayou James.

The number of persons ascertained to be employed in the fisheries of this State in 1894 was 1,263, of whom 137 were on the Mississippi and 756 on the Atchafalaya. More than half the fishermen, namely, 677, used set lines; 358 operated fyke nets; 290 hunted alligators; 124 trapped otters; 77 fished seines, no allowance being made in these figures for the persons who were engaged in two or more fisheries.

The investment in boats, apparatus, and other fishing property was $77,339, of which $51,873 represented the value of 1,282 boats. The set line or trawl line was the most important means of capture; 2,484 lines, with an aggregate length of 1,545,055 feet and with 483,140 hooks, were used. The number of seines was 33, of fyke nets 939, of guns 200, of steel traps 9,912, and of cast nets 61. The total value of the apparatus was $24,501. Shore and accessory property of the value of $965 was in use. Most of the seines and set lines were operated in the Atchafalaya River, where also the cast nets and many of the fyke nets were used. Set lines were also prominently used in Red and Mississippi rivers and in Lakes Calcasieu, des Allemands, and Salvadore. In Ouachita and Red rivers fyke nets were comparatively numerous.

The output of the fresh-water fisheries of Louisiana in 1894 consisted of 6,274,103 pounds of fish, crawfish, shrimp, turtles, and terrapin, 53,267 alligator hides, and 1,935 otter skins, the whole having a value of $192,012. The number of species of fish of prominence commercially is limited and includes only catfish, buffalo-fish, fresh-water drum, and crappie. By far the most valuable of the Louisiana fresh-water fishes is the catfish, which constitutes much more than half the quantity and value of the catch; over 4,900,000 pounds, worth $126,550, were taken. The buffalo-fish ranks after the catfish; the catch was over 956,000 pounds, for which the fishermen received $14,500. Of fresh-water drum, nearly 160,000 pounds were taken, which yielded the fishermen $4,280. The value of some of the other products was as

follows: Black bass, $1,355; crappie, $2,048; shrimp, $1,716; terrapin and turtles, $6,108; alligators, $23,334; otters, $9,254.

The catch in the Atchafalaya basin was larger than in all the other waters of the State combined. Catfish was the most important product, amounting to over 3,890,000 pounds, valued at $87,000; other prominent species were buffalo-fish (559,000 pounds, $5,850), terrapin (51,500 pounds, $4,635), alligators (25,070 hides, $12,535). The aggregate yield of this region was about 4,567,900 pounds of edible products, the value of which, with alligator and otter skins, was $126,620. In the Mississippi River the output was 283,000 pounds, valued at $16,140, and in the Red River 565,000 pounds, worth $14,530.

MISSISSIPPI.

The Mississippi River, which forms the western boundary of this State, is the principal fishing-ground, as would naturally be expected from its size and length. In its principal tributaries, the Homachitto, Yazoo, and Big Black rivers, considerable fishing is also done. In that section of the State having a frontage on the Gulf of Mexico, commercial fishing is prosecuted in the Pascagoula, Big Biloxi, Jordan, Wolf, and other streams. In the northeastern part of Mississippi there is some fishing in the Tombigbee River, the principal part of which stream is in Alabama. Several lakes along the Mississippi River, which represent the former channel of that stream, have economic fishing; among these are Louis, Wolf, and Horn lakes. The Pearl River, which is a stream of considerable size flowing south through the south-central part of the State, has no fishing of noteworthy importance.

As compared with the adjoining State of Louisiana the fishing industry of Mississippi is of small proportions; it is, however, greater in extent than in Alabama.

The persons engaged in taking fishery products for market in 1894 numbered 380; of these, 129 were on the Mississippi River and 70 on the Pascagoula River. The number of fishermen using set lines was 120, trammel nets 104, cast nets 85, hand lines 68, shrimp traps 57, fyke nets 43, and seines 36, many of the men engaging in two or more branches and being duplicated to that extent in these figures.

Only $10,093 was invested in the fisheries of Mississippi in 1894. This sum represented the value of 154 boats, 19 seines, 39 trammel nets, 187 fyke nets, 87 cast nets, 472 set and hand lines, 775 small traps, and various shore and accessory property.

The most prominent commercial fishes in the fresh waters of Mississippi are the catfishes, which constitute about half the quantity and value of the yield. The buffalo-fishes rank next in amount and value. Other important species are black bass, fresh-water drum, sunfishes, and shrimp. The aggregate catch in 1894 was 1,500,745 pounds, for which the fishermen received $40,484. Set lines and seines together took about four-fifths the total quantity of products.

The Mississippi River fisheries yielded over 1,030,000 pounds, valued

at $24,000. The results in some of the other waters were as follows: Pascagoula River, 70,000 pounds, $1,750; Yazoo River, 102,000 pounds, $2,540; Big Biloxi River and tributaries, 144,100 pounds, $6,800.

ALABAMA.

The principal fresh-water fisheries of this State are prosecuted in those streams having Mobile Bay as their outlet, namely, the Mobile River; its tributaries, the Alabama and Tombigbee rivers; and the chief tributary of the latter, the Black Warrior River. The Tennessee River, which traverses the northern part of the State, also has comparatively important fisheries. In the matter of persons engaged and value of the catch, Alabama has precedence over Mississippi, although the quantity of fish taken in the latter State is somewhat greater; the investment in the two States is about the same.

The number of persons ascertained to be engaged in the commercial fisheries of this State was 407, of whom 123 were on Mobile River and Bay, 100 on Alabama River, 67 on Tennessee River, 64 on Black Warrior River, and 53 on Tombigbee River. The trammel-net, fyke-net, and set-line fisheries gave employment to 115, 194, and 188 persons, respectively, some of the men being in two or more branches and duplicated in these figures.

The capital invested in the Alabama fisheries was about $14,500. The most prominent items in the investment were fyke nets ($6,560), boats ($3,433), and trammel nets ($2,900). The boats numbered 287, the fyke nets 970, the trammel nets 116, the set lines 690. The fyke nets and set lines were most numerous on the Tennessee River; the trammel nets were confined to Mobile Bay and River.

The buffalo-fishes are the most important economic fishes of this State; more than 1,000,000 pounds of these, having a value of over $25,000, were taken. Catfish rank next in quantity and value, the yield being over 300,000 pounds, worth $15,700. Other prominent species are fresh-water drum, sunfish, and warmouth bass. The aggregate output of the fisheries was 1,869,400 pounds, with a value to the fishermen of $72,500. Much more than half the catch was obtained with fyke nets.

More fish were taken in the Alabama River than in any other water, although the value of the catch was greatest in Mobile Bay and River. In the former stream the yield was 482,650 pounds, for which the fishermen received $19,500. In the Tombigbee River 462,300 pounds of fish were secured, valued at $10,150. The results of the fishing in Mobile Bay and River were 396,900 pounds, worth $21,520.

ARKANSAS.

The fresh-water fisheries of Arkansas are more important than those of any other State in this region, with the exception of Louisiana. Besides the Mississippi River, which borders the eastern side of the State, there are several important streams, tributary to the Mississippi, which traverse the State. Among these are the Arkansas, the White,

the St. Francis, and Ouachita, in all of which commercial fishing is carried on. In a number of lakes representing former beds of rivers considerable fishing is also done.

In 1894, 750 persons were engaged in the fisheries of Arkansas. Of these, 566 used set lines, 286 fyke nets, 129 seines, and 114 trammel nets, some fishermen being in two or more fisheries. The number on the different rivers was as follows: 302 on the Arkansas, 81 on the White, 73 on the St. Francis, 158 on the Ouachita, 61 on the Mississippi, and 75 on various minor waters.

The fyke net is the most prominent means of capture in this State, representing nearly one third the investment in the fishing industry. It is used in almost every river and lake having commercial fisheries, the largest numbers being set in the Mississippi, White, and St. Francis rivers. The total number of fykes in use in 1894 was 1,590, valued at $11,040. Set lines are also very generally employed. Their number was 1,615, valued at $1,914. The lines contained over 79,000 hooks and were 328,000 feet in length. The number and value of the other important forms of apparatus were as follows: Seines, 41, $5,470; trammel nets, 72, $2,670. An interesting feature of the fisheries of the State is the use of 8 pound nets in Crittenden County, on the Mississippi River, this type of net being very seldom met with in the interior waters. The 561 boats employed had a value of $7,917. The aggregate amount of capital invested in the industry was $36,564.

The yield of the fisheries of Arkansas was 3,875,860 pounds, having a value to the fishermen of $116,010. In point of quantity the buffalo-fishes are the most important in the State; about 1,626,000 pounds, valued at $30,800, were taken. The value of the catfishes was greater, being $38,000, but the quantity was only 904,500 pounds. Next in importance is the fresh-water drum, or sheepshead; of this, nearly 580,000 pounds, worth $15,000, were obtained. Other comparatively prominent species are crappy, black bass, and paddle-fish. The output of the Mississippi River fisheries was larger than that of any other stream, although the value of the catch was less than in several other waters. The yield and value of the catch in the principal waters were as follows: Mississippi River, 882,500 pounds, $18,800; St. Francis River, 772,600 pounds, $19,700; White River, 605,600 pounds, $23,580; Arkansas River, 594,000 pounds, $22,800; Horseshoe Lake, 376,000 pounds, $10,300; Ouachita River, 248,000 pounds, $10,000.

TENNESSEE.

This State has comparatively important fisheries in the Tennessee, Cumberland, and Mississippi rivers, and in Reelfoot Lake. The most extensive interests are in the first-named stream and the lake. The principal features are the extent of the fyke-net and set-line fisheries and the preponderance of buffalo-fish and catfish in the catch.

The number of persons engaged in the commercial fisheries of Tennessee in 1894 was 520. Of these, 45 were on the Cumberland River,

235 on the Tennessee River, 75 on the Mississippi River, and 165 on Reelfoot and Open lakes. Without taking into consideration the duplications arising from the employment of two or more kinds of apparatus, 17 fishermen used seines, 87 trammel nets, 293 fyke nets, 364 set lines, and 80 hand lines; 17 persons were specially engaged in the preparation of products.

The number and value of the boats and apparatus employed in the Tennessee fisheries were as follows: 446 boats, $4,879; 2 seines, $525; 46 trammel nets, $1,640; 1 trap, $1,500; 1,619 fyke nets, $13,190; 1,830 set lines, $1,897; 200 hand lines, $150; shore and accessory property, valued at $6,422, the total investment being $30,203. Two-thirds of the fyke nets were set in the Tennessee River and Reelfoot Lake. The trammel nets and hand lines were confined to the lakes; the set lines were used principally in the Mississippi and Tennessee rivers. The single trap net reported was a very large appliance built in the bed of the Tennessee River in Knox County.

The economic fisheries of Tennessee in 1894 yielded over 2,445,000 pounds of fishery products, having a value of $82,500. In the value of its catch, as in persons employed and capital invested, Tennessee ranks third among the five States of this region now under consideration. Buffalo-fish constituted nearly one-half the output, 1,057,000 pounds, valued at $25,950, being taken. The catch of catfish was about 670,000 pounds, having a value of $28,400. The next important fish was the drum, or sheepshead, the yield being 254,000 pounds, worth $10,255.

The products of the fisheries of Reelfoot Lake were greater than of all the other waters combined. They consisted of 626,000 pounds of buffalo-fish, 305,000 pounds of catfish, 107,000 pounds of drum, 85,000 pounds of crappy, and 250,200 pounds of other fish, the aggregate being 1,373,200 pounds, for which the fishermen received $36,182. The Tennessee River fisheries produced 524,200 pounds, valued at $28,688, of which buffalo-fish constituted 124,560 pounds, catfish 233,500 pounds, and drum 112,410 pounds. The fishermen on the Mississippi River took 370,500 pounds having a value of $9,454, and those on the Cumberland River 86,000 pounds, worth $5,953. In Open Lake, a catch of 91,285 pounds brought $2,225.

More than one-third of the fishery products of Tennessee are taken on set lines; in 1894 the yield was 935,848 pounds, valued at $31,666. The fyke-net catch was 787,536 pounds, worth $31,628. The trammel nets took over 575,000 pounds of fish, which sold for $12,765. The yield of other forms of apparatus was comparatively unimportant.

THE MENHADEN FISHERY.

The inauguration of an investigation of some of the features of the menhaden industry was referred to in the division report for 1894; the desirability of making this inquiry and suggestions as to its scope and character were stated in the report of the division for 1892. The work of the field agents, which began in May, 1894, was carried on

continuously until the suspension of the fishery in December. A report embodying the results of the investigation was submitted to the Commissioner in May, 1895.

The menhaden is probably the most abundant fish found on the Atlantic coast of the United States, and its capture constitutes one of the principal fisheries of the country. The fishery is prosecuted from Maine to North Carolina, inclusive, and in almost every State between those limits an important shore industry is dependent on the fishery. In recent years over 50 establishments for the making of menhaden oil and fertilizer have been operated annually. The business on land and water has given employment to about 3,400 men. The steam and sail vessels used, numbering about 135, have a value, with their seines and equipment, of nearly $1,000,000. The other property devoted to the industry brings the investment up to over $2,500,000. The annual catch has been from 400,000,000 to 600,000,000 fish, which have yielded manufactured products having an average annual value of over $1,000,000.

The menhaden fishery has been and still is the subject of much opposition, because of its supposed effects on the abundance of other fish. The grounds on which those opposed to the fishery base their complaints may be summarized as follows: (1) Large numbers of desirable food and game fish are taken, which are landed at the factories to serve the same purpose as the menhaden; (2) the supply of food-fish on the coast has been greatly reduced on account of the menhaden fishing, fishing-grounds once productive having been destroyed; (3) food-fish, when not actually caught, have been driven off the coast or have been prevented from reaching their spawning-grounds in the inshore waters.

Those pecuniarily interested in the menhaden fishery deny the foregoing points. They contend that only comparatively few food-fish are taken in the fishery, and those only incidentally or unavoidably; that they are not sufficient to keep the vessels' crews regularly supplied with fresh fish food; that the thousands of sharks and other predaceous fishes destroyed in fishing for menhaden would do infinitely more damage to the food-fish fisheries than the menhaden fishery does; and that there is no evidence to show that this fishery is in any way responsible for the real or apparent scarcity of certain food-fish.

It was with a view to gathering information bearing on some of these disputed questions that the Commission conducted a special investigation in 1894. The original plan of the inquiry was to place the entire available force of the division on menhaden vessels having headquarters on various parts of the coast, and to have each agent continue his observations on a given vessel throughout the fishing season. Owing, however, to the necessity for carrying on other work, it was found impracticable to utilize all the field force in the menhaden inquiry, and it was finally determined to restrict the studies to two vessels.

The agents were instructed to use the greatest care in obtaining information and to refrain from the expression of any opinion as to the

results of the inquiry or the general menhaden question. On specially prepared forms they were required to record, for each haul of the seine, the following data: Date, hour, fishing-ground, number of menhaden taken, number of each kind of other fish taken, disposition made of fish, and physical observations on the air, water, etc. The position of each seine haul was indicated on a chart. Notes on the fishery and on the abundance, size, movements, and spawning condition of menhaden were also obtained.

The vessels selected for the purposes of the investigation were the steamers *Quickstep*, of New London, Conn., and *J. W. Hawkins*, Harborton, Va. The accommodations on the *Quickstep* proving insufficient, on June 22 the observations were transferred to the steamer *Arizona*, of New London, for the remainder of the season. The *Arizona* is a screw steamer of 103 net tons having a value, with outfit, of $25,000. The crew consists of 30 fishermen, 2 captains, 2 mates, and 8 other persons. Two purse seines, each about 1,400 feet long, are used, the vessel being what is known as a "double-gang" steamer. The tonnage of the *J. W. Hawkins* was 125; her value was about $20,000; her crew consisted of 18 fishermen and 8 other persons, and her regular seine was 900 feet long, although at times a seine 1,500 feet long was employed.

The representatives of the Commission on these vessels were as follows: Mr. C. E. Latimer, Mr. W. P. Hay, and Mr. A. E. Marschalk, on the *Quickstep* and *Arizona*; Mr. E. F. Locke and Mr. E. E. Race, on the *J. W. Hawkins*. On June 22 Mr. Latimer was relieved by Mr. Hay, who was connected with the inquiry until August 1, when Mr. Marschalk took his place and continued the work until the suspension of fishing. Mr. Locke was on the *J. W. Hawkins* during the entire season, with the exception of the month of October, when he was relieved by Mr. Race.

The vessels fished from Maine to North Carolina, and their operations were sufficiently extensive to warrant conclusions as to some of the questions in dispute. Fish were fairly abundant along the entire coast, and the season was an average one for the general menhaden industry. The observations of the agents covered fishing operations in which nearly 28,000,000 menhaden were taken, or about one-twentieth of the total catch in 1894. The *Arizona* took 22,000,000 menhaden during the year and 18,706,800 while agents of the Commission were aboard; this was the second largest yield in the history of the vessel. During the observations on the *Quickstep* that vessel took 2,532,000 fish. The catch of the *J. W. Hawkins* was 9,301,955 menhaden, a number considerably less than the average in recent years.

Two-thirds of the menhaden taken by the *Arizona* (and *Quickstep*) were obtained in Delaware Bay and off the New Jersey coast. Of the 619 seine-hauls of these vessels, 370 were in those regions. More than two-thirds of the fish caught by the *J. W. Hawkins* were in Chesapeake Bay, where 315 seine-hauls in a total of 459 were made.

About 60 species of fishes were represented in the catch of the

steamers. Those most conspicuous for their numbers are those which, like menhaden, swim at or near the surface; among these are bluefish, butter-fish, mackerel, shad, and alewives. Deep-water bottom species, like cod, haddock, etc., were obtained in only small quantities, but the bottom fishes inhabiting shallow water, like skates and flounders, were taken in comparatively large quantities. Many of the species were represented by only a single specimen, and of most of the others only a few individuals were caught.

The total number of fish taken with the menhaden was 94,795, of which 93,893 may be classed as food-fish, although over 86,000 of one kind belonged to the menhaden family and are considered suitable for the manufacture of oil and guano. Omitting these, the number of food-fish obtained was 6,990, an average of less than 7 fish to a set; including them, the average was about 87 food-fish to a seine haul.

The most numerous fish, next to the menhaden, were the alewives, or river herring; these were usually taken among schools of menhaden. Of the 86,898 reported by the agents, nearly half were caught at one haul in Boston Harbor, and most of the others were taken by the same vessel on the coast of New England.

Bluefish were taken on numerous occasions, and the aggregate catch was 2,274. The largest number taken at one haul of the seine was 140, in Chesapeake Bay. Shad, which figure rather prominently in the returns, were mostly caught in a few hauls on the Maine coast, in company with alewives and other fish; the records show a catch of 1,816 fish. Among other fish taken in noteworthy numbers were butter-fish, mackerel, squeteague, sharks, flounders, skates and rays, Spanish mackerel, and croakers, of which from 100 to 800 were taken. The sharks destroyed numbered 388, of which the dogfish and dusky shark were most numerous. Following is a statement of the quantities of different kinds of fish taken and the average number obtained at each successful haul of the seine:

Species.	Total number taken.	Average number of fish at each haul.
Menhaden	27,965,755	29,562.11
Alewives, or river herring	86,898	91.86
Bluefish	2,274	2.40
Shad	1,816	1.92
Butter-fish	814	.86
Mackerel	631	.67
Squeteague	498	.53
Sharks	401	.42
Skates and rays	372	.39
Flounders	360	.39
Spanish mackerel	150	.16
All others	590	.62
Total	28,060,565	29,662.33

The prohibition of menhaden fishing within certain distances of the shore is a prominent feature of the legislation advocated by some who believe in restriction of the industry by governmental or State authority.

The interdiction of seining within 1, 2, or 3 miles of the mainland has been urged, the 3-mile protected zone being the one most generally favored. In the investigation of the fishery, full data were obtained showing the distances from shore at which fish were taken, and the information recorded on this point for the two vessels may be regarded as entirely typical of the fleet. It is well known that the menhaden is found comparatively close to land, during both the migrations and the intervening season; and those financially interested in the industry have contended that to limit the fishery to the water beyond 3 miles from land would result in the destruction of the business.

The following summary of the operations of the vessels in question shows that 18,387,370 menhaden, or about two-thirds the aggregate catch, were taken under 3 miles from shore, and 6,089,104 fish, or less than two-ninths of the total yield, were obtained 5 miles or more from land. A conspicuous part of the fishing done beyond 3 miles from the shore was in Delaware, Chesapeake, and other bays.

Distances from shore.	Number of menhaden taken.	Percentage.
Under 1 mile	5,850,131	21
Between 1 and (under) 2 miles	9,164,889	33
Between 2 and (under) 3 miles	3,372,350	12
Between 3 and (under) 5 miles	3,489,281	12
5 miles and over	6,089,104	22
Total	27,965,755	100

The daily record of the observations of the Commission's agents shows that, as a rule, not enough desirable food-fish were taken by the steamers to keep the crews supplied with fresh fish, and that only rarely were more edible fish taken than could be consumed on the vessels or by the men employed at the factories. In the case of shad and bluefish, the comparatively large numbers seined on a few occasions were more than could be utilized, and the records show that 266 of the former and 410 of the latter taken by one vessel shared the fate of the menhaden; none of these fish caught by the other vessel was so disposed of. Of the other fish made into oil and guano, there were 356 butter-fish (mostly too small to eat), 246 flounders (many being the worthless hogchoker), 36 scup, 44 croakers, 15 haddock, 28 hake, 20 spots, 31 squeteague, and 22 whiting.

The percentage of food-fish catch not eaten was about 20, excluding alewives. All but 13 of the sharks and 4 of the skates were landed at the factories. The crews salted, for their personal use, 25,000 menhaden and 1,607 bluefish, bonito, butter-fish, flounders, shad, and squeteague. The fish sold for bait consisted of 199,900 menhaden and 10,000 alewives. The fish dumped overboard, given away, or otherwise disposed of, numbered 8,232; of these 2,500 menhaden and 5,000 alewives were thrown away and 675 shad were released alive.

INQUIRIES AT BOSTON AND GLOUCESTER, MASS.

The local agents of the Commission at these important fishing ports have continued their efficient service along the lines indicated in previous reports. Their returns show the extent of the fisheries centering at these places, and afford an accurate idea of the general condition of the vessel fisheries of New England.

The receipts at Gloucester in 1894 of fish caught by United States fishing vessels aggregated nearly 80,000,000 pounds, having a value of over $2,229,000. Following is a comparison of the receipts in the calendar years 1889, 1891, 1892, 1893, and 1894, from which it will be seen that the quantity of fish landed in 1894 was nearly 5,000,000 pounds greater than in the previous year, and more than 3,000,000 pounds greater than the average for the five years in question.

Year.	Pounds.	Value.
1889	68,997,717	.....
1891	76,949,347	.....
1892	82,154,995	$2,735,655
1893	74,801,159	2,503,945
1894	79,651,606	2,229,653

The number of separate fares of fish which entered Gloucester in 1894 was 3,583; of these, 776 were from the fishing-grounds located to the east of the sixty-sixth meridian, and 2,807 from the grounds off the New England coast. Of the arrivals from the eastern grounds, 177 were from La Have Bank, 148 from Grand Bank, 122 from Western Bank, 120 from Quereau Bank, and 100 from Cape Shore. Of the more western grounds, Georges Bank contributed 782 fares, Cashes Bank 225 fares, Nantucket Shoals and South Channel 99 fares, and the general shore grounds off the New England coast 1,587 fares.

Cod constituted more than half the catch. The quantity of cod landed was over 35,800,000 pounds of salt fish, valued at more than $1,000,000, and about 6,000,000 pounds of dressed fresh fish, valued at $100,000. The aggregate quantity, 41,900,000 pounds, exceeded the receipts in 1893 by 3,351,600 pounds. The Grand Banks yielded more than all the other grounds combined; upward of 18,000,000 pounds of salt cod, worth nearly $450,000, are credited to these famous banks. The catch was 358,000 pounds less than in 1893, but this decrease was more than counterbalanced by the noteworthy increase in the production of other offshore grounds, especially La Have and Western banks, so that the aggregate receipts of cod from the eastern banks were greater in 1894 than in 1893 by over 400,000 pounds. Georges Bank, the most productive of the western grounds, yielded 13,600,000 pounds of fresh and salted cod, having a value of nearly $400,000, an increase of 2,295,000 pounds over the previous year. All the other grounds off the New England coast produced less than 5,000,000 pounds.

The quantity and value of the receipts of other members of the cod family are as follows: Cusk, 4,804,840 pounds, $63,508; haddock, 6,109,406 pounds, $44,149; hake, 8,480,715 pounds, $57,126; pollock, 1,258,621 pounds, $8,277, a total of 20,653,582 pounds and $173,060. The principal part of the cusk and hake were taken on Cashes Bank, of the haddock on Georges Bank, and of the pollock on the inshore grounds. The total receipts of these species in 1894 differed little from those in 1893; the catch of cusk and pollock was somewhat less, that of hake was about the same, while that of haddock was considerably more, the increase amounting to nearly 3,500,000 pounds.

Grand, Quereau, Western, and Georges banks contributed the principal part of the fresh halibut landed in Gloucester, while Greenland and Iceland grounds produced practically all of the salt halibut. The receipts of fresh fish were 7,707,787 pounds, valued at $599,538, and of salt fish 1,527,480 pounds, worth $91,898. As compared with 1893 these figures show an increase of 1,118,000 pounds of fresh halibut and a decrease of 301,500 pounds of salt halibut.

The Gloucester mackerel fishery in 1894 was a great disappointment. The early fishing on the Cape Shore was reported to be the best ever known, and many fishermen were led to believe that the mackerel had returned in their former abundance and that the season would show a very large catch. The subsequent fishing, however, was poor, and the aggregate receipts were very much less than in the previous year.

The fresh mackerel landed amounted to 80,662 pounds, valued at $6,259, against 48,420 pounds, worth $3,205, in 1893. The quantity of salt fish brought in was 28,705 barrels, having a value of $236,849, against 38,335 barrels, valued at $500,682, in the preceding year. The receipts from the different grounds in 1894 were as follows: Cape Shore, 19,763½ barrels, $124,490; Gulf of St. Lawrence, 4,185 barrels, $58,822; New England shore, 4,756½ barrels, $53,537. As compared with 1893, there was an increased catch on the Cape Shore and in the Gulf of St. Lawrence of 6,081 barrels and a decrease on the New England coast of 15,711 barrels.

A detailed summary of the Gloucester receipts, specified by species and fishing-grounds, is contained in the following table. In the case of vessels that fished on more than one ground during a single trip, their operations are credited to those grounds on which the bulk of the fish were taken.

Summary by fishing-grounds of certain fishery products landed at Gloucester, Mass., in 1894 by American fishing vessels.

Fishing-grounds.	No. of trips from each ground.	Cod.				Cusk.			
		Fresh.		Salted.		Fresh.		Salted.	
		Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
East of 66° W. longitude:									
La Have Bank	177	497,700	$7,497	2,805,673	$93,616	649,000	$7,115	.....	.....
Western Bank	122	60,000	973	638,120	16,937	.....	.....	.....	.....
Quereau Bank	120	2,000	40	558,630	15,472	.....	.....	.....	.....
St. Peters Bank	20	.....	.....	87,900	2,313	.....	.....	.....	.....
Green Bank	35	.....	.....	102,800	3,096	.....	.....	.....	.....
Grand Bank	148	.....	.....	17,663,320	445,165	.....	.....	.....	.....
Canso Bank	6	55,800	839	194,130	5,172	.....	.....	.....	.....
Cape Shore	100	132,000	1,957	213,100	6,546	151,500	1,970	.....	.....
Cape North	1	.....	.....	85,000	1,800	.....	.....	.....	.....
Gulf of St. Lawrence	27	.....	.....	345,000	7,193	.....	.....	.....	.....
Iceland and Greenland	14	.....	.....	9,500	264	.....	.....	.....	.....
Off Newfoundland	6	.....	.....	25,000	663	.....	.....	.....	.....
Total	776	747,500	11,306	22,728,173	604,237	800,500	9,085	.....	.....
West of 66° W. longitude:									
Browns Bank	42	398,500	5,492	247,270	7,195	294,000	3,913	3,000	$68
German Bank	3	20,000	280	21,000	525	3,000	38	4,000	80
Georges Bank	782	1,807,720	29,121	11,791,775	364,512	292,000	3,643	179,480	3,922
Cashes Bank	225	1,289,800	19,214	3,000	75	2,360,160	31,419	.....	.....
Fippenies Bank	1	.....	.....	.....	.....	20,000	300	.....	.....
Jeffreys Ledge	48	23,500	408	.....	.....	74,000	1,066	.....	.....
Middle Bank	17	33,180	690	.....	.....	50,000	675	.....	.....
Off Highland Light	2	14,000	200	.....	.....	.....	.....	.....	.....
Off Chatham	1	.....	.....	.....	.....	8,000	80	.....	.....
South Channel	68	158,500	2,312	.....	.....	611,100	7,780	.....	.....
Nantucket Shoals	31	3,000	45	1,013,000	24,321	2,000	25	.....	.....
Shore, general	1,587	1,578,582	32,380	25,000	745	98,600	1,308	5,000	106
Total	2,807	5,326,782	90,142	13,101,045	397,373	3,812,860	50,247	191,480	4,176
Grand total	3,583	6,074,282	101,448	35,829,218	1,001,610	4,613,360	59,332	191,480	4,176

Fishing-grounds.	Haddock.				Hake.				Pollock.			
	Fresh.		Salted.		Fresh.		Salted.		Fresh.		Salted.	
	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.	Lbs.	Val.
East of 66° west longitude:												
La Have Bank	306,300	$1,860	.....	.....	1,491,100	$10,167	3,000	$26	10,000	$125	.....	.....
Western Bank	35,000	210	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cape Shore	77,200	494	.....	.....	286,500	2,020	.....	.....	1,000	7	.....	.....
Gulf of St. Lawrence	.....	.....	.....	.....	.....	.....	20,000	250	.....	.....	.....	.....
Total	418,500	2,564	.....	.....	1,777,600	12,187	23,000	276	11,000	132	.....	.....
West of 66° west longitude:												
Browns Bank	449,000	2,686	.....	.....	313,500	1,779	.....	.....	.....	.....	6,000	$60
German Bank	5,000	30	4,000	$50	10,000	60	10,000	125	.....	.....	.....	.....
Georges Bank	4,223,645	31,308	.....	.....	541,500	3,604	.....	.....	.....	.....	.....	.....
Cashes Bank	615,500	4,430	.....	.....	4,002,800	27,158	.....	.....	.....	.....	.....	.....
Fippenies Bank	3,000	19	.....	.....	8,000	48	.....	.....	.....	.....	.....	.....
Jeffreys Ledge	21,500	196	.....	.....	147,000	1,146	.....	.....	188,900	1,174	.....	.....
Middle Bank	16,900	185	.....	.....	79,000	546	.....	.....	1,000	6	.....	.....
Off Highland Light	20,000	120	.....	.....	5,000	38	.....	.....	.....	.....	.....	.....
Off Chatham	10,000	50	.....	.....	5,000	20	.....	.....	.....	.....	.....	.....
South Channel	226,100	1,426	.....	.....	1,178,100	7,580	.....	.....	2,000	15	.....	.....
Nantucket Shoals	15,000	90	.....	.....	3,000	15	.....	.....	.....	.....	.....	.....
Shore, general	81,261	995	.....	.....	371,215	2,484	6,000	60	1,049,721	6,890	.....	.....
Total	5,686,906	41,535	4,000	50	6,664,115	44,478	16,000	185	1,241,621	8,085	6,000	60
Grand total	6,105,406	44,099	4,000	50	8,441,715	56,665	39,000	461	1,252,621	8,217	6,000	60

Summary by fishing-grounds of certain fishery products, etc.—Continued.

Fishing-grounds.	Halibut.				Mackerel.*			
	Fresh.		Salted.		Fresh.		Salted.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
East of 66° W. longitude:								
La Have Bank	349,174	$33,050						
Western Bank	2,004,018	155,742	11,500	$615				
Quereau Bank	1,821,303	149,968	300	19				
St. Peters Bank	403,990	29,847						
Green Bank	789,387	64,599	6,000	330				
Grand Bank	1,061,360	73,100	124,180	7,519				
Canso Bank	11,500	918						
Cape Shore	3,800	322	300	20			3,952,700	$124,490
Cape North			2,200	132				
Gulf of St. Lawrence							837,000	58,822
Iceland and Greenland			1,383,000	83,263				
Off Newfoundland	239,620	14,704						
Total	6,684,152	522,259	1,527,480	91,898			4,789,700	183,312
West of 66° W. longitude:								
Browns Bank	5,400	320						
Georges Bank	1,012,915	76,576						
Cashes Bank	2,500	180						
Jeffreys Ledge	300	24						
Middle Bank	1,700	119						
Nantucket Shoals	820	60			1,432	$108		
Shore, general					79,230	6,151	951,300	53,537
Total	1,023,635	77,279			80,662	6,259	951,300	53,537
Grand total	7,707,787	599,538	1,527,480	91,898	80,662	6,259	5,741,000	236,849

Fishing-grounds.	Other fish.†				Total.	
	Fresh.		Salted.			
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
East of 66° W. longitude:						
La Have Bank					6,111,947	$159,456
Western Bank	885	$35			2,749,523	174,512
Quereau Bank	800	60			2,383,033	105,559
St. Peters Bank					491,890	32,160
Green Bank					898,187	68,025
Grand Bank					18,848,860	525,793
Canso Bank					261,430	6,929
Cape Shore			4,000	$38	4,822,100	137,864
Cape North					87,200	1,932
Gulf of St. Lawrence					1,202,000	66,265
Iceland and Greenland			98,000	1,225	1,490,500	84,752
Off Newfoundland					264,620	15,367
Total	1,685	95	102,000	1,263	39,611,290	1,438,614
West of 66° W. longitude:						
Browns Bank					1,716,670	21,513
German Bank					77,000	1,188
Georges Bank	1,000	80			19,850,035	512,766
Cashes Bank					8,273,760	82,476
Fippenies Bank					31,000	367
Jeffreys Ledge					455,200	4,014
Middle Bank					183,212	2,329
Off Highland Light					39,000	358
Off Chatham					23,000	150
South Channel					2,175,800	10,113
Nantucket Shoals					1,036,820	24,556
Shore, general	711,310	5,277	1,221,600	12,276	6,178,819	122,209
Total	712,310	5,357	1,221,600	12,276	40,040,316	791,039
Grand total	713,995	5,452	1,323,600	13,539	79,651,606	2,229,653

*The mackerel shown in the table were landed in 320 fares, as follows: 221 from New England shore, 74 from Cape Shore, 24 from Gulf of St. Lawrence, 1 from Middle Bank.

†Under this head are included 5,845 pounds of swordfish, $436; 10,000 pounds of menhaden, $100; 98,000 pounds of ling, $1,225; 699,500 pounds of fresh herring, $4,986; and 1,224,200 pounds of salt herring, $12,244. All of these fish except the herring were taken incidentally while fishing for other fish; the ling were caught on the Iceland halibut grounds; the swordfish on Western, Quereau, and Georges banks and the New England shore; the menhaden on shore grounds. The herring were landed in 96 trips, all from the New England shore.

The quantity of fish landed at Boston by American fishing vessels was nearly 87,500,000 pounds, with a value of over $1,600,000. The apparent inconsistency in the figures for Gloucester and Boston (the larger receipts at the latter place having much less value) is explained by the condition in which the fish were brought, a large percentage of the Gloucester fish being salted, while practically the entire receipts at Boston consisted of fresh fish.

The aggregate quantity of ground fish, mackerel, and other fish brought into Boston by American fishing vessels in 1894 was larger than for any previous year. The growth of the market fisheries centering at Boston is one of the most noteworthy features of the New England fisheries in recent years. The expansion of this branch has been largely at the expense of the salt-fish business. The following table shows the extent of the ground-fish trade during the six years ending in 1894. The receipts in the last-named year are seen to have exceeded by over 13,000,000 pounds those for 1892, the next highest year, and to have been over 19,000,000 pounds more than the average for the six years.

Years.	Pounds.
1889	46,319,693
1890	55,805,615
1891	68,026,517
1892	71,756,181
1893	65,396,342
1894	84,486,135

The number of trips of fish brought into Boston in 1894 was 4,537. The arrivals from the grounds east of the sixty-sixth meridian numbered only 289, while 4,248 were from the grounds adjacent to the New England coast, this being in marked contrast to Gloucester, where more than one-fifth of the fares were from the far eastern grounds. The number of trips from La Have Bank was 135, from Western Bank 86, from Cape Shore 66, and from Grand Bank only 1. Georges Bank, Middle Bank, and Jeffreys Ledge each contributed between 500 and 600 fares, South Channel over 650 fares, and general shore grounds over 800 trips.

Of the fishes which enter into the fish trade of Boston the haddock is preeminent. The quantity brought in during 1894 was over 39,500,000 pounds, valued at $640,000. The receipts exceeded those of the previous year by over 8,000,000 pounds. The quantity taken on Georges Bank was over 13,000,000 pounds, and in South Channel nearly 10,000,000 pounds. The catch on these two grounds was 5,000,000 pounds greater than in 1893. Of the remaining grounds the most important as regards the haddock catch were Middle Bank, Jeffreys Ledge, Cashes Bank, Browns Bank, and off Highland Light.

Cod ranks next to haddock in importance. The receipts at Boston were over 21,500,000 pounds, having a value of nearly $500,000.

Georges Bank and South Channel contributed nearly half the catch, Georges alone being credited with 5,250,000 pounds. La Have Bank, Cashes Bank, Browns Bank, and Nantucket Shoals are also important grounds. The quantity of cod landed in 1894 was 5,600,000 pounds greater than in 1893, the increase being shared by all the banks named.

The quantity of hake brought to Boston was nearly 15,000,000 pounds, valued at $135,000. The South Channel yielded more hake than any other grounds, although Georges, La Have, Cashes, and Middle banks and Jeffreys Ledge were also very productive grounds. The receipts of hake were over 3,000,000 pounds larger than in 1893, the increase being chiefly in the catch on La Have and South Channel.

The cusk landed amounted to 5,840,000 pounds, with a market value of $75,000. Cashes and La Have banks contributed more than any other grounds. The catch in 1894 was 1,600,000 pounds more than in the previous year. Of pollock, 900,000 pounds, valued at $12,000, were taken, principally on La Have, Cashes, and Jeffreys. The halibut receipts were 1,669,000 pounds, worth $158,000; three-fourths of this quantity came from Western, La Have, and Georges banks.

The mackerel receipts at Boston in 1894 consisted of 855,000 pounds of fresh fish and 1,335,000 pounds, or 6,675 barrels, of salt fish. The grounds off Race Point and the Cape Shore yielded the principal part of the fresh and salt fish, respectively. In 1893 the quantity of both fresh and salted mackerel brought to Boston was less than in 1894.

In the following table the receipts of the different fish from the various fishing-grounds are shown:

Summary by fishing-grounds of certain fishery products landed at Boston, Mass., in 1894 by American fishing vessels.

Fishing-grounds.	No. of trips from each ground.	Cod.		Cusk.		Haddock.	
		Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
East of 66° W. longitude:							
La Have Bank	135	2,342,500	$52,539	1,000,000	$12,499	1,450,500	$20,700
Western Bank	86	985,400	20,165	301,300	3,752	158,400	2,754
Grand Bank	1	275,000	6,875				
Cape Shore	66	749,400	21,702	198,000	2,641	583,300	8,891
Cape North	1						
West of 66° W. longitude:							
Browns Bank	79	986,000	18,390	282,800	3,483	1,392,500	17,452
Georges Bank	528	5,259,900	112,884	700,500	9,532	13,121,800	195,026
Cashes Bank	202	1,440,900	33,318	1,683,400	21,966	1,481,700	24,901
Fippennies Bank	21	72,200	2,010	74,000	943	110,700	2,020
Tillies Bank	18	53,800	1,436	9,500	124	71,600	1,725
Clark Bank	13	73,500	1,528	1,200	14	155,500	2,263
Ipswich Bay	42	252,600	5,068	3,000	38	144,600	2,248
Jeffreys Ledge	517	885,200	23,125	157,000	2,185	2,736,250	53,311
Middle Bank	577	873,750	21,029	113,600	1,472	2,994,900	56,187
Off Race Point	220	237,600	6,157			257,700	5,460
Off Highland Light	323	847,600	20,498	138,000	1,759	1,979,500	35,643
Off Chatham	111	368,000	8,525	53,800	700	1,072,000	19,554
South Channel	657	4,090,700	95,212	847,600	10,686	9,754,700	155,342
Nantucket Shoals	111	1,095,300	28,776	2,000	25	554,600	8,087
Shore, general	829	797,980	19,606	280,100	3,381	1,482,200	27,562
Total	4,537	21,687,330	498,843	5,840,800	75,200	39,502,450	639,726

Summary by fishing-grounds of certain fishery products, etc.—Continued.

Fishing-grounds.	Hake.		Pollock.		Halibut.	
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
East of 66° W. longitude:						
La Have Bank	1,721,100	$15,491	117,100	$1,695	315,700	$29,236
Western Bank	253,600	2,694	12,200	179	734,300	71,165
Cape Shore	312,500	2,491	24,400	397	40,700	3,434
Cape North					8,000	480
West of 66° W. longitude:						
Browns Bank	220,500	2,112	13,700	203	172,500	15,392
Georges Bank	1,261,800	13,140	98,300	1,563	223,850	21,347
Cashes Bank	2,308,700	20,235	138,100	1,925	19,200	1,906
Fippenies Bank	126,500	1,083	5,100	62	1,000	145
Tillies Bank	118,500	992				
Clark Bank	18,200	144	1,000	10	14,400	1,126
Ipswich Bay	7,900	72	4,300	45		
Jeffreys Ledge	1,152,100	11,681	177,500	2,401	3,230	352
Middle Bank	987,200	9,978	98,000	1,249	8,700	851
Off Race Point	6,200	54	7,000	70	500	80
Off Highland Light	771,900	6,923	28,600	360	8,175	997
Off Chatham	313,500	2,706	8,200	70	1,900	237
South Channel	4,131,000	34,902	79,100	938	109,400	10,686
Nantucket Shoals	43,600	353	36,600	415	6,700	564
Shore, general	1,108,300	9,723	73,400	907	1,600	152
Total	14,863,100	134,774	922,600	12,489	1,669,855	158,150

Fishing-grounds.	Mackerel.*				Other fish.†		Total.	
	Fresh.		Salted.					
	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.	Lbs.	Value.
East of 66° W. longitude:								
La Have Bank					1,550	$70	6,948,450	$132,230
Western Bank							2,445,200	100,709
Grand Bank							275,000	6,875
Cape Shore	54,203	$3,431	820,400	$24,482	250	14	2,783,153	67,483
Cape North							8,000	480
West of 66° W. longitude:								
Browns Bank							3,068,000	57,032
Georges Bank					103,600	6,837	20,769,750	360,929
Cashes Bank					500	50	7,072,500	104,301
Fippenies Bank							389,500	6,263
Tillies Bank							253,400	4,277
Clark Bank							263,800	5,085
Ipswich Bay							412,400	7,471
Jeffreys Ledge	1,604	126			6,700	230	5,119,584	93,411
Middle Bank	24,697	2,051			12,050	803	5,112,897	93,620
Off Race Point	418,625	27,562	178,500	8,890	5,188	36	1,111,313	48,309
Off Highland Light	25,410	2,085	7,000	315	4,900	98	3,806,085	68,678
Off Chatham					1,000	5	1,818,400	31,707
South Channel					61,470	3,261	19,073,070	311,027
Nantucket Shoals							1,738,800	38,220
Shore, general	331,300	24,014	329,900	18,084	590,130	26,392	4,995,009	129,821
Total	855,938	59,269	1,335,800	51,771	787,338	37,796	87,465,211	1,668,018

*The fares of mackerel numbered 249, of which 132 were from the general shore grounds of New England, 92 from off Race Point, 14 from Cape Shore, 6 from Middle Bank, 4 from off Highland Light, and 1 from Jeffreys Ledge.

†"Other fish" includes 411,600 pounds of swordfish, $33,883; 249,300 pounds of menhaden, $2,605; 99,100 pounds of herring, $974; 16,400 pounds of sea catfish, or wolf-fish, $230; 8,000 pounds of whiting, $40; 1,688 pounds of shad, $14; 1,250 pounds of bluefish, $50. The swordfish fares numbered 54, as follows: 35 from shore grounds, 236,480 pounds, $22,728; 14 from Georges Bank, 103,600 pounds, $6,837; 2 from South Channel, 59,470 pounds, $3,251; 2 from Middle Bank, 9,050 pounds, $738; 1 from Jeffreys Ledge, 1,700 pounds, $205; 1,300 pounds, $124, were brought in with other fish from La Have, Georges, and Cape Shore. Of herring, menhaden, and bluefish, 10, 27, and 1 fares, respectively, were landed from shore grounds. The shad, which came from off Race Point, and the whiting, from Jeffreys Ledge and shore grounds, were taken incidentally and landed with other fish.

Considering the combined fish trade of Boston and Gloucester in 1894, it appears that 8,120 fares of fish were brought in, which aggregated 167,116,817 pounds, and were valued at $3,897,671. It should be understood that in addition to the foregoing, very large quantities of fishery products are landed by merchant vessels from United States and Canadian ports and that the receipts by rail are also important. The number

of trips in 1894 exceeded that in 1893 by over 1,100. The increase in receipts was nearly 25,000,000 pounds, but the value of products decreased over $200,000, the value of the augmented yield of cod, haddock, etc., not compensating for that of the diminution in the mackerel catch. The following table is a recapitulatory comparison, by fishing-grounds, of the fish receipts in 1893 and 1894. For a more detailed exhibition of the changes in the two years, the foregoing tables may be compared with similar tables in the previous report of this division.

Grounds.	No. of trips.		Pounds.		Value.	
	1893.	1894.	1893.	1894.	1893.	1894.
La Have Bank	193	312	7,081,405	13,060,397	$189,934	$291,686
Western Bank	141	208	4,140,169	5,194,723	217,859	275,221
Quereau Bank	164	120	3,071,980	2,383,033	237,871	165,559
St. Peters Bank	7	20	223,980	491,890	14,865	32,160
Green Bank	2	35	48,400	898,187	4,542	68,025
Grand Banks	148	149	19,041,180	19,123,860	572,591	532,668
Canso Bank	9	6	867,480	261,430	24,361	6,929
Cape Shore	147	166	5,668,380	7,605,253	240,947	205,347
Cape North	.....	2	.....	95,200	.....	2,412
Gulf of St. Lawrence	37	27	1,724,730	1,202,000	84,301	66,265
Iceland and Greenland	11	14	1,845,900	1,490,500	103,327	84,752
Off Newfoundland	4	6	137,250	264,620	7,732	15,367
Browns Bank	71	121	2,665,900	4,784,670	54,951	78,545
German Bank	1	3	30,000	77,000	255	1,188
Georges Bank	1,219	1,310	31,202,772	40,619,785	900,849	873,695
Cashes Bank	476	427	18,427,090	15,346,260	244,866	186,717
Fippenies Bank	15	22	241,200	420,500	5,287	6,630
Tillies Bank	7	18	66,000	253,400	1,382	4,277
Clark Bank	7	13	220,000	263,800	4,718	5,085
Jeffreys Ledge	538	565	5,653,365	5,574,784	104,650	97,425
Middle Bank	571	594	4,967,530	5,296,109	108,507	95,949
Off Highland Light	215	325	2,633,785	3,845,085	52,411	69,036
Off Chatham	90	112	1,502,132	1,841,400	28,205	31,947
South Channel	556	725	14,082,550	21,249,770	285,244	331,140
Nantucket Shoals	119	142	2,533,800	2,775,620	69,892	62,776
Shore, general	2,194	2,678	13,986,070	12,697,541	526,013	307,810
Total	7,014	8,120	142,396,448	167,116,817	4,099,847	3,897,671

The following statement is a summary comparison of the aggregate receipts at Boston and Gloucester in 1893 and 1894, each of the prominent fishes being shown separately:

Species.	Pounds.		Value.	
	1893.	1894.	1893.	1894.
Cod	54,627,104	63,590,830	$1,596,010	$1,601,901
Haddock	33,908,780	45,611,856	685,500	683,875
Hake	19,991,600	23,343,815	193,043	191,900
Cusk	9,283,370	10,045,640	140,400	138,708
Pollock	3,614,626	2,181,221	33,632	20,706
Halibut	9,792,911	10,905,122	795,258	849,586
Mackerel	9,296,220	8,013,400	612,505	351,148
Other fish	1,881,837	2,824,933	43,499	56,787

RÉSUMÉ OF REPORTS ISSUED.

The printed articles emanating from this division in 1895 consisted of statistical and descriptive reports on the fisheries of the Great Lakes and Middle Atlantic States, a general paper on the statistical aspects of the United States fisheries, and several reports treating of special subjects. An outline of the nature and scope of these papersis given.

In August, 1894, a report of the Commissioner of Fish and Fisheries on the salmon industry of the Columbia River basin was made to Congress, and issued as a Senate miscellaneous document. The report is based largely on data gathered by Mr. W. A. Wilcox, field agent of this division.

Statistics of the Fisheries of the United States. (Bulletin 1893, pp. 389–417.)

This is a brief but comprehensive summary of the fisheries in 1890, 1891, and 1892, but principally in 1892, based on the inquiries of the statistical agents of the division. The statistics cover the fishing industries of all States bordering on the coasts and Great Lakes, and show the condition of the fisheries of each State, the quantity and value of the yield of each principal product, the catch with each major form of apparatus, the actual and relative importance of United States fisheries as compared with those of other countries, and the changes in the principal phases of the industry as compared with 1880.

The report shows the number of persons employed in the fishery industries of the coastal and Great Lakes States to have been 182,376; the amount of capital invested, $58,245,406; the value of products to the fishermen, $45,312,818. The most valuable products were oysters, worth $16,152,257; Pacific salmon, $3,710,250; Atlantic cod, $2,856,225; whalebone, oil, etc., $2,141,738; shad, $1,879,688; clams, $1,690,536; mackerel, $1,102,651; lobster, $1,050,677, and haddock, $1,045,814.

This paper was primarily prepared for presentation to the World's Fishery Congress at Chicago in 1893, and is referred to in the last report of the division.

Report on the Fisheries of the Great Lakes. (Report 1892, pp. 361–462.)

This report represents the results of an investigation of the economic fisheries of the Great Lakes conducted by this division during the fiscal year 1892, and illustrates the condition and extent of the industry during the year ending December 31, 1890. It is a detailed statistical presentation of the various phases of the lake fisheries. The statistical matter and the accompanying text are arranged with a view to show, (1) the general extent of the lake fisheries and their condition as compared with 1880 and 1885; (2) the fisheries considered by lakes; (3) the fisheries considered by States, and (4) the extent and results of artificial propagation. A feature of this paper which has not appeared in any previous report on the Great Lakes fisheries is the presentation of statistics showing the quantity of each principal fish taken with each kind of apparatus. A basis is thus furnished for determining the existence of augmentation or diminution in the supply of the various fishes, the extent of the increase or decrease, and the form of fishery in which it has occurred.

The extent of the fisheries of the Great Lakes in 1890, as indicated by this report, was as follows: Persons employed, 9,738; capital invested, $5,362,744; pounds of fish taken, 113,898,531; value of the catch to the fishermen, $2,471,768.

Notes on the Oyster Industry of New Jersey. (Report 1892, pp. 463-528.)

The importance of the oyster industry of New Jersey and the examples there afforded for the prosecution of oyster-culture in localities possessed of similar physical conditions make this paper timely and valuable. It is based on original inquiries by Mr. Ansley Hall, field agent of the division, during 1892, in the course of which all parts of the State having oyster interests were visited and a careful study made of the conditions, special attention being given to the methods of planting and cultivation. New Jersey now ranks fourth among the oyster-producing States, being surpassed only by Maryland, New York, and Virginia, this high rank being largely the result of advanced methods of oyster-culture.

While the New Jersey Agricultural Experiment Station has devoted considerable attention to the embryology and natural history of the oyster, no comprehensive account of the economic conditions of the industry in that State had appeared since 1880.

The report discusses the history and present condition of the industry in each of the three important oyster regions, viz: (1) The northern coast of New Jersey, (2) the ocean side of New Jersey, and (3) the New Jersey side of Delaware Bay (Maurice River Cove). The methods and conditions here prevailing are, in many respects, dissimilar to those in any other State, and there are many phases of the subject which afford suggestive information of great value, not only to States in which the artificial production of oysters has but recently been undertaken, but those in which successful cultivation has long been practiced.

The most recent data contained in the report relate to the calendar year 1892, during which 4,351 persons were directly engaged in the oyster industry of the State, $1,393,892 was invested, and 1,097,228 bushels of marketable oysters were obtained, for which the producers received $1,220,878.

A Bibliography of Publications in the English Language relative to Oysters and the Oyster Industries. (Report 1892, pp. 305-359.)

Although the literature relative to the oyster and the oyster industries is very rich and comprehensive, yet it is so widely distributed through publications and periodicals of almost every description that the casual inquirer has difficulty in finding references to reports of any special branch of the oyster business. This compilation is intended to supply the need experienced by many persons interested in the literature of this important subject. The paper gives the titles and descriptions of 546 separate publications, the work of 278 authors. Of these articles, 294 were issued in the United States, 26 in Canada, 176 in England, 25 in Scotland, 10 in Ireland, and 15 in various other countries. Of the American publications, 73 were printed by the United States Fish Commission; of these, 25 were translations and 48 original articles. A brief account of the scope of most of the publications is given, and abstracts of important or interesting statements occurring in some of the papers enhance the value of the article. A subject index

and an index of authors facilitate the finding of works on special topics and the papers of individual writers.

Notes on a Reconnoissance of the Fisheries of the Pacific Coast of the United States in 1894. (Bulletin 1894, pp. 223-288.)

The inquiry on which this paper is based was made in May and June, 1894, and is referred to in the previous report of the division. The article embodies the results of observations on the condition of the salmon industry of the different sections that it was deemed advisable to visit; the development of the market fishery and the sardine industry; the history, growth, and present extent of the sturgeon fishery of the Columbia River; and notes on several other branches of the fisheries that possess special interest. A special feature of the paper is the presentation of detailed statistical data showing for certain apparatus, fishermen, and years the fluctuations in the catch of different kinds of salmon in various parts of the Columbia River.

A Statistical Report on the Fisheries of the Middle Atlantic States. (Bulletin 1894, pp. 339-467.)

This completes the series of papers on the economic fisheries of the different geographical coast sections, the regions for which reports have been previously issued being the New England States, the Pacific States, the Gulf States, and the South Atlantic States, in the order named. The present paper is based entirely on original field investigations carried on by agents of this division during parts of the fiscal years 1891, 1892, and 1893; and the statistics and other information obtained relate to the calendar years 1889, 1890, 1891, and 1892. The statistical matter consists of (1) general condensed tables showing by States the extent of the fishery industry in the entire region, (2) detailed data for each State by counties, (3) a series of tables giving the extent of some of the more important fisheries, and (4) comparisons with 1880.

In the items of persons engaged and the value of the products the commercial fisheries of the Middle Atlantic States are more important than those of any other geographical section of the United States; but the amount of capital invested is much less than in the New England States. The returns show that during the last year covered by the statistics 90,923 persons were engaged in the various branches of the industry; $19,318,664 was invested in the vessels, boats, apparatus, and other property employed; and the value of the products at first hands amounted to $19,023,474. This represents an increase since 1880 of 51.91 per cent in the number of persons employed, 32.35 per cent in value of investment, and 13 per cent in the value of the yield.

The branches that are noticeably important and surpass in value those of all other regions combined are the fisheries for oysters, clams, shad, menhaden, bluefish, squeteague, crabs, alewives, striped bass, sea bass, white perch, yellow perch, Spanish mackerel, and terrapin. During the last year reported the value of the oysters taken was $12,402,925; clams, $1,222,495; shad, $1,216,589; menhaden, $615,829; bluefish, $591,479, and squeteague, $480,887.