4.—THE FISHERIES OF THE GREAT LAKES.

INTRODUCTORY NOTE.

The fisheries of the Great Lakes, by reason of their great extent and the energetic measures taken by the General Government and the various States to maintain and increase their productiveness, have received an unusual amount of public attention, which has been increasing during late years, owing to the more extensive fish-cultural operations carried on, the threatened depletion of some of the lakes, due to wasteful methods or overfishing, and the growing necessity for concurrent action on the part of the several States and Canadian Provinces for the preservation of this important industry.

This Commission has aimed to keep well informed as to the status of the lake fisheries and has within a comparatively short time conducted two thorough investigations of the industry, viewed from the standpoint of the economic fisherman. The first canvass of this region, since the census of 1880, was made in 1885; the results of this comprehensive investigation of the history, apparatus, methods, and statistics of the fisheries were published in a report entitled "Review of the Fisheries of the Great Lakes in 1885" (330 pages, 7 charts, and 37 illustrations of fishes, apparatus, etc.).

The present paper represents the results of an investigation of the commercial fisheries of the Great Lakes conducted by this Commission during the fiscal year 1892, and illustrates the condition and extent of the industry during the year ending December 31, 1890. Notice of the field work and a summarized account of the results of the inquiry have appeared in my annual report for 1892. The following agents of the Division of Fisheries participated in the investigation and canvassed the regions specified: W. A. Wilcox and T. M. Cogswell, Lake Superior; E. E. Race and H. P. Parker, northern, western, and eastern shores of Lake Michigan, south of and including South Haven; Ansley Hall, eastern shore of Lake Michigan north of South Haven; W. A. Wilcox, Lake St. Clair, St. Clair and Detroit rivers, and the fisheries of the southern shore of Lake Huron tributary to Port Huron and the St. Clair River; Charles H. Stevenson, the shore of Lake Erie east of Port Clinton, including the Bass Islands, and part of the shore of Lake Ontario west of the Genesee River; and H. M. Smith, Lake Ontario, with the exception of part covered by Charles H. Stevenson. Messrs. Seymour

Bower and E. A. Tulian were detailed from the Division of Fish-culture to assist in the field inquiries. Mr. Bower canvassed that part of Lake Erie west of Sandusky, and Mr. Tulian the American shores of Lake Huron. The duty of preparing the notes of the agents for publication and of discussing the prominent features disclosed by the statistics has devolved upon Dr. Hugh M. Smith, the assistant in charge of the Division of Statistics and Methods of the Fisheries.

This report is essentially a detailed statistical presentation of the various phases of the lake fisheries. The previous full discussions of the methods employed, descriptions of the apparatus and boats used, and notes on the fishes taken render further information of this kind uncalled for and make necessary at this time only a notice of the principal changes which have occurred in these matters since the last inquiry. The statistical matter and the accompanying text are arranged with a view to show (1) the general extent of the lake fisheries and their importance 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.

Attention may properly be directed to one feature of the paper which has not appeared in any previous report on the Great Lakes fisheries, viz, the presentation of statistics showing the quantity of each principal fish taken with each kind of apparatus. The tables are interesting for the information given and are important in affording an opportunity to make comparisions of the relative catch of the different species with the different appliances in future years. An invaluable basis is 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 region, as determined by the inquiries of this Commission, 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.

The canvass of the fisheries of the lake region was materially assisted by the fishermen and wholesale dealers, without whose hearty coöperation a satisfactory inquiry could not have been made. Dealers in every section gave to the agents of the Commission free access to their records, thus permitting the collection of the most reliable statistics and, in some instances, furnishing necessary data that could not otherwise have been obtained, in the absence of records kept by the fishermen. Dealers in many places also accorded to the Commission's agents free passage on their fishing and collecting steamers, and so contributed to a better understanding of the fisheries as well as a saving of time and expense. The thanks of the Commission are heartily extended to the fishing interests of the lakes.

MARSHALL MCDONALD,
U. S. Commissioner of Fish and Fisheries.

THE FISHERIES OF THE GREAT LAKES.

By Hugh M. Smith, M. D.,

Assistant in charge of Division of Statistics and Methods of the Fisheries.

I.—GENERAL REMARKS ON THE LAKE FISHERIES.

In the basin of the Great Lakes there are about 100,000 square miles of water, distributed as follows:

	Square miles.
Lake Superior	32,000
Lake Michigan	22,000
Lake Huron	21,000
Lake Erie	9,500
Lake Ontario	6,500
St. Mary, St. Clair, Detroit, Niagara, and St. Lawrence rivers, Lake St. Clair	9,000
Total	100,000

This enormous area supports a fish fauna that is peculiarly rich and varied. At least 40 species of recognized food value are found in greater or less abundance, including some of the most highly esteemed and valuable food and game fishes occurring in North America. The fisheries here prosecuted by the people of the United States and Canada are the most extensive lake fisheries in the world. The quantity of fish annually taken is now over 150,000,000 pounds, having a value of more than $4,400,000. The wonderful fertility of these waters may be better appreciated when it is recalled that since 1880 not less than 1,400,000,000 pounds of food-fish have been put on the market from this region, the value of which was not less than $42,000,000, and that up to within a comparatively short time no serious or apparently permanent diminution in the general supply had been observed. Even at the present time the output is wonderfully well maintained, all things considered, and it may be safely stated that in much the larger part of this region the resources are not fully utilized.

While the fisheries of the American side of the Great Lakes are not important by comparison with the fishing industry of some of the coast sections of the country, their actual extent is great, and in some respects they are more prominent and interesting than those of any other region;

but the importance which the fisheries of this great basin are destined to attain in the not far distant future overbalances the mere question of their present extent. The development of other industries, the increase in population, especially in the more western and northern parts of the chain, and the growing demand for food-fish in the country at large, will undoubtedly lead to the advance of the lake fisheries.

In anticipating the continued growth of the lake fisheries, the serious effects of overfishing must not be disregarded, and the possibility of practical extinction of some of the more important fishes must not be lost sight of. While the natural resources of the lakes, their large size, and their physical features conduce to the preservation of the supply even when exceedingly large quantities of fish are caught, the history of the fisheries, in the two smallest lakes at least, clearly indicates the influence which man may exert on the abundance of the lake fishes and suggests what may be the case in even the largest lakes if the fishing operations are sufficiently extensive and if no regard is given to the question of needed protection. In looking, therefore, for the continued increase and prosperity of the lake fisheries, the necessity for rational regulations in certain lines must be recognized.

Of fully as great importance and, in some instances, of even greater consequence, is the resort to adequate artificial methods for the counteraction of the effects of fishing and for the regeneration of depleted grounds.

The investigation of the Commission in 1891–92 disclosed the fact that the lake fisheries gave employment to about 9,740 persons, that the amount of capital invested was over $5,362,000, that nearly 114,000,000 pounds of fish were taken, and that the value of the catch was about $2,471,700.

The different capacities in which the persons were employed were as follows:

Persons employed in the fisheries of the Great Lakes.

How engaged.	Number.
On fishing vessels	598
On transporting vessels	133
In shore or boat fishing	7,393
On shore	1,614
Total	9,738

The details of the investment are shown in the following table. The prominent features of the lake fisheries disclosed by the statistics are the relatively expensive class of vessels employed, the great importance of the pound-net and gill-net fisheries as shown by the number of pound nets and gill nets operated, and the expensive shore property devoted to the industry.

Vessels, boats, apparatus, shore property, and cash capital employed in the fisheries of the Great Lakes.

Items.	Number.	Value.
Vessels fishing	97	*$373,771
Vessels transporting	31	*233,055
Boats	3,710	361,648
Apparatus:		
Pound nets	3,750	949,957
Gill nets	†103,800	498,096
Seines	154	17,236
Fyke nets	2,968	96,808
Lines and other apparatus	.....	13,052
Shore and accessory property	.....	1,534,871
Cash capital	.....	1,184,190
Total	.....	5,362,744

*Including outfit. †28,901,071 feet in length.

Of the 113,898,531 pounds of fish resulting from the operations of the Great Lakes fishermen, the minor varieties of whitefish known under the general name of lake herring represent much the largest part; next in point of quantity are the pike and pike perch, the lake trout, the whitefish, the perch, and the sturgeon. The quantities and values of the principal fish are as follows:

Products of the fisheries of the Great Lakes.

Species.	Pounds.	Value.
Herring	48,753,349	$561,703
Perch	7,754,023	113,260
Pike and pike perch	16,825,119	417,038
Sturgeon	4,289,759	148,366
Trout	12,890,441	507,050
Whitefish	12,401,335	518,891
All others	10,974,500	204,560
Total	113,898,531	2,471,768

Reference should be made to the bulletin relating to the fisheries of the Great Lakes issued by the Eleventh Census.* This is a more condensed exhibit of the subject than is given in the present paper. The statistical data in the two reports are presented from somewhat different standpoints, and each has some features that the other lacks, owing to different methods of treatment, different objects in view, and the adoption of different plans for the prosecution of the field investigations on which the reports are based. The census bulletin relates to the year 1889, and gives the following figures as representing the extent of the Great Lake fisheries during that year, the tables being condensed to meet the requirements of the present notice.

*Fisheries of the Great Lakes. By Charles F. Pidgin and Bert Fesler. Census Bulletin 173. Issued March, 1892.

STATISTICS OF THE FISHERIES OF THE GREAT LAKES IN 1889, AS REPORTED BY THE ELEVENTH CENSUS.

Persons employed.

Lakes.	Fishermen.	Shore help.	Total.
Superior	762	27	789
Michigan	2,049	35	2,084
Huron and St. Clair	1,432	12	1,444
Erie	1,965	216	2,181
Ontario	390	8	398
Total	6,598	298	6,896

Apparatus, boats, etc.

Designation.	Lake Superior.		Lake Michigan.		Lakes Huron and St. Clair.		Lake Erie.		Lake Ontario.		Total.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels	9	$27,350	48	$165,400	12	$30,000	42	$143,700	....	.....	111	$366,450
Boats	475	30,568	1,225	62,115	736	37,117	1,183	173,006	253	$13,232	3,872	316,038
Pound nets	210	36,810	856	171,146	755	123,818	1,838	483,920	172	8,225	3,831	823,919
Gill nets	....	72,624	.....	184,742	....	43,116	.....	94,978	....	13,337	.....	408,797
Seines	36	3,094	48	4,489	49	4,091	34	2,150	9	665	176	15,089
Fyke nets	2	190	1,171	17,291	251	2,987	930	30,080	558	5,807	2,912	56,955
Other apparatus	....	9,712	.....	7,097	....	12,630	.....	8,302	....	1,650	.....	40,297
Shore and other property	....	30,477	.....	103,369	....	121,771	.....	544,397	....	4,800	.....	804,814
Total	....	210,825	.....	716,549	....	376,136	.....	1,481,733	....	47,716	.....	2,832,959

Products.

Species.	Lake Superior.		Lake Michigan.		Lakes Huron and St. Clair.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Bass	80	$5	47,082	$2,464	70,895	$3,122
Catfish	500	11	224,080	4,415	285,874	7,205
Herring	382,123	5,602	9,568,587	190,359	4,659,221	78,327
Perch	27,590	447	2,181,426	37,603	2,634,488	28,218
Pike and pickerel	122,055	4,271	488,784	18,101	2,724,588	71,044
Sturgeon	84,469	1,931	612,353	26,634	656,369	19,400
Suckers	800	20	1,728,074	9,589	1,145,885	12,292
Trout	3,360,724	112,516	5,580,358	249,255	2,181,340	86,508
Whitefish	3,898,558	156,572	5,523,971	246,493	2,556,804	119,850
Others	1,050	32	51,029	3,023	23,932	386
Total	7,883,949	280,807	26,006,944	788,536	16,939,397	427,252

Species.	Lake Erie.		Lake Ontario.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Bass	854,957	$34,053	44,994	$1,683	1,018,008	$43,227
Catfish	1,251,990	41,973	167,006	7,413	1,930,050	61,017
Herring	37,200,850	395,171	1,850,140	48,202	53,060,921	717,061
Perch	3,830,030	45,383	85,496	1,821	8,759,039	113,272
Pike and pickerel	14,583,471	284,201	184,254	10,959	18,103,147	389,476
Sturgeon	1,244,607	47,045	200,927	10,925	2,798,725	105,935
Suckers	1,072,495	10,609	74,344	800	4,022,198	38,400
Trout	66,703	3,714	6,500	511	11,201,631	452,504
Whitefish	3,323,772	167,172	23,383	1,476	15,326,488	691,503
Others	134,448	3,537	54,902	1,751	265,361	9,329
Total	63,563,332	1,033,758	2,691,946	85,431	117,085,568	2,615,784

Attention may be directed to the permanent value of the detailed statistics presented in the following pages, showing the extent of the fishing industry in each county bordering on the lakes. Such data afford an invaluable guide for determining the changes in the condition of the fisheries, and furnish the most satisfactory basis for noting comparisons from time to time. In the increased attention now being bestowed on the lake fisheries, and in the consideration of questions of legislation and propagation which are continually arising, detailed comparative statistics will necessarily have great utility.

II.—THE FISHERIES CONSIDERED BY LAKES.

GENERAL STATISTICS.

As an introduction to a detailed presentation of the statistics of the fisheries in each lake, the following series of general tables is given, showing, by lakes, the number of persons engaged in the industry, the apparatus, boats, etc., employed, and the quantity and value of the catch.

The fisheries of Lake Erie, as is well known, are much more extensive than those of any other lake. In all the essential items which enter into a statistical consideration—persons, capital, and products—this lake takes precedence. In the canvass conducted by this office, 4,482 persons were found to be directly connected with the fisheries, $2,816,302 was ascertained to be invested, and 64,850,873 pounds of fishery products were taken, having a value to the fishermen of $1,000,905.

Lake Michigan ranks next to Lake Erie. Here 2,877 persons found employment in the fishing industry, $1,437,224 was invested, 26,434,266 pounds of fish were caught, and the income of the fishermen was $830,465.

Third in general importance is Lake Huron, although in the items of fishing population and investment it is surpassed to a comparatively slight extent by Lake Superior, and the value of the catch is so little in excess of that of Lake Superior that the relative positions of the two lakes might be changed from time to time without the supervention of any specially marked changes in the condition of the fisheries in either. The fisheries of Lake Huron gave employment to 726 persons and $408,858 invested capital, and yielded 10,056,381 pounds of fish, which were sold for $221,067.

Lake Superior had 653 persons engaged in the industry, had $366,682 invested therein, and was credited with a catch of 6,115,992 pounds, valued at $220,968.

Next to Lake Superior in the quantity and value of the catch is Lake Ontario, which is, however, surpassed by Lake St. Clair in the number of fishermen and the amount of invested capital. It had 389 fishery employés, fishing property to the value of $123,533, and a catch of 3,446,448 pounds, worth $124,786.

Last in point of importance is Lake St. Clair and the two rivers connected therewith. The fisheries gave employment to 611 persons, $210,145 was invested, and 2,994,571 pounds of fish were secured, for which $73,577 was received.

Table showing by lakes the number of persons employed in the fisheries of the Great Lakes in 1890.

How employed.	Superior.	Michigan.	Huron.	St. Clair.	Erie.	Ontario.	Total.
On vessels fishing	45	284	18	28	218	5	598
On vessels transporting	13	9	8	.....	97	6	133
In shore fisheries	517	2,215	590	517	3,198	356	7,393
On shore, in fish houses, etc	78	369	110	66	969	22	1,614
Total	653	2,877	726	611	4,482	389	9,738

Table showing by lakes the apparatus and capital employed in the fisheries of the Great Lakes in 1890.

Items.	Superior.		Michigan.		Huron.	
	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	7	$22,700	48	$151,850	3	$9,700
Tonnage	91.08	.....	671.57	.....	37.94	.....
Outfit	.....	6,600	.....	19,703	.....	1,900
Vessels transporting	1	25,000	2	21,500	4	2,800
Tonnage	165.62	.....	122.08	.....	41.11	.....
Outfit	.....	7,000	.....	1,615	.....	130
Boats	320	23,975	1,052	71,663	410	22,308
Apparatus of capture, vessel fisheries:						
Gill nets	1,318	18,438	18,810	106,854	324	3,933
Apparatus of capture, shore fisheries:						
Pound nets and trap nets	140	34,435	844	244,880	551	88,515
Gill nets	4,656	45,038	22,086	109,060	1,882	17,732
Fyke nets	9	415	731	11,316	221	6,385
Seines	19	955	29	3,480	6	600
Lines, spears, dip nets, etc	.....	2,348	.....	2,144	.....	770
Shore property	.....	109,878	.....	434,759	.....	208,625
Cash capital	.....	69,900	.....	258,400	.....	45,400
Total	.....	366,682	.....	1,437,224	.....	408,858

Items.	St. Clair.		Erie.		Ontario.		Total.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	4	$21,000	34	$115,400	1	$2,800	97	$323,450
Tonnage	38.56	.....	344.42	.....	13.69	.....	1,197.26	.....
Outfit	.....	3,400	.....	18,158	.....	500	.....	50,321
Vessels transporting	.....	.....	22	154,700	2	5,280	31	209,280
Tonnage	.....	.....	1,040.92	.....	32.48	.....	1,402.21	.....
Outfit	.....	.....	.....	14,025	.....	1,005	.....	23,775
Boats	162	4,375	1,393	217,750	373	21,577	3,710	361,648
Apparatus of capture, vessel fisheries:								
Gill nets	814	9,418	19,046	67,044	50	200	42,607	206,787
Apparatus of capture, shore fisheries:								
Pound nets and trap nets	34	9,450	1,803	548,100	288	24,577	3,750	949,957
Gill nets	.....	.....	30,274	101,569	2,295	17,910	61,103	291,309
Fyke nets	148	4,480	1,175	64,450	684	9,822	2,968	96,868
Seines	28	6,240	44	5,305	27	656	153	17,230
Lines, spears, dip nets, etc	.....	1,100	.....	6,151	.....	530	.....	13,052
Shore property	.....	106,082	.....	749,750	.....	25,777	.....	1,634,871
Cash capital	.....	44,000	.....	753,000	.....	12,890	.....	1,184,190
Total	.....	210,145	.....	2,816,302	.....	123,533	.....	5,362,744

Table showing by lakes and species the yield of the fisheries of the Great Lakes in 1890.

Species.	Superior.		Michigan.		Huron.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Bass			143,130	$6,477	29,351	$2,167
Herring	199,121	$4,616	6,082,082	102,721	2,514,551	28,181
Perch			1,943,953	46,641	1,817,628	20,792
Pike and pike perch	26,362	1,134	566,021	21,087	1,483,072	50,834
Sturgeon	47,482	1,401	946,897	34,253	365,718	8,924
Trout	2,613,378	88,201	8,364,167	349,193	1,505,619	51,042
Whitefish	3,213,176	124,987	5,455,079	219,059	1,004,004	37,247
Other fish	16,473	629	2,932,928	50,134	1,330,348	21,880
Total	6,115,992	220,968	26,434,266	830,465	10,056,381	221,067

Species.	St. Clair.		Erie.		Ontario.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Bass	9,086	$544	248,418	$13,521	33,092	$2,364	463,086	$25,073
Herring	490,334	5,797	38,868,283	399,452	598,978	20,936	48,753,340	561,703
Perch	763,093	10,160	2,870,407	30,299	358,947	5,368	7,754,028	113,260
Pike and pike perch	524,669	17,533	13,774,503	290,537	460,492	35,013	16,835,119	417,038
Sturgeon	309,003	7,794	2,078,907	73,703	541,752	22,291	4,289,759	148,366
Trout	244,847	12,242	121,420	5,183	41,010	2,089	12,890,441	507,950
Whitefish	238,764	14,753	2,341,451	115,970	148,771	6,875	12,401,325	518,891
Other fish	414,775	4,754	4,547,484	72,240	1,263,406	29,850	10,511,414	179,487
Total	2,994,571	73,577	64,850,873	1,000,905	3,446,448	124,786	113,898,531	2,471,768

LAKE SUPERIOR.

General features of the fisheries.—The condition of the fishing industry of this lake in the year covered by the investigation of the Fish Commission was generally regarded as satisfactory and as representing the average in recent years; the figures presented therefore afford a basis for rational comparisons.

The fishery resources of this lake are less developed than those of any other member of the chain. Long stretches of shore line are not only without fishing communities, but also without settlements of any kind. The sparsity of the population and the relative remoteness of most parts of the lake from markets will doubtless retard the rapid growth of the fisheries and prevent them attaining for some years the importance which the natural resources warrant.

While some fishes which in parts of the Great Lakes chain have great commercial importance are not relatively abundant in Lake Superior, still the most prominent of the lake fishes are here present in large quantities, and it is probable that in no other lake can a continued supply of desirable food-fishes be more certainly depended on. The great area of the lake (32,000 square miles) and its depth (1,200 feet in places) are conditions favorable to the maintenance of fisheries of much larger extent than are now prosecuted anywhere in the Great Lakes basin.

The fishing centers in this lake are, beginning at the western end of the lake, Duluth, Minn.; Bayfield and Ashland, Wis.; Ontonagon, L'Anse, Baraga, Marquette, Whitefish Point, and Sault Ste. Marie, Mich. Important places for the collection, sale, and shipment of fish are Duluth, Bayfield, Houghton, Marquette, Whitefish Point, and Sault Ste. Marie.

A prominent feature of the fisheries during recent years has been the

movement of considerable quantities of apparatus from the American to the Canadian side of the lake, and the establishment of important fisheries at a number of places on the Canadian shore. In certain sections having important fisheries in 1885, the diversion of apparatus to the other side of the lake has resulted in a practical obliteration of once extensive interests. The most conspicuous instance of this kind was in the vicinity of Duluth.

Notes on the principal fishes.—The movements of fish in this lake appear to be less definite and less understood than in any of the other Great Lakes. An enormous run of fish and apparently favorable prospects will often be changed to an entire absence of fish for weeks, and, on the contrary, dull periods will sometimes be terminated by the advent of large bodies of fish without any apparent cause and independently of the migrations for spawning purposes which here, as in other lakes, are observed. During the spring fishing season of 1891 the fish came on to the shores in great abundance, and the prospects of a large catch appeared unusually good. Suddenly, however, the fish disappeared, and for weeks the catch was very light, and in many places scarcely any fish were taken. The fishermen became discouraged and moved their nets from point to point. Mr. A. Booth, of Chicago, the well-known fish-dealer, remarked on this point, "No one can say what the year's business will be until it is over. The best prospects come far short, and the poorest opening may turn out remarkably well."

The fishermen and dealers attribute to the weather a very marked influence on the abundance and catch of fish, which seems to be borne out by the results. The cold north wind which prevails in this lake during a large part of the year keeps the fish out in the lake in the deeper and warmer water. In 1890 and 1891, in the vicinity of Bayfield and the Apostle Islands, a very cold wind from the north continued during the greater part of the fishing season, a light catch being the result. Within twenty-four hours after a change from a northerly to a southerly wind there are usually a large run of fish and a good catch. In the vicinity of Lighthouse Point, Ashland County, Wis., 35 pound nets were put down in 1891, which, up to July 22, had not taken as many fish as were caught by 8 nets in the same region in the previous year, owing, as the fishermen believe, to the prevalence of northerly winds and the consequent cold water.

Foremost among the fishes of Lake Superior is the whitefish. This species represents more than half the quantity and value of the catch, and in nearly every fishing center is more important than all other fish combined. In the vessel gill-net fishery, however, it is less valuable than the lake trout. About two-thirds of the catch is taken in Michigan, and practically all the remainder in Wisconsin, this fish now being an insignificant element in the fisheries of Minnesota. In Michigan the largest quantities of whitefish are taken in Chippewa County, situated at the extreme eastern end of the lake and including, as its most important fishing-ground, Whitefish Bay. The fish is also prominent in the fisheries of Marquette, Houghton, and Alger counties. Ash-

land County, in Wisconsin, has a large whitefish catch, the yield being greater than in any other county on the lake except Chippewa.

Next to the whitefish in general importance is the lake trout. The cold, deep waters of this lake are well adapted to this fish, which is here found in greater abundance and of larger size than in any other lake, with the possible exception of Lake Michigan. In the gill-net fishery carried on with vessels, and also in the shore gill-net fishery, it is the most prominent fish, but in the pound-net fishery it is of slight value compared with whitefish. Considerable quantities are taken in ice fishing, and small catches are made in the minor fishing carried on with spears, fyke nets, and seines. The average weight of the fish marketed is about 6 pounds, but very large examples are not uncommon.

The variety of the trout known as the siscowet is found only in deep water. It is taken with trawl lines and gill nets at a depth of 600 to 800 feet. While extremely abundant and of large size, there is scarcely any demand for it in a fresh state, owing to its excessive fatness. A limited demand exists for it in a salted condition. In the more northern parts of the lake, where it is most numerous and where the largest quantities are taken, the fishermen report that it is always abundant, but they will only catch it when other fish that are in greater demand and more easily taken are scarce. The weight of the siscowet is from 3 to 15 pounds. Compared with 1885, the catch of siscowet shows a large decrease; this, however, is due entirely to the demand.

The lake herring is abundant throughout the lake, but, being regarded as a cheap fish, it has little market value at the present time. The small catch reported was taken chiefly in the gill nets of Houghton, Ashland, and Bayfield counties and the seines of Marquette County. A few fish, caught in gill nets, are used as bait in the trawl-line fishery for trout. In the year covered by the investigation on which this paper is based a very large supply of herring was observed; but the low price and small demand deterred the fishermen from taking it, and the catch was much less than in 1885.

The pike perches, which are of great importance in lakes Erie and Ontario, are taken in smaller quantities and appear to be less abundant in Lake Superior than in any other lake. Only a few thousand pounds are annually taken, principally in the pound-net fishery of Chippewa and Ashland counties and in the fyke-net fishery of the latter county. The wall-eyed pike caught in this lake are shipped to market in a round condition, thus constituting a notable exception in the fish trade; they are sold in an undressed state to supply a special demand for hard fish coming from the Jewish population.

The catch of sturgeon in this lake has always been small. The fish appears to be less abundant than in the shallower, warmer waters of the lower lakes. In many places where sturgeon are incidentally caught no value is attached to them, and in but few localities are any special efforts made to secure them. The bulk of the catch is taken in pound nets in Chippewa County, Mich. The average weight of the fish is about 60 pounds.

Both the fishermen and dealers take much interest in the artificial propagation of fish and realize its value in keeping up the supply; they concede the importance of fish-cultural work in enabling the fishermen to supply the increasing demand for food-fish. The following statement regarding the results of fish-culture in this lake emanates from the Census Office:

The information of local fishermen on the work of the U. S. Fish Commission in Saint Louis County, Minn., is that much good has been done and the catch, especially of whitefish, considerably increased. The fishermen claim that they are able to judge accurately of the benefit done them by the hatching and distribution of whitefish, for the reason that, as the ova used at the Duluth, Minn., hatcheries are obtained from Lakes Erie and Michigan, the fish are different and can readily be distinguished from those native to those waters. They say that the fish from Lakes Erie and Michigan are lighter in color and rarely weigh over 4.5 pounds, while Lake Superior whitefish often weigh as much as 16 pounds.—(Census Bulletin 173. Fisheries of the Great Lakes.)

Apparatus and methods.—While practically every form of fishing apparatus found in the Great Lakes region is represented in the fisheries of Lake Superior, the pound net and gill net are especially prominent. Fyke nets, seines, dip nets, spears, and lines are in some regions locally important as means of capture, but are insignificant taking the entire lake into consideration.

The pound net is employed in every county on this lake, with the exception of two counties in Minnesota. The most important fisheries are in Alger, Baraga, Chippewa, and Ontonagon counties, Mich., and Ashland County, Wis. The 140 nets used in the American waters of the lake were valued at $34,435. A prominent feature of the pound-net fishery of the lake is the great depth of water in which some nets are set. At Whitefish Point, in Chippewa County, at the eastern end of the lake, some of the pounds are 86 feet deep, and are put in water 80 feet deep, the surplus of 6 feet being allowed for slacking; the poles to which the nets are attached are 97 or 98 feet long, and consist of spliced tamarack and pine poles. The leaders are 40 to 75 rods long, the pot 36 feet square, and the heart or pound 4 rods long. In lifting the pot a windlass is used. These are among the largest and deepest pound nets found in the Great Lakes. Others from 40 to 70 feet in depth are operated in various sections of the lake, but much the largest number of the pound nets are set in 20 to 30 feet of water.

The prevailing sizes of mesh in the different parts of the net are as follows: Leader, 7 to 8 inches (stretch); bowl or heart, 5 to 6 inches; pot, 3½ inches. The tendency to set the net in long continuous lines, which is so noticeable in Lake Erie, is not observed in Lake Superior, owing chiefly to the great depth of water, which not only makes the setting of pounds difficult and expensive, but also unnecessary in view of the fact that the fish naturally resort to the inshore waters. The largest and most expensive pound nets cost between $500 and $600 and the smallest about $190, the average being $246. The only fish, considering the entire lake, that occupies a prominent place in the pound-net

fishery is the whitefish, although in Baraga, Chippewa, and Isle Royale counties, Michigan, the lake trout is of considerable importance.

Gill nets are employed in every county bordering on the lake, but are specially important, on account of their number and catch, in Alger, Chippewa, Houghton, Isle Royale, Keweenaw, and Marquette counties in Michigan, and Ashland and Bayfield counties in Wisconsin. Vessels are employed in the gill-net fishery of Chippewa and Marquette counties in Michigan, St. Louis County in Minnesota, and Bayfield County in Wisconsin. The number of vessels so engaged was 7, 3 of which were in Marquette County, 2 in Chippewa County, and 1 in each of the other counties. The 1,318 gill nets operated from the vessels had a value of $18,438 and a length of 1,017,976 feet, or 193 miles, an average of 27½ miles to each vessel. The gill nets fished from small boats numbered 4,656; these, valued at $45,038, had a combined length of 2,352,560 feet, or 446 miles. The gill nets are mostly machine-made; a few, however, are made by hand by the fishermen's families during the winter.

Considerable ice fishing is done with hand lines along certain parts of the shore. The method followed in this lake is somewhat different from that pursued in other places. As soon as the ice is firm enough to bear the weight of the men, regular fishermen and semi-professionals begin their winter work or sport. Through a hole cut in the ice a line 6 feet long is dropped, supported by a small stick which runs across the hole and is soon firmly frozen on either side. To the line a single hook is attached, although sometimes 2 hooks are used on each line. The lines, baited with fresh herring, are left to fish themselves. One man will sometimes operate as many as 100 lines. These are visited every morning. The catch, consisting almost entirely of lake trout, is removed, and the hooks newly baited. In the western part of the lake a similar method is followed, but the lines are fished deeper, being 18 feet long. Trout is the only fish thus taken in noticeable quantities, although a few pike perch are caught in places.

Set lines, or trot lines, are used, to a limited extent, in a number of counties on this lake. The usual method of rigging the lines is to attach 50 hooks to each line, the hooks being 30 feet apart. These are baited with herring. They are set mostly for lake trout, and are fished in water from 100 to 130 fathoms deep. When fished for lake trout, the lines are buoyed about 3 fathoms from the bottom; but in fishing for siscowet, they are used directly on the bottom. Besides lake trout a few sturgeon and pike perch are caught.

The use of dip nets is restricted to the Chippewa Indians living in the vicinity of the rapids of St. Mary River. No such fishery is carried on in other lakes. While the method is primitive, the fishing-ground limited in extent, and the season short, relatively large quantities of fish are taken. The fish obtained are chiefly whitefish, although small quantities of lake trout, pike, pike perch, suckers, and other minor fish are also caught; a few brook trout are also taken. The State law

forbids the selling of any brook trout, which have to be consumed by the fisherman or given away when caught. About 20 Indians, using 10 canoes, engage regularly in the fishery, who are assisted on shore by 10 others, employed in preparing the catch for market. On the Canadian side of the river, about the same number of Indians follow the fishery. The catch on the Michigan side is sold to wholesale dealers in Sault Ste. Marie, while that on the Canadian side is shipped principally to Montreal and other Canadian cities. The fishery opens in May and continues as long as the fish run freely, usually until the middle of June; after that time but few fish are seen, and the fishery is practically suspended until the late fall run. During the summer, when a few fish are found, the fishery is limited to the small number of Indians who take tourists through the rapids and fish for sport or for home use. There is an abundance of fish in the river during the late fall and early winter, when fishing is resumed. Formerly this run was in October and November, but of late years, owing to climatic conditions, the run of fish has commenced and ended in December.

In dipping in the rapids two Indians occupy a canoe together; one sits or stands in the stern to guide or pole the boat, while his companion occupies the bow with a pole or paddle or dip net in hand. The Indian in the bow keeps a sharp lookout for fish that are ascending the rapids, while his companion gives his attention to the management of the canoe. The fish are always seen before any attempt is made to dip them, this practice being in marked contrast with the important salmon dip-net fishery carried on by Indians in the Upper Columbia River. When the fish is spied, the dip net is rapidly seized and thrust downward into the turbulent water with great velocity and dexterity, the fish usually being secured. During the best of the run boats will average 300 pounds of fish daily; individual catches are often much larger. On May 8, 1891, a noted Indian guide, scout, and fisherman, known as John Bouche, dipped 825 whitefish, averaging 2 pounds each; in April, 1878, the same Indian dipped 2,952 pounds of whitefish in a single day.

The nets are all made by the Indians. They are about 6 feet deep, 4 feet in diameter, and are attached to a pole about 12½ feet long. The size of the mesh is 3½ or 4 inches; about 100 meshes enter into the depth. The Indians lay considerable stress on the size, shape, and general composition of the dip nets. Any departure from the approved style is thought by them to prevent a good catch being made. The time occupied by an Indian in knitting and rigging such a net is a week to ten days. When fish are abundant, the net lasts only about two weeks. The average value of the net is $12. A small amount of dip-net fishing is also done from rude platforms erected over the rapids near the shore. This kind of fishing is followed chiefly by those who are not expert enough to dip from a canoe.

Spear fishing for commercial purposes is limited to the vicinity of Bayfield, Wis., where it is chiefly carried on by Indians, 500 or 600 of whom live in Bayfield. Spears are employed only in fishing through

the ice. The usual type of spear consists of 6 double-barbed prongs, 6 inches long, which are fastened to a crossbar, to which is attached a 10-foot wooden handle. The Indians go out to the fishing-grounds in the vicinity of their homes with hand sleds or dog teams. On four uprights at the corners of the sleds a canvas house is constructed to protect the fishermen from the wind. A hole is cut in the ice, over which the sled is drawn, and through this the fisherman suspends a decoy fish attached to a line, which is pulled up and down to attract the attention of passing fish. When a fish is seen the spear is thrown with great force, often to a depth of 30 or 40 feet, the same being withdrawn by means of a line attached to it. This fishing is often carried on with the mercury 40° to 45° below zero, and sometimes lower, the Indians remaining on the ice all day watching and fishing. Often large catches are taken, but at times few fish are secured. The catch is made up of whitefish and trout, about three-fourths consisting of the former.

Winter fishing through the ice with spears is followed by nearly all the male Indians living at or near the rapids of the St. Mary River. While considerable quantities of fish are caught, the fishery is not a commercial one, the catch being used to supply the Indian families. The fish caught are mostly whitefish and herring, which are chiefly consumed in a salted condition, a small amount being smoked. Spear fishing of this character is not carried on elsewhere in the Great Lakes, and, while not commercially important, deserves mention. The method pursued is as follows: A hole having been cut through the ice and a small sheltering tent placed over it, the Indian takes his stand and gently raises and lowers a wooden decoy attached to the end of a short line, all the while keeping a sharp lookout for any fish that may be attracted. When a fish is seen the line is dropped and the spear is instantly brought into use. Of late the Indians have found that they can fish as well by night as by day, by simply scooping out a hole in the ice and placing a lantern therein in such a manner as to throw its rays through the ice beneath the open hole.

Three kinds of spears are used. One, introduced by white men, is called by the Indians the "Yankee spear"; it has a handle 18 to 20 feet long, and is provided with three prongs attached to a cross-piece, each 10 inches long, and with a barb on either side of each prong, one placed a few inches above the other.

The favorite spear of the Indian is his own device and make. It is provided with three prongs, each fastened independently to the end of the handle. The outer prongs are fitted into little grooves on the side of the handle and are kept in place by rivets, while the middle prong is driven into the center of the pole. Another form of spear used for taking herring consists of a one-pronged piece of barbed iron, driven into or fastened to the end of a pole. This is supplemented with a long piece of iron attached to the end of the spear by its middle and bent into the shape of an incomplete circle, the free ends spreading. The Indians say that in using this spear, if a herring is touched it darts inside the iron band and virtually spears itself.

A feature of the fisheries of this lake that contrasts strongly with the conditions in most other fishing regions is the extreme neatness and cleanliness observed at the packing, curing, and cleansing houses and on the fishing steamers. The houses where the fish are handled are usually built partly over the water, yet no offal is permitted to go into the lake. On the arrival of a fishing steamer or boat a gang of men or women at once dress the fish and then thoroughly wash them. Then all offal is at once carried ashore, in many places some distance from the houses. The refuse is quickly visited by flocks of gulls hovering near by for that purpose and is quickly taken up. The fishing firms protect the gulls, which serve the useful functions of scavengers. The crews of steamers engaged in collecting fish from distant pound-net or gill-net fisheries employ their time on the return trip in dressing the fish, but no offal or blood is allowed to be thrown into the lake, and even the bloody water from the hold is carried ashore.

In parts of the lake considerable changes in the prevailing kinds of apparatus have occurred since 1885. A poor catch with one form of apparatus, or an unusually large catch with another, may have led, in a very short time, to a complete reversal of methods, the establishment of new fishing centers, or the discontinuance of old fisheries. Among other changes of this kind which have occurred the following may be mentioned:

The use of seines is much less extensive than in 1885; in that year 43 were employed, while at present only 19 or 20 are operated. What was said of the seine fishery in 1885 applies now with equal force:

> Prior to the introduction of pound nets seines were extensively used for catching the fish that chanced to be swimming in the vicinity of the shore; but these are now only occasionally employed for a few weeks, when the fishing is at its height, by those who are not so fortunate as to own pound nets. The continued use of pounds is said to have interfered with the migrations of fish in the inshore waters, and seines are not now sufficiently remunerative to warrant their extended use.

Seines are used in 5 counties, but the catch is usually insignificant. About two-thirds the quantity and value of the catch is whitefish.

Fresh and salt fish.—The demand for fresh fish is so constant that a ready market exists for all fish that can be caught. In placing fresh fish on the market the two methods chiefly adopted are to ship the fish in special fish cars or in ordinary boxes. The cost of transportation, however, from Lake Superior to the chief distributing centers is so great that cheap or inferior fish, like herring, are not profitable to catch or ship, even if very abundant.

The fishermen of this lake are averse to salting any of their catch, for the reason that it requires extra labor and brings them less money than fresh fish. In places remote from the wholesale purchasing-houses and in regions which are not regularly visited by the collecting steamers of the firms, a certain amount of salt fish is necessarily prepared each year. This consists of trout and whitefish. The usual practice is for the wholesale dealers to furnish salt and barrels to the

fishermen free of charge, on condition that fish be returned to the firms furnishing the packages and that the supplies needed in the fisheries be purchased from them. A slight charge is made for the empty packages, but the fishermen are credited for the amount when the barrels are returned filled.

In salting fish the method is as follows: The heads and viscera are removed and the fish are split down the belly like a codfish, though the backbone is not removed. This practice, together with the shrinkage from salting, makes a loss of one-fourth or one-third in the original weight of the fish. The price received for the salt fish is about the same as that commanded by fish when sold fresh in a round condition.

Whitefish have for a number of years been graded as Nos. 1, 2, and 3; No. 1 to weigh 2 pounds or over; No. 2, from 1 to 1½ pounds, and No. 3, 1 pound or less. Previous to 1891 trout were all branded No. 1, regardless of size. In that year, however, the trade began packing and numbering the salt trout as follows: No. 1 to weigh 1½ pounds or more, and No. 2 under 1½ pounds. The rules as to packing and grading are unwritten laws of the trade, not being subject to legal regulations.

Statistics of Lake Superior fisheries.—In the following tables, the extent of the fisheries of Lake Superior is shown by States and counties. The tables relate to the persons employed in different capacities, the vessels, boats, apparatus, and capital devoted to the industry, and the quantity and value of the products taken. For the products, three tables are shown, one giving the catch of the entire lake, classified by species, another showing the results of the vessel fishery, and the third giving in great detail the catch of each form of apparatus.

Table showing by States and counties the number of persons employed in the fisheries of Lake Superior in 1890.

States and counties.	How engaged.				
	On vessels fishing.	On vessels transporting.	In shore fisheries.	On shore, in fish-houses, etc.	Total.
Michigan:					
Alger	.....	.....	14	2	16
Baraga	.....	.....	62	.....	62
Chippewa	14	.....	49	20	83
Houghton	.....	.....	37	12	49
Isle Royale	.....	.....	66	.....	66
Keweenaw	.....	.....	30	.....	30
Marquette	17	.....	21	10	48
Ontonagon and Gogebic	.....	.....	42	.....	42
Total	31	.....	321	44	396
Minnesota:					
Cook	.....	.....	7	.....	7
Lake	.....	.....	8	.....	8
St. Louis	6	13	2	15	36
Total	6	13	17	15	51
Wisconsin:					
Ashland	.....	.....	42	6	48
Bayfield	8	.....	131	13	152
Douglas	.....	.....	6	.....	6
Total	8	.....	179	19	206
Grand total	45	13	517	78	653

Table showing by States and counties the apparatus and capital employed in the fisheries of Lake Superior in 1890.

States and counties.	Vessels fishing.				Vessels transporting.				Boats.	
	No.	Tonnage.	Value.	Value of outfit.	No.	Tonnage.	Value.	Value of outfit.	No.	Value.
Michigan:										
Alger									8	$4,025
Baraga									11	440
Chippewa	2	35.68	$9,000	$2,000					24	2,550
Houghton									20	1,230
Isle Royale									59	3,690
Keweenaw									24	1,275
Marquette	3	25.98	8,200	1,700					11	700
Ontonagon and Gogebic									31	1,760
Total	5	61.66	17,200	3,700					188	15,700
Minnesota:										
Cook									8	385
Lake									4	290
St. Louis	1	11.23	2,000	900	1	165.62	$25,000	$7,000	4	160
Total	1	11.23	2,000	900	1	165.62	25,000	7,000	16	835
Wisconsin:										
Ashland									44	2,215
Bayfield	1	18.19	3,500	2,000					65	4,785
Douglas									7	380
Total	1	18.19	3,500	2,000					116	7,380
Grand total	7	91.08	22,700	6,600	1	165.62	25,000	7,000	320	23,975

States and counties.	Apparatus of capture—vessel fisheries.		Apparatus of capture—shore fisheries.								Value of lines, dip-nets, and spears.
	Gill nets.		Pound nets.		Gill nets.		Fyke nets.		Seines.		
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.	
Michigan:											
Alger			16	$3,510	142	$1,594					
Baraga			12	3,500	94	770					$100
Chippewa	550	$9,350	17	7,300	80	1,400			1	$50	405
Houghton			7	1,800	794	6,520	3	$60			100
Isle Royale			8	1,600	941	9,410					924
Keweenaw			4	1,100	105	1,280					
Marquette	496	6,224	2	400	191	2,040			2	80	30
Ontonagon and Gogebic			24	5,125	390	3,415	1	20	5	375	
Total	1,046	15,574	90	24,335	2,737	26,409	4	80	8	505	1,559
Minnesota:											
Cook			1	200	94	940					39
Lake					100	1,000					140
St. Louis	200	2,000			29	290					70
Total	200	2,000	1	200	223	2,230					249
Wisconsin:											
Ashland			31	6,370	288	2,008	5	335			40
Bayfield	72	864	16	3,130	1,363	13,941			11	450	500
Douglas			2	400	45	450					
Total	72	864	49	9,900	1,696	16,399	5	335	11	450	540
Grand total	*1,318	18,438	140	34,435	*4,656	45,038	9	415	19	955	2,348

*Length of gill nets, 3,870,536 feet.

Table showing by States and counties the apparatus and capital employed in the fisheries of Lake Superior—Continued.

States and counties.	Shore property and accessories	Cash capital.	Total investment.
Michigan:			
Alger	$2,675	.....	$11,804
Baraga	1,650	.....	6,460
Chippewa	22,000	$20,000	74,055
Houghton	2,000	.....	11,710
Isle Royale	2,755	.....	18,379
Keweenaw	1,700	.....	5,335
Marquette	4,670	15,000	89,134
Ontonagon and Gogebic	2,315	.....	13,010
Total	39,765	35,000	179,887
Minnesota:			
Cook	165	.....	1,729
Lake	225	.....	1,655
St. Louis	52,278	20,300	109,998
Total	52,668	20,300	113,382
Wisconsin:			
Ashland	1,180	.....	12,148
Bayfield	15,955	14,600	59,725
Douglas	310	.....	1,540
Total	17,445	14,600	73,413
Grand total	109,878	69,900	366,682

Table showing by States, counties, and species the yield of the vessel fisheries of Lake Superior in 1890.

States and counties.	Trout, fresh.		Trout, salted.	
	Pounds.	Value.	Pounds.	Value.
Michigan				
Chippewa	202,750	$7,603	.....	.....
Marquette	331,650	12,151	2,300	$92
Total	534,400	19,754	2,300	92
Minnesota				
St. Louis	33,542	1,408	.....	.....
Wisconsin				
Bayfield	38,505	770	1,924	39
Grand total	606,447	21,932	4,224	131

States and counties.	Whitefish, fresh.		Whitefish, salted.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Michigan						
Chippewa	101,375	$3,802	.....	.....	304,125	$11,405
Marquette	244,308	10,995	3,300	$149	581,558	23,387
Total	345,683	14,797	3,300	149	885,683	34,792
Minnesota						
St. Louis	30,734	1,359	.....	.....	64,276	2,767
Wisconsin						
Bayfield	77,011	2,695	920	23	118,360	3,527
Grand total	453,428	18,851	4,220	172	1,068,319	41,086

Table showing by counties and species the yield of the fisheries of Lake Superior in 1890.

States and counties.	Herring, fresh and salted.		Pike, fresh and salted.		Sturgeon, fresh and salted.		Trout, fresh.		Trout, salted.	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Michigan:										
Alger							66,000	$2,348	1,000	$40
Baraga	4,000	$120	1,000	$50	3,000	$90	76,800	3,840	14,200	715
Chippewa			6,000	180	29,000	907	303,927	10,791		
Houghton	60,000	1,800	280	10	1,000	30	317,030	9,680	77,000	2,310
Isle Royale	10,590	204	470	19			460,058	15,021	239,547	4,816
Keweenaw									103,800	4,152
Marquette	24,000	480					388,422	14,216	12,300	517
Ontonagon and Gogebic	1,100	15	230	9	6,824	136	37,857	1,512	20,729	749
Total	99,690	2,619	7,980	268	39,824	1,163	1,650,094	57,408	468,666	13,299
Minnesota:										
Cook	4,700	90					25,800	719	4,195	113
Lake							51,013	1,687	21,392	484
St. Louis	629	12					36,088	1,516		
Total	5,329	102					112,901	3,922	25,587	579
Wisconsin:										
Ashland	35,000	710	18,200	860	7,658	238	78,368	2,755	1,204	49
Bayfield	59,102	1,185	118	4			221,065	8,251	51,372	1,803
Douglas			64	2			2,602	94	1,519	23
Total	94,102	1,895	18,382	866	7,658	238	302,035	11,100	54,095	1,875
Grand total	199,121	4,616	26,362	1,134	47,482	1,401	2,065,030	72,430	548,348	15,771

States and counties.	Whitefish, fresh.		Whitefish, salted.		Other fish, fresh and salted.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Michigan:								
Alger	142,640	$5,260	12,500	$575			222,140	$8,223
Baraga	47,000	2,350	53,164	2,658			199,254	9,823
Chippewa	768,375	28,412			12,000	$480	1,119,302	40,770
Houghton	290,250	9,286	88,750	2,763	2,000	60	836,310	25,935
Isle Royale	71,229	2,781	12,415	351			794,309	23,102
Keweenaw			142,320	7,116			246,120	11,268
Marquette	275,886	12,393	3,300	149			703,908	27,755
Ontonagon and Gogebic	81,739	3,255	74,758	2,947	1,875	75	225,112	8,698
Total	1,677,119	63,737	387,207	16,559	15,875	615	4,846,455	155,668
Minnesota:								
Cook	2,780	80	5,841	168			43,316	1,179
Lake							72,405	2,171
St. Louis	30,984	1,369					67,701	2,897
Total	33,764	1,449	5,841	168			183,422	6,238
Wisconsin:								
Ashland	266,913	10,568	204,677	7,784			612,020	22,964
Bayfield	421,016	17,722	189,788	5,913	598	14	943,059	34,892
Douglas	24,299	1,036	2,552	51			31,036	1,206
Total	712,228	29,326	397,017	13,748	598	14	1,586,115	59,062
Grand total	2,423,111	94,512	790,065	30,475	16,473	629	6,115,992	220,968

Table showing by States, counties, and apparatus of capture the yield of the shore fisheries of Lake Superior in 1890.

States, apparatus, and counties.	Herring, fresh and salted.		Pike, fresh and salted.		Sturgeon, fresh and salted.		Trout, fresh.		Trout, salted.	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Michigan.										
Pound nets:										
Alger							14,500	$435	1,000	$40
Baraga			1,000	$50	3,000	$90	31,800	1,590	10,000	500
Chippewa			6,000	180	29,000	907	41,177	1,388		
Houghton			280	10	1,000	30	7,800	310		
Isle Royale							42,927	1,368	10,759	382
Keweenaw									5,133	205
Marquette							2,400	84		
Ontonagon and Gogebic	1,100	$15	230	9	6,824	136	17,527	699	9,210	317
Total	1,100	15	7,510	249	39,824	1,163	158,131	5,874	42,102	1,444
Gill nets:										
Alger							51,500	1,913		
Baraga	2,000	60					20,000	1,000	4,290	215
Chippewa							60,000	1,800		
Houghton	60,000	1,800					237,230	7,210	77,000	2,310
Isle Royale	10,590	201					321,012	10,535	171,511	3,398
Keweenaw									98,667	3,947
Marquette							49,372	1,781	10,000	425
Ontonagon and Gogebic							20,330	813	11,519	432
Total	72,590	2,064					759,444	25,052	372,987	10,727
Seines:										
Baraga	2,000	60								
Marquette	24,000	480								
Total	26,000	540								
Lines:										
Baraga							25,000	1,250		
Houghton							72,000	2,160		
Isle Royale			470	19			99,119	3,118	51,277	1,036
Marquette							5,000	200		
Total			470	19			198,119	6,728	51,277	1,036
Total for State	99,690	2,619	7,980	268	39,824	1,163	1,115,694	37,654	466,366	13,207
Minnesota.										
Pound nets:										
Cook	1,700	30					400	13	2,580	77
Gill nets:										
Cook	3,000	60					22,200	610	1,115	26
Lake							38,260	1,266	16,044	363
St. Louis	629	12					1,910	77		
Total	3,629	72					62,370	1,953	17,159	389
Lines:										
Cook							3,200	96	500	10
Lake							12,753	421	5,348	121
St. Louis							636	31		
Total							16,589	548	5,848	131
Total for State	5,329	102					79,359	2,514	25,587	597
Wisconsin.										
Pound nets:										
Ashland			5,000	200	3,158	103	13,368	480	1,204	49
Bayfield	510	10	118	4			11,864	415	1,000	40
Douglas							425	14	1,232	18
Total	510	10	5,118	204	3,158	103	25,657	909	3,436	107
Gill nets:										
Ashland	35,000	710					57,500	1,900		
Bayfield	58,592	1,175					133,759	5,259	46,623	1,660
Douglas			64	2			2,177	80	287	5
Total	93,592	1,885	64	2			193,436	7,239	46,910	1,665

Table showing by States, counties, and apparatus of capture the yield of the shore fisheries of Lake Superior—Continued.

State, apparatus, and counties.	Herring, fresh and salted.		Pike, fresh and salted.		Sturgeon, fresh and salted.		Trout, fresh.		Trout, salted.	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Wisconsin—Continued.										
Fyke nets:										
Ashland	.....	.....	13,200	$660	.....	.....	3,500	$175	.....	.....
Seines:										
Bayfield	.....	.....	.....	.....	.....	.....	2,657	93	1,825	$64
Spears:										
Bayfield	.....	.....	.....	.....	.....	.....	10,020	546	.....	.....
Lines:										
Ashland	.....	.....	.....	.....	4,500	$135	4,000	200	.....	.....
Bayfield	.....	.....	.....	.....	.....	.....	23,360	1,168	.....	.....
Total	.....	.....	.....	.....	4,500	135	27,360	1,368	.....	.....
Total for State	94,102	$1,895	18,382	866	7,658	238	263,530	10,330	52,171	1,836
Total pound-net catch	3,310	55	12,628	453	42,982	1,266	184,188	6,790	48,118	1,628
Total gill-net catch	160,811	4,021	64	2	.....	.....	1,015,250	34,244	437,056	12,781
Total fyke-net catch	.....	.....	13,200	660	.....	.....	3,500	175	.....	.....
Total seine catch	26,000	540	.....	.....	.....	.....	2,657	93	1,825	64
Total dip-net catch	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total spear catch	.....	.....	.....	.....	.....	.....	10,920	546	.....	.....
Total line catch	.....	.....	470	19	4,500	135	242,068	8,644	57,125	1,167
Grand total	199,121	4,616	26,362	1,134	47,482	1,401	1,458,583	50,498	544,124	15,640

States, apparatus, and counties.	Whitefish, fresh.		Whitefish, salted.		Other fish, fresh and salted.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Michigan.								
Pound nets:								
Alger	98,000	$3,505	12,500	$575	.....	.....	126,000	$4,555
Baraga	37,000	1,850	51,000	2,550	.....	.....	133,800	6,630
Chippewa	408,000	14,875	.....	.....	.....	.....	484,177	17,350
Houghton	46,500	1,860	10,000	400	.....	.....	65,580	2,610
Isle Royale	42,751	1,724	1,631	39	.....	.....	104,068	3,513
Keweenaw	.....	.....	48,600	2,430	.....	.....	53,733	2,635
Marquette	1,600	72	.....	.....	.....	.....	4,000	156
Ontonagon and Gogebic	34,683	1,386	52,215	2,052	.....	.....	121,789	4,614
Total	668,534	25,272	175,946	8,046	.....	.....	1,093,147	42,063
Gill nets:								
Alger	44,640	1,755	.....	.....	.....	.....	96,140	3,668
Baraga	10,000	500	2,164	108	.....	.....	38,454	1,883
Chippewa	60,000	1,800	.....	.....	.....	.....	120,000	3,600
Houghton	243,750	7,426	78,750	2,363	.....	.....	606,730	21,109
Isle Royale	28,478	1,057	10,784	312	.....	.....	542,375	15,506
Keweenaw	.....	.....	93,720	4,686	.....	.....	192,387	8,633
Marquette	29,978	1,326	.....	.....	.....	.....	89,350	3,532
Ontonagon and Gogebic	38,550	1,529	18,543	735	.....	.....	88,942	3,509
Total	455,396	15,393	203,961	8,204	.....	.....	1,864,378	61,440
Fyke nets:								
Houghton	.....	.....	.....	.....	2,000	$60	2,000	60
Ontonagon and Gogebic	.....	.....	.....	.....	1,875	75	1,875	75
Total	.....	.....	.....	.....	3,875	135	3,875	135
Seines:								
Baraga	.....	.....	.....	.....	.....	.....	2,000	60
Chippewa	10,000	375	.....	.....	.....	.....	10,000	375
Marquette	.....	.....	.....	.....	.....	.....	24,000	480
Ontonagon and Gogebic	8,506	340	4,000	160	.....	.....	12,506	500
Total	18,506	715	4,000	160	.....	.....	48,506	1,415

Table showing by States, counties, and apparatus of capture the yield of the shore fisheries of Lake Superior—Continued.

States, apparatus, and counties.	Whitefish, fresh.		Whitefish, salted.		Other fish, fresh and salted.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Michigan—Continued.								
Dip nets:								
Chippewa	189,000	$7,560	.....	.....	12,000	$480	201,000	$8,040
Lines:								
Baraga	.....	.....	.....	.....	.....	.....	25,000	1,250
Houghton	.....	.....	.....	.....	.....	.....	72,000	2,160
Isle Royale	.....	.....	.....	.....	.....	.....	147,866	4,173
Marquette	.....	.....	.....	.....	.....	.....	5,000	200
Total	.....	.....	.....	.....	.....	.....	249,866	7,783
Total for State	1,331,436	48,940	383,907	$16,410	15,875	615	3,460,772	120,870
Minnesota.								
Pound nets:								
Cook	900	30	4,940	148	.....	.....	10,520	298
Gill nets:								
Cook	1,880	50	901	20	.....	.....	29,096	766
Lake	.....	.....	.....	.....	.....	.....	54,304	1,629
St. Louis	250	10	.....	.....	.....	.....	2,789	99
Total	2,130	60	901	20	.....	.....	86,189	2,494
Lines:								
Cook	.....	.....	.....	.....	.....	.....	3,700	106
Lake	.....	.....	.....	.....	.....	.....	18,101	542
St. Louis	.....	.....	.....	.....	.....	.....	636	31
Total	.....	.....	.....	.....	.....	.....	22,437	679
Total for State	3,030	90	5,841	168	.....	.....	119,146	3,471
Wisconsin.								
Pound nets:								
Ashland	200,413	7,818	204,677	7,784	.....	.....	427,820	16,434
Bayfield	24,656	803	79,077	2,060	598	14	118,423	3,436
Douglas	16,160	629	1,290	19	.....	.....	19,107	680
Total	241,229	9,340	285,644	9,863	598	14	565,350	20,550
Gill nets:								
Ashland	62,500	2,550	.....	.....	.....	.....	155,000	5,160
Bayfield	276,503	12,142	76,720	2,694	.....	.....	592,107	22,930
Douglas	8,139	407	1,262	32	.....	.....	11,929	526
Total	347,142	15,099	77,982	2,726	.....	.....	759,126	28,616
Fyke nets:								
Ashland	4,000	200	.....	.....	.....	.....	20,700	1,035
Seines:								
Bayfield	10,018	351	32,471	1,136	.....	.....	46,971	1,644
Spears:								
Bayfield	32,828	1,641	.....	.....	.....	.....	43,748	2,187
Lines:								
Ashland	.....	.....	.....	.....	.....	.....	8,500	335
Bayfield	.....	.....	.....	.....	.....	.....	23,360	1,168
Total	.....	.....	.....	.....	.....	.....	31,860	1,503
Total for State	635,217	26,631	396,097	13,725	598	14	1,467,755	55,535
Total pound-net catch	910,663	34,642	466,530	18,057	598	14	1,669,017	62,911
Total gill-net catch	804,668	30,552	282,844	10,950	.....	.....	2,709,893	92,550
Total fyke-net catch	4,000	200	.....	.....	3,875	135	24,575	1,170
Total seine catch	28,524	1,066	36,471	1,296	.....	.....	95,477	3,059
Total dip-net catch	189,000	7,560	.....	.....	12,000	480	201,000	8,040
Total spear catch	32,828	1,641	.....	.....	.....	.....	43,748	2,187
Total line catch	.....	.....	.....	.....	.....	.....	304,163	9,965
Grand total	1,969,683	75,661	785,845	30,303	16,473	629	5,047,673	179,882

LAKE MICHIGAN.

Importance of the fisheries.—The fishing industry of this lake is but little inferior to that of Lake Erie in general extent and importance, and exceeds that of all the other members of the Great Lakes combined, excluding Lake Erie. Several features of the fisheries serve to distinguish this lake from the others. The use of vessels for fishing is more extensive than elsewhere in the lakes; in fact, fully half the fishing vessels of the lakes are found in Lake Michigan, although the practice of employing vessels for the special purpose of collecting fish is not so common as in Lake Erie or Lake Huron. While there are several prominent fishes which are found in much greater abundance in other lakes than in Lake Michigan, the general fishery resources of the latter are very large, and the two most popular food-fishes of the entire lake region here exist in larger numbers and are taken in greater quantities than in any other lake. A kind of whitefish not found in the other lakes is an important economic product.

While fishing is prosecuted in all the 35 counties of the four States bordering on the lake, the industry is most extensive in the northern third, particularly in Green Bay, Big Bay de Noquet, Little Bay de Noquet, Grand Traverse Bay, along the north shore, and round the several groups of islands which break the surface of the upper section of the lake. Owing chiefly to the extensive use of vessels, the fisheries of several lower counties of Michigan and Wisconsin also have considerable importance.

In Michigan the specially prominent counties as regards fisheries are Schoolcraft, Mackinac, Delta, and Berrien; in Wisconsin the principal counties are Brown, Door, Milwaukee, and Sheboygan.

In the opinion of many fisherman, considerable damage has been done to the fisheries of this lake by sawdust, which escapes from mills situated on or near the lake and covers the feeding and spawning grounds of the principal fish. While most of the sawdust is consumed by the mills in large kilns in consequence of a State law prohibiting its deposit in the waters of the lake, nevertheless, much sawdust escapes in various other ways than by directly throwing it in the water.

Notes on the principal fishes.—The fish which is the most important factor in the fisheries of this lake is the lake trout. It is the most generally distributed of all the leading fishes, being taken in greater or less quantities in every county and at practically every fishing center. It is most abundant in the northern part of the lake, and is secured in especially large numbers in the fisheries of Berrien, Charlevoix, Emmet, and Schoolcraft counties in Michigan, and Door, Manitowoc, Milwaukee, and Sheboygan counties, Wisconsin. Much the largest part of the catch is taken with gill nets, although the pound-net yield is also important.

The existence in this lake of the siscowet, or deep-water variety of lake trout, which is so abundant in Lake Superior, was made known in the previous report on the fisheries of the Great Lakes issued by the Fish Commission. It is very common in the vicinity of the islands in

the northern part of the lake, and in some places constitutes fully half the trout catch.

About two-thirds of the trout taken in the Great Lakes are obtained in Lake Michigan, the value of whose trout fishery is one-sixth that of all of the other fisheries of the Great Lakes. Considering the large annual production, the supply of this fish is remarkably well sustained, and the catch is now larger than ever before, being fully three times greater than in 1880 and about one-third more than in 1885.

At least five species of whitefish are of economic importance in the fisheries of this lake, and there are doubtless several others of rarer occurrence which in some places constitute an element of the catch, but are perhaps not usually distinguished by the fishermen from closely related species. Those which are generally recognized by the fishermen are the common whitefish, the lake herring, the blackfin or bluefin whitefish, the long-jaw whitefish, and the Menominee whitefish.

The common whitefish is more abundant in this lake than in any other member of the chain, the catch being over a million pounds larger than in Lake Superior, the lake having the next largest output. The fish occurs throughout the lake, but is comparatively uncommon in the southern part, and is secured in largest quantities in that part of the lake north of Manistee County, Mich. The principal part of the catch is taken with pound nets.

The lake herring ranks next to the trout and common whitefish in importance, and is here taken in much larger quantities than in all the other lakes, except Erie, combined. The regions of maximum abundance in Lake Michigan correspond closely with those of the regular whitefish. In some counties it is the principal fish taken, among them being Menominee and Ottawa counties in Michigan, and Oconto and Racine counties in Wisconsin.

A species whose capture constitutes a fishery peculiar to this lake is the blackfin or bluefin whitefish (*Coregonus nigripinnis*), which occurs in great abundance in the deepest water. The fish often reaches the weight of 4 or 5 pounds, but the average is under 3 pounds. About November 1, the fish are reported to make their appearance in the accessible localities, gradually increasing in abundance till December, during which month the maximum point is attained. The fishermen have found that in December and January the blackfins resort to stony bottoms for the purpose of spawning, but at other seasons they seem to prefer clay bottoms. This fish has up to this time been detected in none of the other Great Lakes.

Associated with the blackfin is a species similar in shape and size, but without the black marking on the fins, generally known among the fishermen as the longjaw. It resembles the blackfin in habits and edible qualities, but is by some regarded as inferior to the latter in food value.

In the accompanying statistics, the blackfin and the longjaw whitefishes have been included with the common whitefish. This is in harmony with the practice followed in previous investigations, including

those of the Fish Commission in 1885 and of the census in 1880 and 1889. A statement of the catch of these fish in 1885 and 1890 will be found in footnotes to the products tables.

The habit of these fish of frequenting the deepest parts of the lake makes their capture in the appliances set in the inshore waters uncommon. They are sought mostly in steam vessels, and are taken in gill nets set 60 to 110 fathoms deep. A few are occasionally caught in pound nets. The principal fishery for them is carried on from Benzie, Leelanaw, Ottawa, Schoolcraft, and Charlevoix counties in Michigan, and in Sheboygan, Milwaukee, Kenosha, and Manitowoc counties in Wisconsin.

The Menominee whitefish is not abundant. It is taken in the northern part of the lake, the principal catch being in Green Bay (where it is known as the blackback), around the Manitou Islands, and along the north shore. The fish weighs from 4 to 6 pounds, and has about the same market value as the blackfin, viz, 3 cents per pound. The aggregate yield is not more than 30,000 pounds. In the tables this fish has been included with the common whitefish.

The sturgeon, while more important than in any other lake except Erie, is not abundant anywhere in this lake, and is annually decreasing in numbers. Like several other species, it is found in greatest numbers in the northern part of the lake. The catch is nowhere noticeably large except in Delta County, Mich., where it is, next to the whitefish, the principal fish taken in pound nets.

The yellow perch is another fish caught in larger quantities in this lake than elsewhere in the lake system. It is of relatively greater value in the southern part of the lake than any other species, being taken in especially large numbers in Cook County, Ill.

As an incidental element of the output, suckers are not unimportant, nearly 2,000,000 pounds being disposed of by the fishermen. They figure most prominently in the fisheries of Delta County in Michigan, and Brown, Kewaunee, and Oconto counties in Wisconsin.

Wall-eyed pike, pike, and the various basses, which complete the list of prominent species of this lake, are not of great general value, although in a few fishing communities they have a relatively important place. The fresh-water drum, which in most localities is not utilized, on account of the low price received, is in a few centers marketed; in Allegan County, Mich., for instance, 20,000 pounds caught in pound nets were sold for $100.

Notes on apparatus and methods.—The fishery which gives to Lake Michigan the special prominence which it holds in the Great Lake system is that prosecuted with gill nets. While the number of pound nets employed is larger than in any other lake except Erie, and while the pound-net catch is very important, the gill-net fishery represents the larger investment and yields the larger quantities of fish having the greater money value. This fishery is here more extensive than in any other lake as regards the value of apparatus used, the number of vessels employed, and the value of fish taken,

The gill-net fishery prosecuted from small boats is rather more important in Michigan than in Wisconsin. The counties maintaining the most extensive fishing are Charlevoix, Delta, Manitou, and Schoolcraft in Michigan, and Brown, Door, Kewaunee, and Manitowoc in Wisconsin. The specially important counties are Schoolcraft and Door.

Of the 22,086 gill nets used from small boats, 11,928 were operated by Michigan fishermen and 9,673 by Wisconsin fishermen. The value of the nets was $109,060, an average of a little less than $5 each.

The species taken are trout, the various whitefishes, sturgeon, suckers, bass, perch, pike, and wall-eyed pike, the principal part of the catch consisting of trout, common whitefish, lake herring, longjaws, and perch. The nets used for all of these have about the same dimensions, differing only in the size of the mesh. The average length is about 250 feet. The whitefish, trout, and pike nets have about a 4¼-inch mesh, those for sturgeon a 12-inch mesh, and those for perch and the minor species about a 2½ or 3-inch mesh.

The number of vessels engaged in the gill-net fishery of Lake Michigan is 48, having a net tonnage of 671.57, a value of $151,850, and carrying outfits worth $19,703, exclusive of nets. The crews numbered 284, giving an average of about 6 men to a vessel. The nets employed numbered 18,810, and were valued at $106,854, an average of about $6 each. The vessels are operated from all parts of the lake, but are most numerous in Milwaukee and Sheboygan counties in Wisconsin, and Ottawa, Berrien, and Emmet counties in Michigan, where 29 of the 48 vessels made their headquarters. The distribution of the vessels among the fishing centers of the lake is as follows:

The gill-net fleet of Lake Michigan.

Fishing headquarters.	County.	No. of vessels.
Michigan:		
Petoskey	Emmet	4
Charlevoix	Charlevoix	2
Northport	Leelanaw	1
Frankfort	Benzie	2
Grand Haven	Ottawa	6
Saugatuck	Allegan	1
Ludington	Mason	2
Manistique	Schoolcraft	2
St. Joseph	Berrien	6
Total		26
Wisconsin:		
Fish Creek	Door	1
Sturgeon Bay	do	1
Two Rivers	Manitowoc	2
Kenosha	Kenosha	1
Milwaukee	Milwaukee	8
Sheboygan	Sheboygan	5
Racine	Racine	1
Total		19
Illinois:		
Chicago	Cook	2
Indiana:		
Michigan City	Laporte	1
Grand total		48

The gill nets carried by the vessels are of various lengths, varying from 200 to 720 feet, the average being about 300 feet. The depth is 6 feet, the usual mesh 4¼ inches. The number of nets used by each vessel varies from 300 to 600, and the quantity of netting operated by each is 10 to 50 miles in length. Fishing continues during the season of open water, and may be carried on, with slight intermissions, from January 1 to December 31. Usually, however, the season does not begin till March or April.

The vessel catch consists of trout, common whitefish, blackfins, longjaws, herring, and a few minor fishes, blackfins, longjaws, and trout predominating. In 1890 the amount of stock of vessels which fished regularly was from $6,000 to $13,000 each.

Pound nets to the number of 844 were operated in Lake Michigan in 1890; they had a value of $244,880. They were distributed among the four States bordering on the lake as follows: Michigan, 552; Wisconsin, 250; Indiana, 32, and Illinois, 10. The counties having the largest numbers of such nets were Delta, Mackinac, Manitou, and Schoolcraft in Michigan, and Door and Oconto in Wisconsin. Mackinac and Oconto counties, which lead in the item of pound nets in their respective States, each had 111 nets, although the catch of these counties was less valuable than in Delta County in Michigan or in Door County in Wisconsin.

The preëminent fish in the pound-net fishery of this lake are whitefish, which constitute nearly one-third the quantity and more than one-third the value of the pound-net catch. Lake herring rank next in point of quantity, but trout as regards value. Sturgeon are of considerable importance, as are also perch, suckers, and pike perch. The total pound-net catch was about 8,785,000 pounds, having a value to the fishermen of $270,000.

Fyke nets are employed in considerable numbers in three counties in Wisconsin, but are unimportant in other parts of this lake. Of the 731 used in 1890, 524 were owned in Brown County, 96 in Door County, and 95 in Oconto County, Wis. The species taken in fyke nets are chiefly lake herring, perch, suckers, and pike. The whole catch consisted of about 1,311,000 pounds, having a value to the fishermen of $25,560.

Seines are sparingly used, principally in the capture of perch, suckers, and pike. They are found in seven counties bordering on the lake, but are most numerous in Delta County, Mich., and Brown County, Wis., where more than half of the total number employed are owned.

Set lines or hand lines are fished in most of the counties on this lake. Much of the fishing is done in the winter, but there are also considerable quantities of set lines and troll lines used during the season of open weather. The principal part of the catch consists of sturgeon, perch, trout, and bass. The most important fisheries thus carried on are in the more northern parts of the lake. The counties having noticeably important line fishing are Brown, Keewaunee, and Oconto counties,

in Wisconsin, where trout is the principal fish taken. Cook County, in Illinois, also has an important line fishery for perch, more of which are here caught than elsewhere in the lake.

Statistics by counties.—The following series of tables shows for each county bordering on Lake Michigan (1) the persons engaged in various capacities in the fisheries, (2) the vessels, boats, apparatus, and capital engaged in the industry, (3) the quantity and value of the principal fishes taken, and (4) the catch by each of the prominent kinds of apparatus used.

Table showing by States and counties the number of persons employed in the fisheries of Lake Michigan in 1890.

States and counties.	On vessels fishing.	On vessels transporting.	In shore fisheries.	Shoresmen.	Total.
Michigan:					
Allegan	6	.....	17	.....	23
Antrim	.....	.....	16	.....	16
Benzie	11	.....	13	.....	24
Berrien	37	.....	80	21	138
Charlevoix	11	.....	25	.....	36
Delta	.....	.....	140	26	166
Emmet	23	.....	96	53	177
Grand Traverse	.....	.....	32	4	36
Leelanaw	3	.....	90	.....	93
Mackinac	.....	.....	153	9	162
Manistee	.....	.....	17	.....	17
Manitou	.....	.....	100	13	113
Mason	8	.....	8	.....	16
Menominee	.....	.....	60	6	66
Muskegon	.....	.....	104	.....	104
Oceana	.....	.....	10	.....	10
Ottawa	30	.....	17	30	77
Schoolcraft	15	6	48	18	87
Van Buren	.....	3	14	.....	17
Total	149	9	1,010	180	1,378
Indiana:					
Lake	.....	.....	24	.....	24
Laporte	5	.....	46	.....	51
Porter	.....	.....	19	.....	19
Total	5	.....	89	.....	94
Illinois:					
Cook	12	.....	302	63	377
Lake	.....	.....	7	2	9
Total	12	.....	309	65	386
Wisconsin:					
Brown	.....	.....	133	31	164
Door	12	.....	232	17	261
Kenosha	6	.....	6	2	14
Kewaunee	.....	.....	118	3	121
Manitowoc	12	.....	38	8	58
Marinette	.....	.....	45	7	52
Milwaukee	51	.....	2	31	84
Oconto	.....	.....	178	12	190
Ozaukee	.....	.....	4	.....	4
Racine	7	.....	5	2	14
Sheboygan	30	.....	16	11	57
Total	118	.....	777	124	1,019
Grand total	284	9	2,215	369	2,877

Table showing by States and counties the apparatus and capital employed in the fisheries of Lake Michigan in 1890.

States and counties.	Vessels fishing.				Vessels transporting.				Boats.	
	No.	Tonnage.	Value.	Value of outfit.	No.	Tonnage.	Value.	Value of outfit.	No.	Value.
Michigan:										
Allegan	1	11.31	$1,000	$240					17	$1,154
Antrim									13	455
Benzie	2	19.61	3,500	975					7	840
Berrien	6	80.06	19,000	3,093					16	1,800
Charlevoix	2	15.71	2,000	850					12	1,040
Delta									73	6,205
Emmet	4	76.95	16,500	1,120					30	1,715
Grand Traverse									34	1,310
Leelanaw	1	5.50	800	150					72	1,740
Mackinac									79	7,800
Manistee									16	835
Manitou									74	5,075
Mason	2	24.03	3,500	425					8	540
Menominee									35	3,130
Muskegon									33	1,134
Oceana									13	1,150
Ottawa	6	116.46	25,650	2,755					13	1,030
Schoolcraft	2	33.82	7,000	1,035	1	112.49	$19,500	$1,200	58	6,650
Van Buren					1	9.59	2,000	415	2	280
Total	26	382.85	78,950	10,643	2	122.08	21,500	1,615	605	43,883
Indiana:										
Lake									15	950
Laporte	1	5.51	1,200	420					24	1,620
Porter									13	800
Total	1	5.51	1,200	420					52	3,370
Illinois:										
Cook	2	40.11	7,000	485					26	955
Lake									7	325
Total	2	40.11	7,000	485					33	1,280
Wisconsin:										
Brown									85	3,275
Door	2	26.62	7,000	875					116	8,100
Kenosha	1	14.02	3,500	605					5	75
Kewaunee									17	1,405
Manitowoc	2	18.81	6,300	725					30	2,335
Marinette									33	2,150
Milwaukee	8	117.54	27,500	3,405					2	170
Oconto									60	4,255
Ozaukee									2	230
Racine	1	11.42	3,000	655					3	350
Sheboygan	5	54.09	16,800	1,830					9	785
Total	19	243.10	64,700	8,155					362	23,130
Grand total	48	671.57	151,850	19,703	2	122.08	21,500	1,615	1,052	71,663

Table showing by States and counties the apparatus and capital employed in the fisheries of Lake Michigan in 1890—Continued.

States and counties.	Apparatus of capture, vessel fisheries.		Apparatus of capture, shore fisheries.								
	Gill nets.		Pound nets.		Gill nets.		Fyke nets.		Seines.		Lines, sets, and trap nets.
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.	Value.
Michigan:											
Allegan	359	$2,300	12	$2,400	276	$1,038	.....	.....	.....	.....	$129
Antrim	.....	.....	13	2,600	52	154	.....	.....	.....	.....	.....
Benzie	900	5,600	5	1,100	760	3,570	.....	.....	.....	.....	.....
Berrien	3,780	16,125	16	5,600	84	390	.....	.....	.....	.....	186
Charlevoix	1,040	8,050	1	200	1,102	5,424	.....	.....	.....	.....	.....
Delta	.....	.....	90	28,675	1,135	5,775	.....	.....	7	$1,050	66
Emmet	1,236	12,960	27	7,150	477	2,919	.....	.....	.....	.....	20
Grand Traverse	.....	.....	25	5,000	159	495	.....	.....	.....	.....	12
Leelanaw	100	1,200	43	7,975	827	2,468	.....	.....	1	30	22
Mackinac	.....	.....	111	35,805	820	4,150	.....	.....	.....	.....	126
Manistee	.....	.....	7	950	765	3,870	2	$225	1	85	.....
Manitou	.....	.....	64	25,800	1,175	7,855	.....	.....	.....	.....	.....
Mason	80	1,200	5	1,000	225	1,000	.....	.....	.....	.....	.....
Menominee	.....	.....	31	10,385	150	760	.....	.....	.....	.....	60
Muskegon	.....	.....	20	2,200	410	1,670	6	60	.....	.....	178
Oceana	.....	.....	10	1,800	14	70	.....	.....	.....	.....	.....
Ottawa	2,232	14,684	5	800	697	2,874	.....	.....	.....	.....	.....
Schoolcraft	825	4,185	60	19,960	2,800	13,930	.....	.....	.....	.....	18
Van Buren	.....	.....	7	2,450	.....	.....	.....	.....	.....	.....	36
Total	10,612	66,304	552	151,850	11,928	58,302	8	285	9	1,115	853
Indiana:											
Lake	.....	.....	16	5,600	45	225	.....	.....	.....	.....	66
Laporte	363	1,640	12	4,000	305	1,740	.....	.....	.....	.....	168
Porter	.....	.....	4	1,300	40	200	.....	.....	.....	.....	75
Total	363	1,640	32	11,800	390	2,165	.....	.....	.....	.....	309
Illinois:											
Cook	550	2,650	.....	.....	69	345	.....	.....	3	380	315
Lake	.....	.....	10	3,750	26	130	.....	.....	.....	.....	.....
Total	550	2,650	10	3,750	95	475	.....	.....	3	380	315
Wisconsin:											
Brown	.....	.....	9	2,375	1,600	7,975	524	8,060	10	1,150	39
Door	1,025	4,875	65	20,325	4,285	21,425	96	1,340	.....	.....	164
Kenosha	250	1,150	.....	.....	68	408	.....	.....	.....	.....	.....
Kewaunee	.....	.....	.....	.....	1,135	5,675	.....	.....	.....	.....	173
Manitowoc	700	3,825	25	9,700	1,415	7,075	.....	.....	2	250	.....
Marinette	.....	.....	11	3,180	460	2,025	8	116	.....	.....	42
Milwaukee	3,160	15,500	2	700	.....	.....	.....	.....	.....	.....	.....
Oconto	.....	.....	111	21,075	445	2,210	95	1,515	5	585	249
Ozaukee	.....	.....	.....	.....	150	750	.....	.....	.....	.....	.....
Racine	760	3,960	.....	.....	115	575	.....	.....	.....	.....	.....
Sheboygan	1,390	6,950	27	10,125	.....	.....	.....	.....	.....	.....	.....
Total	7,285	36,260	250	67,480	9,673	48,118	723	11,031	17	1,985	667
Grand total	*18,810	100,854	844	244,880	*22,086	109,060	731	11,316	29	3,480	2,144

* Length of gill nets, 10,428,880 feet.

Table showing by States and counties the apparatus and capital employed in the fisheries of Lake Michigan in 1890—Continued.

States and counties.	Shore property.	Cash capital.	Total investment.
Michigan:			
Allegan	$1,503	.....	$9,764
Antrim	875	.....	4,084
Benzie	7,723	.....	23,308
Berrien	3,125	$3,800	53,119
Charlevoix	5,880	.....	23,444
Delta	18,125	2,800	62,696
Emmet	7,410	10,000	59,794
Grand Traverse	2,225	3,000	11,952
Leelanaw	1,945	1,000	17,330
Mackinac	5,705	2,000	55,586
Manistee	650	.....	6,565
Manitou	11,505	16,000	66,215
Mason	300	.....	7,965
Menominee	2,725	.....	17,060
Muskegon	988	.....	6,230
Oceana	626	.....	3,646
Ottawa	3,469	.....	51,262
Schoolcraft	13,330	6,000	92,808
Van Buren	160	.....	5,341
Total	88,269	44,600	578,169
Indiana:			
Lake	110	.....	6,951
Laporte	465	.....	12,153
Porter	70	.....	2,445
Total	645	.....	21,549
Illinois:			
Cook	248,000	165,000	425,130
Lake	210	.....	4,415
Total	248,210	165,000	429,545
Wisconsin:			
Brown	31,400	19,800	74,074
Door	14,380	3,000	82,084
Kenosha	1,150	.....	6,948
Kewaunee	2,465	1,200	10,918
Manitowoc	3,475	3,000	36,685
Marinette	7,525	4,000	19,038
Milwaukee	29,700	14,300	82,275
Oconto	9,925	.....	39,814
Ozaukee	265	.....	1,245
Racine	2,500	.....	11,040
Sheboygan	3,850	3,500	43,840
Total	97,635	48,800	407,961
Grand total	434,759	258,400	1,437,224

Table showing by States and counties the yield of the fisheries of Lake Michigan in 1890.

States and counties.	Bass.		Herring.		Perch.		Pike and pike perch.		Sturgeon.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Michigan:										
Allegan	.....	.....	20,000	$500	88,300	$3,039	.....	.....	44,185	$1,505
Benzie	.....	.....	.....	.....	.....	.....	.....	.....	3,500	125
Berrien	6,300	$315	412,425	8,243	83,806	2,519	.....	.....	82,970	3,046
Charlevoix	.....	.....	30,000	750	.....	.....	.....	.....	.....	.....
Delta	5,300	265	219,052	3,230	74,400	970	76,870	$2,603	275,000	9,625
Emmet	100	5	8,700	187	.....	.....	2,000	80	3,200	128
Grand Traverse	.....	.....	6,000	150	.....	.....	.....	.....	.....	.....
Leelanaw	.....	.....	15,200	306	.....	.....	.....	.....	25,715	900
Mackinac	.....	.....	169,882	2,367	.....	.....	.....	.....	47,085	1,648
Manistee	.....	.....	7,100	162	.....	.....	100	4	14,200	500
Mason	.....	.....	.....	.....	2,500	75	1,800	90	.....	.....
Menominee	4,800	240	366,452	5,052	40,400	780	20,400	810	24,250	848
Muskegon	32,500	950	27,200	799	15,400	462	2,000	120	83,205	2,998
Oceana	.....	.....	3,000	117	800	24	100	5	34,508	1,250
Ottawa	.....	.....	769,433	19,054	5,000	100	.....	.....	13,400	480
Schoolcraft	.....	.....	70,337	1,153	.....	.....	.....	.....	23,143	810
Van Buren	1,050	53	3,500	70	8,137	278	.....	.....	58,350	2,330
Total	50,050	1,828	2,120,181	42,140	318,743	8,253	103,270	3,712	732,711	26,292
Indiana:										
Lake	.....	.....	16,443	329	34,300	1,000	.....	.....	9,913	390
Laporte	3,287	164	134,909	2,697	58,489	1,761	.....	.....	37,103	1,464
Porter	2,106	106	9,056	180	13,275	423	.....	.....	23,700	926
Total	5,393	270	160,408	3,206	106,064	3,184	.....	.....	70,716	2,780
Illinois:										
Cook	.....	.....	81,575	1,638	495,209	13,539	.....	.....	16,480	640
Lake	.....	.....	6,800	130	15,800	470	.....	.....	.....	.....
Total	.....	.....	88,375	1,768	511,009	14,009	.....	.....	16,480	640
Wisconsin:										
Brown	13,321	664	518,773	7,050	578,275	12,307	192,945	7,578	30,670	996
Door	20,350	1,017	963,175	13,964	100,200	1,983	57,700	2,254	42,900	1,545
Kenosha	.....	.....	22,100	442	15,400	462	.....	.....	.....	.....
Kewaunee	26,630	1,331	295,553	3,994	29,410	598	4,080	160	.....	.....
Manitowoc	.....	.....	185,554	2,698	62,660	1,312	18,370	750	10,570	370
Marinette	11,140	556	194,135	2,711	36,480	808	14,300	574	6,200	310
Milwaukee	.....	.....	407,300	8,104	.....	.....	.....	.....	.....	.....
Oconto	16,255	811	816,660	11,053	134,412	2,685	175,356	6,959	36,650	1,320
Ozaukee	.....	.....	15,110	270	.....	.....	.....	.....	.....	.....
Racine	.....	.....	118,330	2,463	.....	.....	.....	.....	.....	.....
Sheboygan	.....	.....	107,428	2,858	51,300	1,040	.....	.....	.....	.....
Total	87,696	4,379	3,704,118	55,607	1,008,137	21,195	462,751	18,275	126,990	4,541
Grand total	143,139	6,477	6,082,082	102,721	1,943,953	46,641	566,021	21,987	946,897	34,253

States and counties.	Suckers.		Trout.		Whitefish.		Others.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Michigan:										
Allegan	5,000	$50	82,200	$2,910	28,900	$920	20,000	$100	288,585	$9,114
Antrim	.....	.....	23,300	890	55,700	2,695	.....	.....	79,000	3,585
Benzie	.....	.....	298,480	13,022	206,000	8,738	.....	.....	507,980	21,885
Berrien	29,650	578	540,832	24,115	224,185	10,744	46,825	866	1,426,993	50,426
Charlevoix	.....	.....	591,842	17,877	243,900	10,441	.....	.....	865,742	29,068
Delta	204,520	3,163	331,197	13,642	654,150	26,031	30,820	564	1,871,309	60,099
Emmet	500	10	797,620	23,957	285,637	12,009	.....	.....	1,097,757	36,436
Grand Traverse	.....	.....	57,700	2,528	68,720	3,209	.....	.....	132,420	5,077
Leelanaw	20,800	260	326,700	9,761	250,160	8,687	.....	.....	638,575	19,914
Mackinac	82,200	1,446	305,160	12,272	754,489	29,933	101,960	2,008	1,460,776	49,674
Manistee	.....	.....	153,400	6,539	46,500	1,650	2,000	72	223,300	8,927
Manitou	.....	.....	293,100	10,125	504,800	21,856	10,000	150	807,900	32,131
Mason	.....	.....	48,000	2,270	86,100	1,576	.....	.....	88,400	4,011
Menominee	85,393	1,304	52,245	2,390	95,000	3,720	14,462	274	703,402	15,418
Muskegon	2,000	40	29,200	1,688	23,800	1,382	2,150	78	217,455	8,517
Oceana	.....	.....	13,300	665	5,900	295	.....	.....	58,508	2,356
Ottawa	2,300	23	121,420	5,087	216,410	5,947	.....	.....	1,127,963	30,700
Schoolcraft	48,500	852	590,030	24,987	576,370	22,968	59,000	1,175	1,367,380	51,945
	.....	.....	18,000	900	5,200	304	4,500	135	98,737	4,130
Total	480,863	7,726	4,673,726	175,625	4,281,921	153,315	291,717	5,422	13,062,182	444,313

Table showing by States and counties the yield of the fisheries of Lake Michigan in 1890— Continued.

States and counties.	Suckers.		Trout.		Whitefish.		Others.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Indiana:										
Lake	21,569	$470	10,565	$525	8,480	$4[illegible]	6,460	$129	107,770	$3,228
Laporte	19,669	388	127,458	6,373	54,651	2,35[illegible]	16,140	403	451,766	15,583
Porter	9,220	180	16,710	832	3,770	1[illegible]	2,220	42	80,057	2,882
Total	50,458	998	154,733	7,730	66,901	2,95[illegible]	24,820	574	639,493	21,693
Illinois:										
Cook	19,890	361	67,080	3,250	17,520	88	73,920	1,918	771,674	22,226
Lake	10,060	196	4,580	229	10,315	52	3,165	65	50,720	1,610
Total	29,950	557	71,660	3,479	27,835	1,40[illegible]	77,085	1,983	822,394	23,836
Wisconsin:										
Brown	489,068	6,500	40,905	1,909	11,247	493	302,603	6,242	2,177,897	43,739
Door	112,113	1,565	995,469	43,067	364,332	15,740	84,540	1,772	2,740,779	82,907
Kenosha			80,500	4,025	50,935	1,768	10,500	210	179,435	6,907
Kewaunee	280,500	4,110	243,700	10,742	28,000	1,236	31,490	646	930,453	22,817
Manitowoc			450,982	22,276	59,470	2,203	40,440	750	828,055	30,359
Marinette	82,360	1,281	66,373	3,025	25,000	1,100	16,030	303	452,018	10,608
Milwaukee			849,100	42,155	69,510	2,122	68,500	1,370	1,388,410	53,751
Oconto	275,471	4,369	132,814	6,362	39,584	1,733	84,520	1,771	1,711,722	37,063
Ozaukee			5,700	285	480	2	1,275	27	22,565	605
Racine			97,100	4,855	11,476	468	18,983	382	215,989	8,168
Sheboygan			516,315	23,658	418,289	14,507	79,642	1,576	1,232,974	43,639
Total	1,239,512	17,825	3,464,048	162,359	1,078,422	41,393	738,523	15,049	11,910,197	340,623
Grand total	1,800,783	27,106	8,364,167	349,193	*5,455,070	219,059	1,132,145	23,028	26,434,266	830,465

*Includes 1,308,238 pounds of blackfin or bluefin whitefish, longjaw whitefish, and Menominee or round whitefish, valued at $42,339.

Table showing by apparatus and species the yield of the fisheries of Lake Michigan.

Apparatus and species.	Michigan.									
	Allegan.		Antrim.		Benzie.		Berrien.		Charlevoix.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Pound nets:										
Herring							95,300	$1,906		
Perch	400	$12					17,580	520		
Sturgeon	32,885	1,151			3,500	$125	67,320	2,460		
Suckers	4,000	40					17,800	340		
Trout	1,200	60	23,300	$890	13,000	520	41,022	1,855	3,000	$120
Whitefish	2,700	135	46,700	2,335	32,000	1,280	22,550	1,015	4,500	225
Others	20,000	100					11,875	231		
Total	61,185	1,498	70,000	3,225	48,500	1,925	273,447	8,327	7,500	345
Gill nets:										
Herring	20,000	500					317,125	6,337	30,000	750
Perch	86,900	2,992					59,320	1,759		
Sturgeon	5,375	207								
Suckers	1,000	10					11,850	238		
Trout	81,000	2,850			285,480	12,502	480,610	21,300	588,842	17,757
Whitefish	26,200	785	9,000	360	174,000	7,458	201,635	9,720	239,400	10,216
Others							34,950	635		
Total	220,475	7,344	9,000	360	459,480	19,960	1,105,490	39,998	858,242	28,723
Lines, spears, and dip nets:										
Bass							6,300	315		
Perch	1,000	35					6,900	240		
Sturgeon	5,925	237					15,650	586		
Trout							19,200	960		
Total	6,925	272					48,056	2,101		
Grand total	288,585	9,114	79,000	3,585	507,980	21,885	1,426,993	50,426	865,742	29,068

Table showing by apparatus and species the yield of the fisheries of Lake Michigan—Cont'd.

Apparatus and species.	Michigan.									
	Delta.		Emmet.		Grand Traverse.		Leelanaw.		Mackinac.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Pound nets:										
Bass	5,300	$265	100	$5						
Herring	149,500	2,240	7,200	154			200	$6	147,140	$2,000
Perch	14,100	270								
Pike and pike perch	35,730	1,383	2,000	80						
Sturgeon	275,000	9,625	3,200	128			25,715	900	47,085	1,648
Suckers	149,400	2,390	500	10			200	4	82,200	1,440
Trout	164,597	6,586	23,100	869	34,300	$1,374	84,500	2,741	215,900	8,477
Whitefish	502,125	20,045	74,099	3,400	55,220	2,751	108,360	4,546	644,175	25,607
Others	20,200	384							98,100	1,942
Total	1,315,952	43,188	111,099	4,646	89,520	4,125	218,975	8,197	1,234,600	41,180
Gill nets:										
Herring	65,882	950	1,500	83	6,000	150	15,000	300	22,742	807
Suckers	35,440	563					5,000	100		
Trout	127,375	5,095	744,520	21,588	15,400	594	242,200	7,020	60,472	2,356
Whitefish	146,150	5,746	210,638	8,669	13,500	548	137,400	4,009	110,314	4,326
Others	7,820	146							3,860	66
Total	382,667	12,500	956,658	30,200	34,900	1,292	399,600	11,429	197,388	7,055
Seines:										
Herring	3,670	40								
Perch	60,300	706								
Pike and pike perch	41,140	1,220								
Suckers	19,680	210					15,600	156		
Whitefish	5,875	240								
Others	2,800	34								
Total	133,465	2,450					15,600	156		
Lines, spears, and dip nets:										
Trout	39,225	1,961	30,000	1,500	8,000	560			28,788	1,439
Whitefish							4,400	132		
Total	39,225	1,961	30,000	1,500	8,000	560	4,400	132	28,788	1,439
Grand total	1,871,309	60,099	1,097,757	36,436	132,420	5,977	638,575	19,914	1,460,776	49,674

Apparatus and species.	Michigan.									
	Manistee.		Manitou.		Mason.		Menominee.		Muskegon.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Pound nets:										
Bass									1,000	$65
Herring	5,000	$100					311,040	$4,280	8,200	166
Perch					2,500	$75	40,400	780	12,600	278
Pike and pike perch					1,800	90	20,400	810	2,000	120
Sturgeon	14,200	500					24,250	848	74,085	2,593
Suckers							41,143	576	2,000	40
Trout	2,000	80	19,200	$702	3,000	150	9,220	365	12,700	743
Whitefish	22,000	880	387,100	16,471	10,000	500	73,500	2,900	23,800	1,382
Others			10,000	150			7,962	146		
Total	43,200	1,560	416,300	17,323	17,300	815	527,915	10,705	136,385	5,387
Gill nets:										
Bass							2,400	120		
Herring	2,000	60					55,412	772	19,000	633
Perch									2,000	160
Sturgeon									4,920	195
Suckers							44,250	728		
Trout	150,400	6,419	273,900	9,423	45,000	2,120	12,650	596	16,500	945
Whitefish	20,500	610	117,700	5,385	26,100	1,076	21,500	820		
Others							6,500	128		
Total	172,900	7,089	391,600	14,808	71,100	3,196	142,712	3,074	42,420	1,933
Fyke nets:										
Bass									1,500	60
Herring	100	2								
Perch									800	24
Pike and pike perch	100	4								
Trout	1,000	40								
Whitefish	3,000	120								
Others	2,000	72							2,000	70
Total	6,200	238							4,300	154

Table showing by apparatus and species the yield of the fisheries of Lake Michigan—Cont'd.

Apparatus and species.	Michigan.									
	Manistee.		Manitou.		Mason.		Menominee.		Muskegon.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Seines:										
Whitefish	1,000	$40								
Lines, spears, and dip nets:										
Bass							2,400	$120	30,000	$825
Sturgeon									4,200	210
Trout							30,375	1,519		
Others									150	8
Total							32,775	1,639	34,350	1,043
Grand total	223,300	8,927	807,900	$32,131	88,400	$4,011	703,402	15,418	217,455	8,517

Apparatus and species.	Michigan.									
	Oceana.		Ottawa.		Schoolcraft.		Van Buren.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Pound nets:										
Bass									6,400	$336
Herring	3,900	$117			50,500	$757	3,500	$70	781,480	11,856
Perch	800	24					4,700	141	93,080	2,100
Pike and pike perch	100	5							62,030	2,488
Sturgeon	34,508	1,250	9,850	$355	23,143	810	58,350	2,330	693,091	24,723
Suckers			800	8	48,500	852			340,543	5,706
Trout	10,800	540			150,850	5,849	14,800	740	826,489	32,661
Whitefish	4,400	220	3,100	155	306,250	12,084	5,200	364	2,328,679	96,295
Others					30,600	625	4,500	135	203,237	3,713
Total	54,508	2,156	13,750	518	609,843	20,977	91,050	3,780	5,341,029	179,877
Gill nets:										
Bass									2,400	120
Herring			769,433	19,054	19,837	396			1,343,931	30,242
Perch			5,000	100					153,220	5,011
Sturgeon			3,550	134					13,825	536
Suckers			1,500	15					99,040	1,654
Trout	2,500	125	121,420	5,087	435,067	18,932			3,683,336	134,619
Whitefish	1,500	75	213,310	5,792	270,120	10,884			1,938,967	76,488
Others					28,400	550			81,530	1,525
Total	4,000	200	1,114,213	30,182	753,424	30,762			7,316,269	250,195
Fyke nets:										
Bass									1,500	60
Herring									100	2
Perch									800	24
Pike and pike perch									100	4
Trout									1,000	40
Whitefish									3,000	120
Others									4,000	142
Total									10,500	392
Seines:										
Herring									3,670	40
Perch									60,300	706
Pike and pike perch									41,140	1,220
Suckers									35,280	366
Whitefish									6,875	280
Others									2,800	34
Total									150,065	2,646
Lines, spears, and dip nets:										
Bass							1,050	53	39,750	1,313
Perch							8,437	137	11,343	412
Sturgeon									25,775	1,033
Trout					4,113	206	3,200	160	102,901	8,305
Whitefish									4,400	132
Others									150	8
Total					4,113	206	7,687	350	244,319	11,203
Grand total	58,508	2,350	1,127,963	30,700	1,367,380	51,945	98,737	4,130	13,062,182	444,313

Table showing by apparatus and species the yield of the fisheries of Lake Michigan—Cont'd.

Apparatus and species.	Indiana.							
	Lake.		Laporte.		Porter.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Pound nets:								
Herring	14,300	$280	20,565	$531	7,240	$145	48,105	$962
Perch	32,300	940	22,110	680	8,370	254	62,780	1,874
Sturgeon	9,913	390	16,463	624	7,430	266	33,806	1,280
Suckers	16,850	335	10,940	218	4,120	80	31,910	633
Trout	9,300	465	18,200	910	5,050	250	32,550	1,625
Whitefish	8,000	400	14,300	715	3,250	165	25,550	1,280
Others	5,850	117	8,750	185	1,410	27	16,010	329
Total	96,513	2,933	117,328	3,863	36,870	1,187	250,711	7,983
Gill nets:								
Herring	2,143	43	108,344	2,166	1,816	35	112,303	2,244
Perch	2,000	60	30,600	850	2,430	70	35,030	980
Suckers	4,719	95	8,720	170	5,100	100	18,548	365
Trout	1,265	60	95,420	4,771	1,720	85	98,405	4,916
Whitefish	480	25	40,351	1,618	520	28	41,351	1,671
Others	610	12	7,390	218	810	15	8,810	245
Total	11,217	295	290,834	9,793	12,396	333	314,447	10,421
Lines, spears, and dip nets:								
Bass	.....	.....	3,287	164	2,106	106	5,393	270
Perch	.....	.....	5,779	231	2,475	99	8,254	330
Sturgeon	.....	.....	20,640	840	16,270	660	36,910	1,500
Trout	.....	.....	13,838	692	9,940	497	23,778	1,189
Total	.....	.....	43,544	1,927	30,791	1,362	74,335	3,289
Grand total	107,730	3,228	451,706	15,583	80,057	2,882	639,493	21,693

Apparatus and species.	Illinois.					
	Cook.		Lake.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Pound nets:						
Herring	.....	.....	3,500	$70	3,500	$70
Perch	.....	.....	10,300	305	10,300	305
Suckers	.....	.....	9,260	180	9,260	180
Trout	.....	.....	4,580	229	4,580	229
Whitefish	.....	.....	10,315	520	10,315	520
Others	.....	.....	3,165	65	3,165	65
Total	.....	.....	41,120	1,369	41,120	1,369
Gill nets:						
Herring	75,075	$1,508	3,300	60	78,375	1,568
Perch	39,860	1,196	5,500	165	45,360	1,361
Suckers	10,760	175	800	16	11,560	191
Trout	67,080	3,250	.....	.....	67,080	3,250
Whitefish	17,520	880	.....	.....	17,520	880
Others	750	18	.....	.....	750	18
Total	211,045	7,027	9,600	241	220,645	7,268
Seines:						
Herring	6,500	130	.....	.....	6,500	130
Perch	17,065	510	.....	.....	17,065	510
Suckers	9,130	186	.....	.....	9,130	186
Others	1,670	30	.....	.....	1,670	30
Total	34,365	856	.....	.....	34,365	856
Lines, spears, and dip nets:						
Perch	438,284	11,833	.....	.....	438,284	11,833
Sturgeon	16,480	640	.....	.....	16,480	640
Others	71,500	1,870	.....	.....	71,500	1,870
Total	526,264	14,343	.....	.....	526,264	14,343
Grand total	771,674	22,226	50,720	1,610	822,394	23,836

Table showing by apparatus and species the yield of the fisheries of Lake Michigan—Cont'd.

Apparatus and species.	Wisconsin.									
	Brown.		Door.		Kenosha.		Kewaunee.		Manitowoc.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Pound nets:										
Herring	50,900	$762	478,675	$6,462	.....	.....	.....	.....	36,445	$510
Perch	97,600	1,952	35,900	718	.....	.....	.....	.....	53,600	1,112
Pike and pike perch	26,000	1,040	30,000	1,200	.....	.....	.....	.....	17,475	715
Sturgeon	27,920	896	42,900	1,545	.....	.....	.....	.....	10,570	370
Suckers	72,000	1,240	52,220	745	.....	.....	.....	.....	.....	.....
Trout	1,160	50	372,590	16,394	.....	.....	.....	.....	139,380	6,697
Whitefish	8,100	360	128,900	5,672	.....	.....	.....	.....	11,410	555
Others	42,900	858	39,380	787	.....	.....	.....	.....	26,700	480
Total	326,580	7,158	1,180,565	33,523	.....	.....	.....	.....	295,580	10,439
Gill nets:										
Bass	1,156	58	1,337	67	.....	.....	8,075	$403	.....	.....
Herring	272,592	3,688	456,000	7,122	22,100	$442	295,553	3,994	146,929	2,158
Perch	56,840	1,475	34,500	690	15,400	462	29,410	598	.....	.....
Pike and pike perch	37,400	1,496	9,150	362	.....	.....	4,080	160	.....	.....
Sturgeon	2,750	100	.....	.....	.....	.....	.....	.....	.....	.....
Suckers	57,500	920	32,143	450	.....	.....	280,500	4,110	.....	.....
Trout	10,570	465	581,841	24,627	80,500	4,025	165,545	7,284	311,602	15,579
Whitefish	2,387	95	234,232	10,008	50,935	1,768	28,090	1,236	47,684	1,633
Others	28,943	539	38,610	821	10,500	210	31,490	646	12,200	244
Total	470,138	8,836	1,387,813	44,147	179,435	6,907	842,743	18,431	518,415	19,614
Fyke nets:										
Bass	8,100	405	6,500	325	.....	.....	.....	.....	.....	.....
Herring	183,750	2,450	28,500	380	.....	.....	.....	.....	.....	.....
Perch	357,500	7,725	29,800	575	.....	.....	.....	.....	.....	.....
Pike and pike perch	93,560	3,750	18,550	692	.....	.....	.....	.....	.....	.....
Suckers	270,425	3,092	27,750	370	.....	.....	.....	.....	.....	.....
Trout	5,925	237	650	26	.....	.....	.....	.....	.....	.....
Whitefish	760	38	1,200	60	.....	.....	.....	.....	.....	.....
Others	29,320	733	6,550	164	.....	.....	.....	.....	.....	.....
Total	949,340	18,430	119,500	2,592	.....	.....	.....	.....	.....	.....
Seines:										
Herring	11,531	150	.....	.....	.....	.....	.....	.....	2,180	30
Perch	66,335	1,155	.....	.....	.....	.....	.....	.....	9,060	200
Pike and pike perch	35,985	1,202	.....	.....	.....	.....	.....	.....	895	35
Suckers	89,143	1,248	.....	.....	.....	.....	.....	.....	.....	.....
Whitefish	.....	.....	.....	.....	.....	.....	.....	.....	385	15
Others	20,800	625	.....	.....	.....	.....	.....	.....	1,540	26
Total	223,794	4,470	.....	.....	.....	.....	.....	.....	14,060	306
Lines, spears, and dip nets:										
Bass	4,065	201	12,513	625	.....	.....	18,555	928	.....	.....
Trout	23,340	1,157	40,388	2,020	.....	.....	69,155	3,458	.....	.....
Others	180,640	3,487	.....	.....	.....	.....	.....	.....	.....	.....
Total	208,045	4,845	52,901	2,645	.....	.....	87,710	4,386	.....	.....
Grand total	2,177,897	43,739	2,740,779	82,907	179,435	6,907	930,453	22,817	828,055	30,359

Table showing by apparatus and species the yield of the fisheries of Lake Michigan—Cont'd.

Apparatus and species.	Wisconsin.							
	Marinette.		Milwaukee.		Oconto.		Ozaukee.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Pound nets:								
Bass	8,400	$420						
Herring	160,500	2,258	8,000	$124	454,700	$6,179		
Perch	18,000	375			31,120	622		
Pike and pike perch	12,600	504			99,800	3,992		
Sturgeon	6,200	310			30,400	1,100		
Suckers	43,500	670			64,600	1,092		
Trout	20,565	908	3,400	170	20,400	882		
Whitefish	14,700	644	1,180	66	14,200	616		
Others	5,700	114	1,500	30	51,180	1,024		
Total	290,165	6,203	14,080	390	766,400	15,507		
Gill nets:								
Bass	874	43			6,337	315		
Herring	26,885	363	399,300	7,980	235,500	3,180	15,110	$270
Perch	15,480	385			42,335	1,058		
Pike and pike perch					34,480	1,444		
Suckers	36,000	576			137,925	2,347		
Trout	28,091	1,236	839,700	41,985	15,520	683	5,700	285
Whitefish	10,100	446	68,330	2,056	21,365	940	480	23
Others	9,850	177	67,000	1,340	19,840	364	1,275	27
Total	127,280	3,226	1,374,330	53,361	513,362	10,331	22,565	605
Fyke nets:								
Bass	410	20			2,800	140		
Herring	6,750	90			113,550	1,514		
Perch	3,000	48			28,000	490		
Pike and pike perch	1,700	70			28,050	1,041		
Suckers	2,860	35			34,375	390		
Trout	605	25			3,800	142		
Whitefish	200	10			125	7		
Others	480	12			4,400	110		
Total	16,005	310			215,700	3,834		
Seines:								
Herring					12,850	180		
Perch					32,357	515		
Pike and pike perch					13,026	482		
Sturgeon					6,250	220		
Suckers					38,571	540		
Whitefish					3,894	170		
Others					9,100	273		
Total					116,048	2,380		
Lines, spears, and dip nets:								
Bass	1,456	73			7,118	356		
Trout	17,112	856			93,044	4,655		
Total	18,568	929			100,212	5,011		
Grand total	452,018	10,668	1,388,410	53,751	1,711,722	37,063	22,565	605

Table showing by apparatus and species the yield of the fisheries of Lake Michigan—Cont'd.

Apparatus and species.	Wisconsin.						Total for lake.	
	Racine.		Sheboygan.		Total.			
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Pound nets:								
Bass					8,400	$420	14,800	$755
Herring			81,428	$1,138	1,270,648	17,433	2,103,783	30,321
Perch			51,300	1,040	287,520	5,819	453,680	10,098
Pike and pike perch					185,875	7,451	247,905	9,939
Sturgeon					117,990	4,221	844,887	30,224
Suckers					232,320	8,747	620,033	10,266
Trout			92,115	4,145	649,610	29,246	1,513,229	63,761
Whitefish			17,422	784	195,912	8,697	2,560,456	106,792
Others			36,842	720	204,202	4,013	426,614	8,120
Total			279,107	7,827	3,152,477	81,047	8,785,337	270,276
Gill nets:								
Bass					17,779	886	20,179	1,006
Herring	116,330	$2,463	86,000	1,720	2,074,359	33,380	3,008,968	67,434
Perch					193,965	4,668	427,575	12,020
Pike and pike perch					85,110	3,462	85,110	3,462
Sturgeon					2,750	100	15,595	630
Suckers					544,068	8,403	673,216	10,613
Trout	97,100	4,855	424,260	19,513	2,560,369	120,537	6,409,190	263,322
Whitefish	11,476	468	400,867	13,723	875,946	32,396	2,873,784	111,435
Others	18,983	382	42,800	856	281,491	5,606	372,581	7,394
Total	245,889	8,168	953,867	35,812	6,635,837	209,438	14,487,198	477,322
Fyke nets:								
Bass					17,810	890	19,310	950
Herring					332,550	4,434	332,650	4,436
Perch					418,900	8,838	419,700	8,862
Pike and pike perch					141,860	5,553	141,960	5,557
Suckers					335,410	3,887	335,410	3,887
Trout					10,980	430	11,980	470
Whitefish					2,285	115	5,285	235
Others					40,750	1,019	44,750	1,101
Total					1,300,545	25,166	1,311,045	25,558
Seines:								
Herring					26,561	360	36,731	530
Perch					107,752	1,870	185,117	3,086
Pike and pike perch					49,906	1,809	91,046	3,029
Sturgeon					6,250	220	6,250	220
Suckers					127,714	1,788	172,124	2,340
Whitefish					4,279	185	11,154	465
Others					31,440	924	35,910	988
Total					353,902	7,156	538,332	10,658
Lines, spears, and dip nets:								
Bass					43,707	2,183	88,850	3,766
Perch							457,881	12,575
Sturgeon							79,165	3,173
Trout					243,089	12,146	429,768	21,640
Whitefish							4,400	132
Others					180,640	3,487	252,290	5,365
Total					467,436	17,816	1,312,354	46,651
Grand total	245,889	8,168	1,232,974	43,639	11,910,197	340,623	26,434,266	830,465

LAKE HURON.

Importance of the fisheries.—In proportion to the size of this lake and the natural advantages which it affords, the fisheries are but imperfectly developed, and in the year covered by the investigation presented a decrease as compared with 1885. Both whitefish and trout have undergone a diminution in abundance, as shown by the smaller catch, while the output of herring, sturgeon, pike, and pike perch is larger than in 1885. These changes have been coincident with a slight decrease in the fishing population, and an augmented amount of investment made up chiefly of shore property. In some counties or sections a noticeable improvement has taken place in the fisheries, mostly due to the development of the resources, but in the important fisheries prosecuted from Alpena and in Saginaw Bay the decline has been enough to overbalance the increase in other regions.

Notes on the abundance and distribution of the principal fishes.—The fishes of this lake which deserve special mention are trout, whitefish, pike perch, herring, sturgeon, black bass, yellow perch, catfish, pike, and suckers.

The most important fish in Lake Huron is the lake trout. It is generally distributed in the deeper parts of the lake, and is taken chiefly with gill nets and pound nets, and in small quantities with seines and lines. About a fourth of the total catch is obtained by steamers from Alpena and Huron counties using gill nets between 5 and 50 miles off shore. In the boat gill-net fishing, the largest quantity is secured in Alpena, Chippewa, and Presque Isle counties. This fish is most prominent in the pound-net fisheries of Alpena County, Saginaw Bay, and Iosco County. The average weight of the trout is about 4 pounds.

Whitefish is the second important fish in Lake Huron. It is especially prominent in the pound-net fishery of that part of the lake north of Saginaw Bay and in the gill-net fishery from Alpena. The average weight of the whitefish is about 2 pounds.

Everywhere in this lake the effects of whitefish propagation are manifested and appreciated by the fishermen and fish-dealers. While the output in the year covered by this inquiry was somewhat less than in 1885, the increase in the past few years has been marked. A prominent feature of the fishery for this fish was the unprecedentedly large run in many places of small fish of a size that had not been observed in abundance for many years.

The lake herring is an important fish in the pound-net fishery of this lake. It is most abundant and taken in largest numbers in Saginaw Bay, although it is also caught in relatively large quantities in Alpena, Huron, and St. Clair counties.

While pike and pike perch are taken in greater or less numbers in all the shore waters of the lake, they are economically valuable only in the pound-net and fyke-net fisheries of the Saginaw Bay region.

Sturgeon are generally distributed in this lake, but are nowhere abundant. They are taken only in pound nets in the inshore waters, and much more than half the yield is obtained in Saginaw Bay. The aggregate catch in the year covered by the inquiry was greater than in 1885; the north shore, however, showed a markedly decreased catch, while in Saginaw Bay there was an increased production.

Black bass, perch, catfish, and suckers are noteworthy elements in the fisheries of this lake only in Saginaw Bay and River, where they are caught with pound nets and fyke nets. The most important of these are perch and suckers.

On the north shore of this lake, including the counties of Chippewa and Mackinac, whitefish and trout are the most abundant commercial fishes; sturgeon, lake herring, pike, and pike perch are also taken, but in relatively small quantities. In the fisheries centering at Detour, prosecuted between the north shore of Drummond Island and Albany Island, and 7 miles west of Detour Light, at the entrance of Detour Passage, whitefish were found to be much more abundant than in the preceding few years, while trout and pike perch were yearly growing scarcer. Mr. Benjamin Butterfield, who has fished in this locality for the past thirty-six years, stated to an agent of the Commission that at times in 1890 and 1891 he took as many as 6,000 pounds of whitefish from one small pound at one night's fishing, this being a great many more fish than he and other fishermen were ever able previously to catch in the same time and with the same apparatus during his long experience. Mr. Butterfield attributes the growing increase in whitefish almost entirely to artificial propagation, and remarks that previous to the planting in this locality of whitefish fry from the Alpena station whitefish were becoming very scarce and small fish were seldom caught. In 1890, however, a large part of the yield consisted of fish averaging a little more than 1 pound in weight, and the following year their average weight was 1½ pounds. Mr. Thomas Sims, another experienced fisherman of Detour, agreed with Mr. Butterfield in the foregoing statements, and said that, if the mesh in the pound nets were as small as in former years, on a number of occasions his boat, which has a capacity of 4 or 5 tons, would not have carried the whitefish caught in one small pound net in the course of one night.

Along the shore between St. Ignace and Detour, an increase in the abundance of whitefish as compared with a number of preceding years was reported, the increase being especially marked in Les Cheneaux and Prentice Bay. Trout and some other fish appear to be diminishing in number. One reason assigned by Mr. Isaac Goudreau, Mr. Charles Gronden, and other prominent fishermen for the increase of whitefish in the inshore waters and among the islands is that the fish have been driven from their regular resorts in the lake by the large accumulation on the favorite grounds of sawdust and other refuse from a mill at St. Ignace. The bottom, for a mile from the shore at St. Ignace, was said

to be completely covered with sawdust and slabs, which also extended along the shore for 5 or 6 miles below that place. An agent of the Commission, Mr. E. A. Tulian, found the sawdust in large heaps along the shore for 5 miles below St. Ignace, where it had rolled up in such quantities that the farmers in the vicinity were carting it away to be used in leveling roads; the mill at the time of the agent's visit had not been running for six months.

Other causes assigned by the fishermen for the recent increased abundance of this species are artificial propagation and enlargement of the mesh in the bowl of the pound nets.

The principal fishermen of this section think there will be no difficulty in keeping up the supply of whitefish if liberal consignments of fry are planted annually and the size of the mesh in the cribs of the pound nets is regulated so as to permit the escape of immature fish. In the vicinity of St. Ignace the fishermen want also a law to prohibit the pollution of the lake either by sawdust or other refuse, and some favor a close season on all kinds of fishing after November 1 for a period of years in order to give trout and other fish whose abundance has decreased a better opportunity to multiply.

In the fisheries of the southern side of the Strait of Mackinac and the adjacent western shore of Lake Huron, whitefish constitute fully nine-tenths of the catch, the remaining species consisting of trout, pike perch, herring, and sturgeon. During the last two years the number of whitefish in the fisheries tributary to Mackinac City have been steadily increasing.

The only dealer at Mackinac City who has bought and handled fish caught in that vicinity during the past six years says that it has been no uncommon thing in the last two years to take 2,500 pounds of whitefish from one small pound net in one night's fishing, while in previous years if half that quantity was taken under similar circumstances it was considered a big catch; he is satisfied that the fish now being caught were planted in that vicinity by the United States and Michigan fish commissions.

In the vicinity of Cheboygan, while a great many trout are caught, whitefish is the principal species. Every fisherman in this region has commented on the very large increase in the number of whitefish caught during the past two years. Mr. Maynard Corbett, of the fishing firm of Corbett & Duffy, stated that he had fished in that vicinity for twenty-five years, and up to two or three years ago the whitefish were becoming scarcer each season, but during the past three years they have undergone a marked increase in abundance. He is positive it is the result of artificial propagation. He bases this opinion partly on the circumstance that up to the last few years he never saw many small whitefish around the grounds. In the spring of 1891, on the day when his pound net on the east side of Bois Blanc Island was first hauled, the whitefish completely filled the bowl and the net contained at least

10 tons of fish, but when they drew it to get out the fish all but 9 fish were so small that they made their escape through the meshes.

Mr. Charles Corbett stated that he had seen just such a condition in his nets at Hammond Bay. He and others think there is no doubt that the fish they are now catching in Hammond Bay are fish that were artificially hatched. The results of propagation are here so marked and so thoroughly appreciated by the fishermen that they earnestly desire a continuance of fish-cultural work, and the principal fishermen are anxious to see the beneficial effects of fish-culture supplemented by an enlargement of the mesh in the pots of the pound nets, so as to permit the escape of small fish.

In the gill-net fisheries of Presque Isle County, centering at Rogers City, most of the catch consists of trout, although a few whitefish are also taken. Trout at this place are gradually decreasing, but whitefish appear to be holding their own.

Trout is the most abundant and important fish in the extensive fisheries carried on from Alpena and other places in Alpena County. Whitefish rank next in importance. Four-fifths of the catch in the gill nets operated from small boats consists of trout and the rest of whitefish. A few thousand pounds of Menominee whitefish are also thus taken. In the gill-net fisheries carried on with steamers the relative proportions of trout and whitefish are the same. The lake herring is the prominent fish taken in pound nets; after which come trout, sturgeon, whitefish, pike, and pike perch. During the year covered by the inquiries of the Fish Commission no special increase in the abundance of whitefish in this county was noted. In the fall of the previous year, however, the fish came to the shoals north of Thunder Bay Island in very large numbers, and a better catch was made than at any time for many years previous. In the fall of 1890 the advent of another large body of fish appeared to be imminent, when a protracted spell of stormy weather caused the fish to leave the shoals. Indications at the time pointed to a larger run of fish than had been observed in that region for ten years. The fishermen are quite enthusiastic over the prospects of good fishing, which they attribute almost entirely to artificial propagation. They think, however, that the results would be more marked if it were not for the damage done by the large amount of refuse from sawmills thrown into the water along this shore, causing the fish to seek other parts of the lake. The increase of whitefish in Georgian Bay in recent years has been pronounced.

In the report on the fisheries of the Great Lakes in 1885 the following statements were made regarding the causes of the decrease of fish in the Alpena fisheries:

At first whitefish and trout were both abundant, and fishermen found no difficulty in catching with a few small gill nets as many fish as they could sell. But since 1881 or 1882 they have been comparatively scarce. Various causes are given for this decrease. The gill-net fishermen lay the blame on the small-meshed pound nets. The pound-net fishermen, on the other hand, throw the responsibility upon the

sawmills and the gill-net men. The sawmills, they say, pollute the waters with sawdust and vegetable refuse, and the gill-net men lose a great many nets, which, with the fish in them, soon decay and become a putrid mass, which contaminates the fishing-grounds and causes the fish to leave for other places. Mr. S. P. Wires reports: "On two questions they all agree. First, twenty years and less ago the waters on the shores of Alpena County swarmed with whitefish and trout. Second, to-day these fish are not abundant. In 1883 the trap-net grounds of Thunder Bay failed for the first time, and the fishing in 1884 was equally as bad."

The same authority says that in his own opinion (as one interested in the fisheries, but not actively concerned either with gill nets or trap nets) the decrease is owing mainly to excessive and unwise fishing, especially during the spawning season. When whitefish were abundant their favorite spawning-ground was a shoal about 5 miles from the shore, which they visited in countless numbers during the month of November. On this ground it was not an uncommon thing to catch in one net 200 pounds of whitefish during a single night, and boats often returned to their fish-houses with from 20 to 30 barrels, taken at a single lift from a gang of twenty or more gill nets. During a season hundreds and thousands of barrels of whitefish were thus caught, the females being full of spawn, which was left to rot in the offal pile. The water on the spawning-ground is 5 or 6 fathoms in depth, and being fully exposed to the seas that roll on Lake Huron in November is stirred to the bottom whenever a gale is raging from the northeast or southwest. At such times hundreds of gill nets loaded with fish were swept away and never recovered by the fishermen, but remained on the bottom polluting the waters. Mr. Wires further states: "Weeks before the spawning season commenced the gill nets and trap nets had been at work catching fish full of unripe spawn. Is it, therefore, any wonder that whitefish have decreased in numbers, and that once valuable fisheries have become almost barren and worthless?" He says the fishermen look to artificial propagation to restore the abundance of fish in this locality.

In the fisheries of Alcona County whitefish, herring, and Menominee whitefish are the only species taken. The decrease in the abundance of fish at this place is doubtless attributable to the fact that the best grounds formerly frequented by whitefish are literally covered with refuse from the sawmill, consisting of bark and sawdust. Mr. Edward Miller, of Alcona, and Capt. J. E. Henderson, of Sturgeon Point, in this county, stated that they had recently seen a great many small whitefish and thought they were fish that had been put into the lake by the fish commissions, as no fish of similar size had been observed for a great many years before.

Along the shores of Iosco County there is so much refuse from sawmills thrown into the water that most of the fish are kept at some distance from the shore, and pound nets can not be fished to advantage. Even when the gill nets are set 6 or 8 miles from the shore, they are often found full of bark, logs, etc., after a storm. Mr. James McCoy, one of the oldest fishermen of Au Sable, states that he has had nets completely ruined in two or three days by getting rolled up on the bottom with a slime from decayed bark, etc., causing them to rot very rapidly and become absolutely worthless. In the fisheries of Oscoda, Au Sable, and vicinity trout are the most abundant fish taken with gill nets and hooks, while whitefish and herring are the principal fish caught in pound nets. A few sturgeon, pike perch, and other fish are also taken in pound nets in the spring fishery. The average weight of the

whitefish taken in gill nets is 4 to 6 pounds, though many fish weighing from 20 to 22 pounds (dressed) are caught. In the pound nets the average weight of whitefish is 2½ to 3 pounds. During the past two or three years a great many small fish have been secured in pound nets. In the fisheries of East Tawas and Tawas City, in this county, there have, according to Mr. William Brashan and Mr. Joseph Trudell, been unmistakable signs of good results from whitefish propagation. Notwithstanding the deleterious influence of large quantities of sawdust and other mill refuse thrown on the fishing-grounds from mills at Oscoda, Au Sable, East Tawas, and Tawas City, a larger run of small whitefish has been observed than in many years.

The principal fish taken in the important fisheries of Saginaw Bay are herring, perch, catfish, pike, pike perch, suckers, trout, and whitefish, of which the pike and pike perch combined are the most important. All of the principal fishermen in this region are ardent advocates of artificial propagation as a means of keeping up and increasing the supply of fish. Many of the fishermen in this locality are desirous of having the supply of "pickerel" (pike perch) increased by fish-culture.

Messrs. C. Porter, James McCoy, I. S. Osborn, of Au Sable; Joseph Lixey, of Oscoda, and other prominent fishermen of Iosco County, have seen unmistakably good results from artificial propagation in their section, but think that whitefish will never be very abundant again until the throwing of mill refuse into the lake is prevented and the taking of small, immature fish is prohibited.

In the fisheries of Huron County, which borders partly on Saginaw Bay and partly on the lake, herring and pike perch are the most prominent fish, although whitefish and other species are also taken, and in the offshore gill-net fishery from Port Hope and in the set-line fishery trout are obtained. The herring and whitefish resort to the shores in October and November, when most of the catch is taken. The pike perch are found in greatest abundance in spring, but there is also a good run in fall. While trout are uncommon, the fish are large, averaging 10 or 12 pounds in weight. The weights of the other fish are as follows: Whitefish, 4 to 5 pounds; herring, one-half or three-fifths of a pound; pike perch, 3 to 9 pounds. A great many smaller pike perch are also taken and sold as second-quality fish.

Along the shores of this lake south of Saginaw Bay the most abundant fish is the herring. It is most numerous during the months of October, November, and December, and is taken in pound nets; its average weight is three-fifths of a pound. It appears to be much more abundant than in 1885, judging by the quantity taken and sold. Next in value are sturgeon, pike perch, trout, and whitefish, although the fishery for none of these is important as compared with that in the upper part of the lake. The sturgeon have an average weight of 40 pounds, when dressed; the pike perch weigh 2 pounds, the trout 5 pounds, and the whitefish 4 or 5 pounds.

Apparatus and methods.—The pound net is the principal kind of apparatus employed in the fisheries of this lake. It is used in every county, except one, bordering on the lake, and takes larger quantities of fish than all other means combined. The nets are constructed and operated similarly to those in other lakes, and the fishery presents no peculiarities which merit special mention.

Among the fishing interests of the lake there is a general agitation of the question of the size of mesh in the pound nets. The principal fishermen think the mesh should be made large enough to let small fish pass through. While in some places, in the past few years, an advance has taken place in this matter—the mesh being changed from 2½ to 3½ inches—it is held that after the shrinking, which ensues when the twine has been in use for some time, a 3½-inch mesh becomes reduced in size to a 2½-inch mesh; and it is urged by the most thoughtful fishermen that the mesh should be large enough originally to remain at least 3½ inches after shrinking, some even recommending a 4-inch mesh.

Many of the fishermen of Saginaw Bay advocate a law which will prohibit the bringing ashore and offering for sale, by fishermen or dealers, of whitefish and pike perch under a certain size, and which will prevent the fishermen from using small-mesh nets; they would also like to see it made it obligatory on the fishermen to scoop out of their nets and liberate all small whitefish and pike perch which they catch.

Gill nets are generally used in the American waters of the lake, and are especially prominent as a means of capture in Alpena and Presque Isle counties, where the larger quantity of the fish is thus taken, and in Chippewa, Huron, and Iosco counties, where the gill-net catch is a conspicuous part of the yield of the fisheries. The length of the nets varies from 200 to 800 feet, averaging about 500 feet; the depth is usually 5 to 6 feet; and the mesh in the whitefish and trout nets is about 4½ inches. The average cost of the nets is $10.

In proportion to the extent of its fisheries, fewer fishing steamers are owned in Lake Huron than in any other lake, and the gill-net fishery carried on with steamers is now rather less extensive than in 1885. In that year 7 tugs were employed in operating gill nets in addition to 1 other engaged in collecting fish. At the time of the last inquiry, however, only 3 fishing steamers belonging in the lake were found, while 4 vessels were ascertained to be in the collecting trade. In addition to these, 2 tugs from Detroit fished in this lake a part of the season, making their headquarters at Alpena. It has been considered advisable to credit these to Detroit, where owned, especially in view of the fact that they were also operated in another lake during part of the year; their catch in Lake Huron amounted to about 274,000 pounds of trout and whitefish, valued at $13,700.

In the vessel gill-net fishery only trout and whitefish are caught; of these, trout are much more valuable. Statistics show that in the year covered by the inquiry, 335,775 pounds of trout were caught, while only 71,300 pounds of whitefish were taken; these were worth, respectively,

$11,899 and $2,502. The larger catch of trout is attributable to the facts that trout is the fish principally sought, and that the fishing is carried on mostly in the deeper water, where that fish is naturally more abundant.

Set lines in this lake are used in commercial fishing only in the counties of Huron, Iosco, and Sanilac. Trout is the only fish taken. Herring, caught mostly in seines, are used for bait. The most important set-line fishery is in Iosco County, where set lines are fished mostly in April and May, and again between September 15 and November 15. A few are also used in winter, when the weather and ice will permit. In Huron County, while gill-net fisheries are ordinarily the most important, during cold winters, when the ice forms along the shore and remains stationary, a considerable amount of set-line fishing is done, especially when herring bait is plentiful. The fishing depends to a great extent upon the weather and the supply of bait, and is done whenever the men can venture upon the ice and bait is obtainable. In Sanilac County most of the hook fishing is done from Port Sanilac by men who at other times are also engaged in the pound-net fishery.

Fyke nets are employed only in Saginaw Bay and River and on the shores of Huron County. They are most numerous and take the largest quantities of fish in Saginaw Bay and River. The principal fishing in Saginaw River is done with fyke nets, here called "gobblers," or "hoop nets," which are also set in small numbers in the bay at or near the mouths of the smaller rivers which empty into it. The fyke nets are made after the model of a pound net, with the exception of the pot, which is similar to the pot of a Lake Erie fyke net.

Seine fishing in this lake is unimportant. Seines are used only in Chippewa and Iosco counties, and are there employed only to a limited extent. The single seine operated in Chippewa County took only small quantities of pike and pike perch; in Iosco County, 5 seines were hauled for whitefish, trout, perch, pike perch, and pike.

Fishing-grounds.—The principal gill-net grounds in that part of the lake adjacent to Detour are about 2 miles south of Drummond Island. The pound nets are set at Hay Point on Drummond Island, among the smaller islands off the north shore of that island, and at Albany Island.

The best gill-net grounds frequented by the fishermen of St. Ignace and Mackinac Island are south of St. Ignace Point and in the vicinity of Mackinac and Round Islands. The best pound-net grounds are in Les Cheneaux and Prentice Bay.

The gill-net fishermen of the northern part of Cheboygan County frequent the same grounds as those from St. Ignace. An important gill-net ground is Spectacle Reef, where trout resort to spawn, and are caught with gill nets between October 1 and December 1.

The principal trout grounds frequented by the steam tugs of Alpena are from 40 to 50 miles from shore. Big Reef, 40 miles off Alpena, is an important feeding and spawning ground for trout, which are here found in largest numbers in October and November. The sailboats go out from 10 to 15 miles from shore. Prior to May 1, tugs fish on grounds

from 10 to 20 miles from shore; after that date they move the nets to the outside grounds, where they remain until the last of October or the first of November, when they again move their nets to the inside grounds, some vessels going to the trout grounds and some to the whitefish grounds about 8 miles northeast of Thunder Bay Island.

The principal grounds resorted to by the sailboats using gill nets for trout are outside of Thunder Bay and Middle islands, while during the latter part of the season fishing is carried on for whitefish in the immediate vicinity of the islands. The gill-net fishing carried on from rowboats is prosecuted within a few rods of the shores of Middle, Sugar, and Thunder Bay islands, trout being there found in the early part of the season and whitefish during the month of November.

The gill-net grounds in Iosco County are from 6 to 15 miles off shore, the great amount of mill refuse preventing the satisfactory use of gill nets nearer to the shore. The same condition is unfavorable to the use of pound nets, which can be used to advantage only where narrow ridges running out into the lake are kept comparatively clean by the action of the water sweeping up and down the shore.

A few small pound nets are fished in Saginaw River, but the principal fishing-ground for pound nets is the bay. The grounds on which the bay pound nets are set extend all along the east and west shores of that body of water. Pound nets are also fished around the Big and Little Charity islands lying off the mouth of the bay. It is in the latter region that the greater part of the trout are caught. In former years, before lumbering was extensively carried on, this region contained excellent grounds, where whitefish resorted and were caught in large numbers. The present whitefish catch, however, is small in proportion to the large number of nets.

The grounds off the shore of Huron County were formerly among the best whitefish grounds in Lake Huron and, while a great deal of bark from rafts is now scattered along the bottom, these grounds are in good condition as compared with a few years ago, when lumbering was carried on more extensively all along the shore and many sawmills were throwing sawdust, bark, and slabs into the lake. The fishermen think that if large plants of whitefish were now made here the results would be more satisfactory.

Off the shore of Sanilac County the gill-net grounds are in the track of the regular steamers plying up and down the lake, and often after a gale the fishermen will find their nets full of coal clinkers, which have been thrown overboard from steamers and which, when the nets are spread out on the bottom by the force of the current, become entangled in the meshes; the clinkers also cut and destroy the nets. Great injury to the fishing-grounds has naturally been the result of this condition. The grounds off this shore have in past years been very productive; they were, however, destroyed by refuse from sawmills. At the present time the absence of sawmills along this part of the lake makes the fishermen desirous of restoring the productiveness of the grounds, and

they are very anxious that fish-culture shall come to their aid. Mr. Tulian, who has had extensive fish-cultural experience, thinks that if small plants of whitefish were made along the shore of this county each spring much better results would be attained than can be expected in the vicinity of Alpena, Oscoda, and East Tawas, for the reason that there appears to be an entire absence of mill refuse along this shore.

Fishing season.—On the north shore, where the principal fishing is done with pound nets, most of the whitefish pounds are operated from about May 1 to November 25, but if the fishing is not satisfactory some of the nets are taken out about July 1 and put in again about September 1. During May and June some of the smaller pound nets are fished for pike and pike perch among islands north of Drummond Island. The larger gill nets, which take mostly trout and occasionally small quantities of whitefish, are fished from May 1 to November 20; the smaller gill nets, which take only trout, are used during October.

The trout gill-net season of Cheboygan County covers parts of the months of October and November; a few trout are also caught in pound nets during the entire open season. Whitefish, which are principally taken in pound nets, are caught from May 15 to November 20, but the best season is between June 15 and August 15. In the gill-net fisheries centering at Cheboygan, trout are caught from May 1 to July 1 in deep water and from October 1 to December 1 on the spawning-grounds. Herring are taken along the shores early in spring and late in fall. Pound nets are operated mostly from the opening of navigation until August 1, although a few are also fished in fall.

In the gill-net fishery of Presque Isle County, the fishing begins about May 1 and extends to July 1; it is resumed September 15 and continues until November 15. When fish are particularly plentiful, some fishing is also done in July and August. Up to November 1 only trout are taken; after that time a few whitefish are caught.

The sailboats fishing gill nets for trout begin operations about May 1 and continue until November 5; during the balance of the season they take whitefish. Gill nets fished from rowboats are set from September 1 to November 1 for trout and from November 1 to November 20 for whitefish. Pound nets along the shore of this county are put in between May 15 and July 1, and remain down continuously until about November 25.

Steam tugs, used in the gill-net fisheries of Alpena County, are employed from early in the spring until the latter part of October. The tugs begin fishing as soon as the ice weakens sufficiently to allow them to force their way through to the open water. Sometimes they go out as early as March 1, but it is often the 1st of April before the season is opened.

In Alcona County pound nets are fished only in October and November for whitefish and herring, and gill nets from the opening of navigation to about June 1 for Menominee whitefish and herring, both kinds of nets being fished by the same persons.

At Tawas and East Tawas, in Iosco County, pound nets are set as soon as possible after the opening of navigation, and are fished continuously until about July 15, when they are taken out; they are again put in operation in the latter part of August and used till the last of November. At Oscoda and Au Sable, however, most of the nets are fished only in October and November, when the herring and whitefish come on the shores; a few pounds are also fished during the early part of the open season, for sturgeon, pike, etc. Gill nets and fyke nets are used from the opening to the closing of navigation. Herring are found in the inshore waters only in fall, and it is only then that they are caught; some whitefish and trout are taken in spring, but the greater part of the catch is in fall; the run of pike perch and sturgeon is almost confined to the spring months.

In the pound-net fisheries of this region whitefish and herring are caught mostly in fall, while numbers of pike perch are taken in spring. The other fish occurring are obtained in greater or less quantities throughout the entire spring and fall fishing season, although larger quantities are taken in spring, for the reason that the bay pound nets are fished only during that time.

Statistics.—In the following tables the extent of the fisheries of each county bordering on this lake is shown. Separate tables are given for the persons engaged; the number and value of vessels, boats, apparatus, etc., employed; the quantity and value of the catch of each important species, and the quantity and value of the products taken with each kind of apparatus.

Three vessels belonging at Detroit, Mich., fished during a part of the year in Lake Huron. They, with the crews and catch, have been included in the statistics for that city. Their combined tonnage was 29.93, and their value, with outfit, was $18,800; their fishing gear consisted of 639 gill nets, 447,300 feet in length, valued at $7,668. Twenty-one men constituted their crews. The quantity of fish taken by them while in Lake Huron was 244,847 pounds of trout worth $12,242, and 29,064 pounds of whitefish valued at $1,453.

Table showing by counties the number of men employed in the fisheries of Lake Huron.

Counties.	How engaged.				
	On fishing vessels.	On transporting vessels.	In shore fisheries.	On shore, in fish-houses, etc.	Total.
Alcona	.....	.....	5	.....	5
Alpena	8	2	44	18	72
Arenac, Bay, Saginaw, and Tuscola	.....	4	273	64	341
Cheboygan	.....	.....	21	6	27
Chippewa	.....	.....	49	6	55
Huron	10	2	48	6	66
Iosco	.....	.....	52	4	56
Mackinac	.....	.....	47	4	51
Presque Isle	.....	.....	9	2	11
St. Clair	.....	.....	23	.....	23
Sanilac	.....	.....	19	.....	19
Total	18	8	590	110	726

Table showing by counties the apparatus and capital employed in the fisheries of Lake Huron.

Designation.	Alcona.		Alpena.		Arenac, Bay, Saginaw, and Tuscola.		Cheboygan.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	.....	.....	1	$4,500	.....	.....	.....	.....
Tonnage	.....	.....	15.57	.....	.....	.....	.....	.....
Outfit	.....	.....	.....	1,500	.....	.....	.....	.....
Vessels transporting	.....	.....	1	500	2	$1,800	.....	.....
Tonnage	.....	.....	10.38	.....	19.36	.....	.....	.....
Outfit	.....	.....	.....	25	.....	65	.....	.....
Boats	4	$90	26	2,810	196	9,619	20	$995
Apparatus of capture:								
Pound nets	6	750	36	16,300	326	34,165	25	5,050
Gill nets	20	80	915	12,800	.....	.....	185	540
Fyke nets	.....	.....	.....	.....	170	6,075	.....	.....
Shore property	.....	1,075	.....	39,085	.....	117,015	.....	9,385
Cash capital	.....	.....	.....	15,000	.....	16,350	.....	3,500
Total	.....	1,995	.....	92,520	.....	185,089	.....	19,470

Designation.	Chippewa.		Huron.		Iosco.		Mackinac.	
	No.	Value.	No.	Value.	No.	Value	No.	Value.
Vessels fishing	.....	.....	2	$5,200	.....	.....	.....	.....
Tonnage	.....	.....	22.37	.....	.....	.....	.....	.....
Outfit	.....	.....	.....	460	.....	.....	.....	.....
Vessels transporting	.....	.....	1	500	.....	.....	.....	.....
Tonnage	.....	.....	11.37	.....	.....	.....	.....	.....
Outfit	.....	.....	.....	40	.....	.....	.....	.....
Boats	32	$2,590	30	1,230	30	$1,265	38	$1,825
Apparatus of capture:								
Pound nets	28	6,450	44	8,900	29	5,850	25	5,400
Gill nets	190	1,900	136	1,005	130	720	260	1,900
Seines	1	100	.....	.....	5	500	.....	.....
Fyke nets	.....	.....	51	310	.....	.....	.....	.....
Lines	.....	.....	.....	350	.....	200	.....	.....
Shore property	.....	11,660	.....	12,545	.....	4,875	.....	9,805
Cash capital	.....	2,000	.....	2,050	.....	500	.....	5,000
Total	.....	24,700	.....	32,599	.....	13,910	.....	23,930

Designation.	Presque Isle.		St. Clair.		Sanilac.		Total.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	.....	.....	.....	.....	.....	.....	3	$9,700
Tonnage	.....	.....	.....	.....	.....	.....	37.94	.....
Outfit	.....	.....	.....	.....	.....	.....	.....	1,960
Vessels transporting	.....	.....	.....	.....	.....	.....	4	2,800
Tonnage	.....	.....	.....	.....	.....	.....	41.11	.....
Outfit	.....	.....	.....	.....	.....	.....	.....	130
Boats	3	$300	17	$980	14	$595	410	22,308
Apparatus of capture:								
Pound nets	.....	.....	21	3,225	11	2,425	551	88,515
Gill nets	220	2,220	.....	.....	150	500	2,206*	21,665
Seines	.....	.....	.....	.....	.....	.....	6	600
Fyke nets	.....	.....	.....	.....	.....	.....	221	6,385
Lines	.....	.....	.....	.....	.....	220	.....	770
Shore property	.....	1,175	.....	600	.....	1,405	.....	208,625
Cash capital	.....	1,000	.....	.....	.....	.....	.....	45,400
Total	.....	4,695	.....	4,805	.....	5,145	.....	408,858

*Length of gill nets, 1,125,060 feet.

Table showing by counties and species the yield of the fisheries of Lake Huron.

Species.	Alcona.		Alpena.		Arenac, Bay, Saginaw, and Tuscola.		Cheboygan.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Black bass, fresh					28,725	$2,129		
Catfish, fresh					160,738	5,085		
Herring, fresh	7,000	$218	150,000	$3,000	1,430,034	14,302	24,480	$357
Perch, fresh					1,745,892	20,354		
Pike and pike perch, fresh			20,000	500	1,200,807	41,232	1,346	48
Sturgeon, fresh			50,000	1,000	179,000	3,580	1,170	39
Suckers, fresh					1,000,177	15,272		
Trout, fresh			749,000	23,750	151,262	5,911	35,760	1,029
Whitefish, fresh	2,500	170	199,000	6,350	100,868	4,083	224,030	8,243
Other fish, fresh					54,000	1,080		
Total	10,400	388	1,168,000	34,600	6,148,403	113,028	286,786	9,756

Species.	Chippewa.		Huron.		Iosco.		Mackinac.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Black bass, fresh			626	$38				
Catfish, fresh			11,433	843				
Herring, fresh			543,920	4,110	6,000	$20	11,717	$176
Herring, salted					130,700	2,796		
Perch, fresh	2,000	$20	67,736	392	2,000	20		
Pike and pike perch, fresh	30,716	614	152,093	5,503	18,000	730	8,788	263
Sturgeon, fresh	19,972	533	24,173	581	28,350	568		
Suckers, fresh			20,000	100				
Trout, fresh	142,736	4,282	76,627	3,138	153,000	6,270	58,979	1,769
Trout, salted					5,000	300		
Whitefish, fresh	213,634	7,652	24,444	1,143	75,800	3,558	126,978	4,444
Whitefish, salted					1,400	112		
Total	409,058	13,101	921,052	15,354	420,250	14,374	206,462	6,652

Species.	Presque Isle.		St. Clair.		Sanilac.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Black bass, fresh							29,351	$2,107
Catfish, fresh							172,171	5,428
Herring, fresh			130,000	$2,250	78,900	$952	2,383,851	25,385
Herring, salted							130,700	2,796
Perch, fresh							1,817,628	20,792
Pike and pike perch, fresh			43,322	1,870	2,000	74	1,483,072	50,834
Sturgeon, fresh			54,653	2,419	8,400	204	365,718	8,924
Suckers, fresh							1,110,177	15,372
Trout, fresh	101,000	$3,030	9,755	300	22,500	1,133	1,500,619	50,742
Trout, salted							5,000	300
Whitefish, fresh	15,000	450	5,940	297	14,500	745	1,002,694	37,185
Whitefish, salted							1,400	112
Other fish, fresh							54,000	1,080
Total	116,000	3,480	243,670	7,226	126,300	3,108	10,056,381	221,067

Table showing by counties and apparatus the yield of the fisheries of Lake Huron in 1890.

Apparatus and species.	Alcona.		Alpena.		Arenac, Bay, Saginaw, and Tuscola.		Cheboygan.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Pound nets:								
Black bass, fresh					21,075	$1,364		
Catfish, fresh					155,638	4,932		
Herring, fresh	6,700	$182	150,000	$3,000	1,430,934	14,302	8,480	$117
Perch, fresh					1,226,446	12,563		
Pike and pike perch, fresh			20,000	500	1,104,807	35,112	1,346	48
Sturgeon, fresh			50,000	1,000	179,000	3,580	1,170	39
Suckers, fresh					742,622	8,321		
Trout, fresh			60,000	1,800	151,262	5,911	21,760	649
Whitefish, fresh	1,700	114	20,000	600	100,868	4,083	220,530	8,108
Miscellaneous fish, fresh					13,200	264		
Total	8,400	296	300,000	6,900	5,125,852	90,432	253,286	8,961
Gill nets:								
Herring, fresh	1,200	36					16,000	240
Trout, fresh			689,000	21,950			14,000	420
Whitefish, fresh	800	56	179,000	5,750			3,500	135
Total	2,000	92	868,000	27,700			33,500	795
Fyke nets:								
Black bass, fresh					7,650	765		
Catfish, fresh					5,100	153		
Perch, fresh					519,446	7,791		
Pike and pike perch, fresh					102,000	6,120		
Suckers, fresh					347,555	6,951		
Miscellaneous fish, fresh					40,800	816		
Total					1,022,551	22,596		
Grand total	10,400	388	1,168,000	34,600	6,148,403	113,028	286,786	9,756

Apparatus and species.	Chippewa.		Huron.		Iosco.		Mackinac.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Pound nets:								
Black bass, fresh			626	$38				
Catfish, fresh			11,433	343				
Herring, fresh			541,570	4,080			11,717	$176
Herring, salted					130,700	$2,796		
Perch, fresh	2,000	$20	28,730	168				
Pike and pike perch, fresh	20,716	414	146,093	5,203	16,000	650	8,788	263
Sturgeon, fresh	19,972	533	24,173	581	28,350	568		
Trout, fresh	7,137	214	9,502	416	43,000	1,815	17,576	527
Whitefish, fresh	207,517	7,438	22,944	1,081	60,200	2,876	123,038	4,306
Total	257,342	8,619	785,077	12,006	278,250	8,705	161,119	5,272
Gill nets:								
Herring, fresh			1,350	14				
Trout, fresh	135,599	4,068	51,775	2,099	85,000	2,975	41,403	1,242
Trout, salted					5,000	300		
Whitefish, fresh	6,117	214	1,300	52	14,600	632	3,940	138
Whitefish, salted					1,400	112		
Total	141,716	4,282	54,425	2,165	106,000	4,019	45,343	1,380
Fyke nets:								
Herring, fresh			1,000	10				
Perch, fresh			39,000	230				
Pike and pike perch, fresh			6,000	210				
Suckers, fresh			20,000	100				
Whitefish, fresh			200	10				
Total			66,200	560				
Seines:								
Herring, fresh					6,000	20		
Perch, fresh					2,000	20		
Pike and pike perch, fresh	10,000	200			2,000	80		
Trout, fresh					1,000	40		
Whitefish, fresh					1,000	50		
Total	10,000	200			12,000	210		
Lines:								
Trout, fresh			15,350	623	24,000	1,440		
Grand total	409,058	13,101	921,052	15,354	420,250	14,374	206,462	6,652

Table showing by counties and apparatus the yield of the fisheries of Lake Huron in 1890—Continued.

Apparatus and species.	Presque Isle.		St. Clair.		Sanilac.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Pound nets:								
Black bass, fresh							21,701	$1,402
Catfish, fresh							107,071	5,275
Herring, fresh			130,000	$2,250	78,900	$952	2,358,301	25,065
Herring, salted							130,700	2,796
Perch, fresh							1,257,182	12,751
Pike and pike perch, fresh			43,322	1,870	2,000	74	1,363,072	44,224
Sturgeon, fresh			54,653	2,419	8,400	204	365,718	8,924
Suckers, fresh							742,622	8,321
Trout, fresh			9,755	390	9,300	445	329,292	12,167
Whitefish, fresh			5,940	297	14,200	733	776,937	29,636
Miscellaneous fish, fresh							13,200	264
Total			243,670	7,226	112,800	2,408	7,525,796	150,825
Gill nets:								
Herring, fresh							18,550	290
Trout, fresh	101,000	$3,030			4,700	188	1,122,477	35,972
Trout, salted							5,000	300
Whitefish, fresh	15,000	450			300	12	224,557	7,439
Whitefish, salted							1,400	112
Total	116,000	3,480			5,000	200	1,371,984	44,113
Fyke nets:								
Black bass, fresh							7,650	765
Catfish, fresh							5,100	153
Herring, fresh							1,000	10
Perch, fresh							558,446	8,021
Pike and pike perch, fresh							108,000	6,330
Suckers, fresh							367,555	7,051
Whitefish, fresh							200	10
Miscellaneous fish, fresh							40,800	816
Total							1,088,751	23,155
Seines:								
Herring, fresh							6,000	20
Perch, fresh							2,000	20
Pike and pike perch, fresh							12,000	280
Trout, fresh							1,000	40
Whitefish, fresh							1,000	50
Total							22,000	410
Lines:								
Trout, fresh					8,500	500	47,850	2,563
Grand total	116,000	3,480	243,670	7,226	126,300	3,108	10,056,381	221,067

LAKE ST. CLAIR AND THE ST. CLAIR AND DETROIT RIVERS.

General sketch of the fisheries.—While not one of the Great Lakes, Lake St. Clair has fisheries of sufficient importance to entitle it to separate mention, and the lake and its two tributary rivers have a geographical position that is distinct enough to warrant their consideration under one head.

In proportion to the quantity and value of the catch a relatively large number of persons are employed in the fisheries of this section and a comparatively large capital is invested. The disparity is due, on the one hand, to the existence of many semi-professional fishermen, and on the other, to the presence of large wholesale fish-houses, which depend for their receipts on the fisheries of various other sections. Pound nets are the most prominent apparatus used, and seines rank next; fyke nets, lines, and spears complete the list of fishing appliances. The most valuable fish here found is the whitefish, which exists through-

out the lake and the two rivers, but is taken in largest quantities in the lake. Perch, sturgeon, pickerel, and herring are the other principal species.

The fishing in the St. Clair River is of slight extent. Important pound-net fishing, maintained at Port Huron, is carried on in Lake Huron, and has been credited to that lake. The principal fishing centers in the river itself are Roberts Landing, Marine City, St. Clair, and Algonac. A few haul seines are fished for wall-eyed pike, but the largest quantities of fish are taken with hand and troll lines. Yellow perch are caught with hand lines and wall-eyed pike and pike by trolling. The line fishery is semi-professional, and is carried on during the months of May, June, July, and August, but chiefly from the middle of June to the middle of July.

The principal fishing in Lake St. Clair is carried on in Anchor Bay and on the shore immediately north of Detroit, the chief apparatus used being pound nets, fyke nets, and haul seines. In Anchor Bay the fishing centers are Fair Haven, Anchorville, and New Baltimore. The fishes of commercial importance found in the lake are yellow perch, suckers, catfish, sturgeon, black bass, wall-eyed pike, pike, herring, and muskellunge. In Anchor Bay there is some winter fishing through the ice with lines and spears, chiefly for perch. The pound-net fishery is much more important than any of the others and yields somewhat more than half the catch of this entire region. The specially prominent fish thus obtained are whitefish, sturgeon, pike, pike perch, and herring, whitefish and herring being most abundant in the lower part of the lake along the shore adjacent to the entrance to the Detroit River.

The fisheries of the Detroit River are at the present time of little value. The only commercial fishing on the American side is carried on with seines from the early part of October to the last of November, the catch being relatively small and consisting chiefly of whitefish, herring, and pike. The fisheries have greatly declined since 1885, when the industry was at a low ebb. In earlier years there was a great abundance of whitefish in this river, and the annual yield was very large. Mr. James Craig, of Detroit, who has for many years engaged in the fish business of that city, informs us that near Fort Wayne, now within the city limits of Detroit, the average catch of whitefish in haul seines was from 18,000 to 21,000 fish, weighing, on an average, from 2½ to 2⅞ pounds. On November 12, 1871, at one haul of a seine, 3,100 whitefish were caught. With the growth of the city and the increase in the amount of sewage entering the river, the fisheries have declined to their present condition. The number of whitefish taken in the vicinity of Fort Wayne in 1890 was only 3,000, and the output of the entire river was only 35,500 pounds.

Statistics of the fisheries.—In the following tables the fisheries of this region are shown, the extent of the industry in each county being exhibited. Included in the statistics are the vessel fisheries prosecuted from Detroit in lakes Huron and Erie. The vessels are owned in Detroit, to which place the catch is sent. The fact that the vessels fished in more than one lake has made it desirable to treat them as indicated, the quantity of fish taken in each lake being shown in a footnote to the general products tables.

Table showing by counties the number of persons employed in the fisheries of Lake St. Clair and St. Clair and Detroit rivers in 1890.

Counties.	On fishing vessels.	In shore fisheries.	On shore.	Total.
Macomb	.....	350	.....	350
St. Clair	.....	98	13	111
Wayne	28	69	53	150
Total	28	517	66	611

Table showing by counties the yield of the fisheries of Lake St. Clair and the St. Clair and Detroit rivers in 1890.

Species.	Vessel fisheries, Wayne.		Shore fisheries.							
			Macomb.		St. Clair.		Wayne.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Black bass	.....	.....	8,900	$534	186	$10	.....	.....	9,086	$544
Catfish	.....	.....	14,125	365	2,150	51	10,000	$200	26,275	616
Herring	297,934	$2,970	36,000	540	60,000	750	96,400	1,528	192,400	2,818
Perch	29,243	877	636,000	7,790	49,350	753	48,500	740	733,850	9,283
Pike and pike perch	46,276	1,851	116,750	3,860	230,143	7,702	131,500	4,060	478,393	15,682
Sturgeon	.....	.....	93,800	2,355	19,203	539	196,000	4,900	309,003	7,794
Trout	244,847	12,242	.....	.....	.....	.....	.....	.....	.....	.....
Whitefish	29,064	1,453	54,200	3,260	.....	.....	155,500	10,040	209,700	13,300
Other fish	.....	.....	225,500	1,533	.....	.....	163,000	2,605	388,500	4,138
Total	*647,364	19,402	1,185,275	20,237	361,032	9,865	800,900	24,073	2,347,207	54,175

Species.	Grand total.	
	Pounds.	Value.
Black bass	9,086	$544
Catfish	26,275	616
Herring	490,334	5,797
Perch	763,093	10,160
Pike and pike perch	524,669	17,533
Sturgeon	309,003	7,794
Trout	244,847	12,242
Whitefish	238,764	14,753
Other fish	388,500	4,138
Total	2,994,571	73,577

*Of these fish, 273,911 pounds (244,847 trout and 29,064 whitefish) were taken in Lake Huron and 373,453 pounds (297,934 herring, 46,276 pike perch, and 29,243 perch) in Lake Erie, by vessels owned in Detroit, Mich.

Table showing by counties the apparatus and capital employed in the fisheries of Lake St. Clair and St. Clair and Detroit rivers in 1890.

Designation.	Macomb.		St. Clair.		Wayne.		Total.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing					4	$21,000	4	$21,000
Tonnage					38.56		38.56	
Outfit						3,400		3,400
Boats	49	$1,750	77	$1,060	36	1,565	162	4,375
Apparatus of capture, vessel fisheries:								
Gill nets					814	9,418	*814	9,418
Apparatus of capture, shore fisheries:								
Pound nets	9	2,700	5	750	20	6,000	34	9,450
Fyke nets	133	4,010	15	470			148	4,480
Seines	15	4,525	6	490	7	1,225	28	6,240
Lines		300		450				750
Spears	150	350					150	350
Shore property and accessories		4,725		31,957		69,400		106,082
Cash capital		1,500		12,000		31,100		44,600
Total		19,869		47,177		143,108		210,145

*Length of gill nets, 543,550 feet.

Table showing by counties and apparatus of capture the yield of the shore fisheries of Lake St. Clair and St. Clair and Detroit rivers in 1890.

Apparatus and species.	Macomb.		St. Clair.		Wayne.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Pound nets:								
Black bass			103	$6			103	$6
Catfish	4,500	$90	525	16	10,000	$200	15,025	306
Herring	36,000	540			30,000	1,200	116,000	1,740
Perch			8,250	124	48,500	740	56,750	864
Pike and pike perch	54,000	1,020	3,280	147	120,000	3,600	177,280	5,367
Sturgeon	88,200	2,205	667	20	196,000	4,900	284,867	7,125
Whitefish	54,000	3,240			120,000	7,200	174,000	10,440
Miscellaneous fish	90,000	450			151,500	2,260	241,500	2,710
Total	326,700	8,145	12,825	313	726,000	20,100	1,065,525	28,558
Fyke nets:								
Black bass	1,500	90	83	4			1,583	94
Catfish	6,375	194	1,625	35			8,000	229
Perch	224,250	2,646	39,600	599			263,850	3,245
Pike and pike perch	46,450	1,040	4,190	174			50,640	1,814
Sturgeon	3,200	88					3,200	88
Whitefish	200	20					200	20
Miscellaneous fish	87,875	578					87,875	578
Total	369,850	5,256	45,498	812			415,348	6,068
Seines:								
Black bass	7,400	444					7,400	444
Catfish	3,250	81					3,250	81
Herring			60,000	750	16,400	328	76,400	1,078
Perch	136,750	1,819					136,750	1,819
Pike and pike perch	16,300	600	143,503	4,274	11,500	460	171,303	5,334
Sturgeon	2,400	62	18,536	519			20,936	581
Whitefish					35,500	2,840	35,500	2,840
Miscellaneous fish	47,625	505			11,500	345	59,125	850
Total	213,725	3,511	222,039	5,543	74,900	3,973	510,664	13,027
Lines:								
Perch	220,000	2,700	1,500	30			221,500	2,730
Pike and pike perch			79,170	3,167			79,170	3,167
Total	220,000	2,700	80,670	3,197			300,670	5,897
Spears:								
Perch	55,000	625					55,000	625
Grand total	1,185,275	20,237	361,032	9,865	800,900	24,073	2,347,207	54,175

Canadian fisheries in which Americans are interested.—The fisheries on the Canadian side of Lake St. Clair and St. Clair River, carried on with property owned in part by citizens of the United States residing at Detroit and Port Huron, are more extensive than those on the American side of the lake. Fishing is done with pound nets, gill nets, and seines, and vessels are employed to collect and transport the fish; one vessel is also used in gill-net fishing. The fish taken are catfish, herring, pike, sturgeon, trout, and whitefish, the last-named being the most important.

Vessels, boats, apparatus, etc., employed in the fisheries of the Canadian side of Lake St. Clair, in which citizens of the United States are interested.

Designation.	No.	Value.
Vessels	6	$25,500
Outfit	.....	4,500
Boats	71	5,145
Pile-drivers	3	90
Apparatus of capture:		
Pound nets	62	14,300
Gill nets	420	8,400
Seines	15	2,425
Shore property	.....	1,350
Total	.....	61,710

Products of the fisheries of the Canadian side of Lake St. Clair in which citizens of the United States are interested.

Species.	Pounds.	Value.
Catfish	14,520	$436
Herring	20,314	204
Pike	483,868	15,855
Sturgeon	355,793	10,299
Trout	365,260	18,112
Whitefish	1,068,153	53,307
Miscellaneous fish	2,759	83
Total	2,310,667	98,296

LAKE ERIE.

Importance and condition of the fisheries.—Although ranking fourth in area, this lake maintains a fishing industry of vast extent and of much greater importance than that of all the other lakes combined, omitting Michigan, which it surpasses by 36 per cent in fishing population, 49 per cent in invested capital, 60 per cent in the quantity of fish taken, and 17 per cent in the value of the catch. The fisheries of Lake Erie are thought to be more important than those of any other body of fresh water in the world, and there are few, if any, lakes which have afforded such a history of prolificness of fish life in proportion to their size. To illustrate the relative productiveness of the American waters of this lake, it may be noted that the average value of the catch per square mile of lake surface is over $200, while in no other lake of this system is the average more than $50, and in three of them is much less.

The fishing population of Lake Erie numbers about 4,500; the amount of capital invested in the fishing industry is $2,816,300; the quantity of fish caught in 1890 was 64,850,000 pounds, having a first value of over $1,000,000.

The prominent aspects of the fisheries of this lake are the large fleet of steam vessels engaged in the gill-net fishery, and the large number of steamers employed in collecting fish from the pound net and other fisheries—phases of the industry which are here more important than elsewhere in the lake system; the enormous amount of gill nets used in the vessel and boat fisheries, the great development of the pound-net fisheries, and the great distances to which connected lines of pound nets extend; the completeness with which the waters of the lake are scoured with fixed and movable appliances of capture; the taking of greater quantities of certain fishes than are obtained in all the other lakes combined; and the extensive trade in lake fish carried on in the cities bordering on the lake.

Of scarcely less importance than the actual extent of the fisheries of the lake, is the serious decline which has recently been observed in some of the most valuable food-fishes. The discussion of the exhaustion of the fish supply of the lake, of the means to check a further diminution, and of the necessity of taking energetic measures for the increase of the fish life has been one of the most noticeable public questions pertaining to the lake fisheries in recent times, and the great interests here at stake have fully warranted the attention already given and deserve much further consideration.

The inquiries conducted by this Commission show that the aggregate yield of the fisheries of the lake in 1890 was probably larger than at any previous time and was considerably larger than in any earlier year for which data were available. The money value of the products was but little less than in 1885 and much greater than in 1880. An examination of the statistics, however, at once discloses the fact that the catch has been maintained and increased only by the use of larger quantities of apparatus and by the capture and utilization of the cheaper species of fish, while even a very marked increase in the quantity of fishing apparatus has not been able to keep up the supply of the whitefish, sturgeon, and pike perches.

Notes on the principal fishes of the lake.—The natural conditions in this lake appear to be unusually favorable to the existence and production of enormous quantities of desirable food-fishes, whose fecundity and physical surroundings have made possible the extensive fishing which this lake has for many years supported. The general shoalness of the lake, while permitting the prosecution of the fisheries under conditions that are the least conducive to the continuance of an unimpaired supply, furnishes a large spawning area and appears to favor the development of a rich and varied fauna and flora having an important bearing on the food supply of the economic fishes.

Several fishes exist in greater numbers in Lake Erie than in any

other member of the lake chain; several here of great value scarcely figure in the fisheries of some of the other lakes, while the most important fish, considering the entire lake region as a unit, the lake trout, is less abundant than in any other part of the lake system except Lake Ontario.

The most abundant and important fish now taken in Lake Erie is the lake herring. It is found in all parts of the lake, but is least numerous in the eastern end. It is caught in pound nets, gill nets, and, to a slight extent, in other forms of apparatus; nearly half the yield of the lake is obtained in the pound nets set in the waters of Ohio, and almost the same quantity in the gill nets operated in various parts of the lake, about the same catch resulting from the shore and the vessel gill-net fishery. The total catch was 38,868,283 pounds, having a value of $399,452, these amounts representing respectively considerably more than half the quantity and two-fifths the value of the fisheries of this lake. Compared with 1880 and 1885, a noticeable augmentation in the catch of this fish has taken place. The yield in every part of the lake presents an increase. This has resulted from (1) the use of large quantities of apparatus and (2) an increased demand necessitating the utilization of other fish to replace the diminished yield of common whitefish and other fishes. Only the taking of more than double the quantity of lake herring obtained in 1885 prevented the general fisheries of Lake Erie from showing a serious decline, as every other important species underwent a reduction.

The following table, based on data furnished by Mr. A. J. Stoll, of Sandusky, Ohio, shows the catch of lake herring in the years 1887 to 1890, inclusive, in a large number of pound nets controlled by him and set around the Bass Islands, and indicates the seasonal and yearly changes in abundance of the species. The numbers of nets mentioned in the table refer to those operated by different crews of fishermen, and the catch of the different sets of nets is given separately in order to permit a more detailed comparison of the fluctuations in the production than would be possible with only the aggregate figures at hand.

Table showing the number of pounds of lake herring taken in the fall fishing season (during the ten days preceding the dates given) by certain sets of pound nets located around the Bass Islands, Lake Erie, in 1887–1890.

Sets of nets.	September 20—				September 30—			
	1887.	1888.	1889.	1890.	1887.	1888.	1889.	1890.
I. Eleven nets each year	3,180	6,015	7,330	305	8,430	9,620	30,685	615
II. Eleven nets in 1887-1889, 16 in 1890	.....	250	180	.....	.....	1,155	5,625	70
III. Sixteen nets each year	4,290	6,400	4,090	505	13,140	8,925	25,255	2,015
IV. Thirteen nets each year	150	.....	.....	.....	3,175	1,750	1,595	345
V. Five nets each year	6,020	2,310	1,605	330	9,125	3,815	16,805	1,585
VI. Seven nets each year	.....	3,235	215	2,015	14,480	5,130	15,890	3,830
VII. Eight nets in 1888-1890	.....	1,095	.....	1,005	.....	3,290	22,025	1,085
VIII. Five nets in 1887-1889, 6 in 1890	7,370	6,360	155	150	11,765	8,905	6,290	470
IX. Five nets in 1888-1890	.....	2,120	1,130	.....	.....	3,700	5,850	180
X. Four nets each year	.....	.....	.....	.....	315	.....	5,615	.....
Total	21,010	27,815	14,705	4,310	60,430	46,290	135,635	10,795

Table showing the number of pounds of lake herring taken in the fall fishing season (during the ten days preceding the dates given) by certain sets of pound nets located around the Bass Islands, Lake Erie, in 1887–1890—Continued.

Sets of nets.	October 10—				October 20—			
	1887.	1888.	1889.	1890.	1887.	1888.	1889.	1890.
I. Eleven nets each year	17,350	20,595	35,085	5,930	69,210	48,895	61,485	49,250
II. Eleven nets in 1887–1889, 16 in 1890	1,815	3,910	7,175	1,350	13,660	12,870	10,700	9,590
III. Sixteen nets each year	24,135	29,860	35,255	7,930	65,070	140,175	122,280	38,645
IV. Thirteen nets each year	6,460	10,865	5,440	2,910	53,650	36,530	16,665	8,370
V. Five nets each year	10,985	10,665	21,110	2,320	18,845	22,700	32,815	8,900
VI. Seven nets each year	34,650	11,125	23,785	9,415	79,900	15,520	63,985	51,400
VII. Eight nets in 1888–1890	.....	17,000	42,260	3,985	.....	51,040	93,650	100,060
VIII. Five nets in 1887–1889, 6 in 1890	21,840	21,265	9,635	705	45,515	36,955	18,210	5,075
IX. Five nets in 1888–1890	.....	5,440	6,915	1,215	.....	13,150	14,725	4,540
X. Four nets each year	775	.....	9,260	2,990	4,530	8,785	21,255	6,730
Total	118,010	130,725	195,920	38,750	349,780	386,620	455,770	282,560

Sets of nets.	October 30—				November 10—			
	1887.	1888.	1889.	1890.	1887.	1888.	1889.	1890.
I. Eleven nets each year	96,805	99,520	106,885	87,205	145,720	167,235	201,810	206,420
II. Eleven nets in 1887–1889, 16 in 1890	7,580	59,260	31,530	23,745	84,165	215,350	79,480	92,800
III. Sixteen nets each year	87,930	220,985	162,855	55,745	118,310	310,940	290,710	149,735
IV. Thirteen nets each year	60,420	68,830	38,570	20,165	95,950	166,440	62,975	40,920
V. Five nets each year	22,455	39,145	66,700	26,155	34,955	61,600	80,510	35,540
VI. Seven nets each year	138,290	27,555	95,610	86,595	200,510	29,760	103,560	124,265
VII. Eight nets in 1888–1890	.....	78,090	148,885	157,465	.....	96,600	189,680	240,340
VIII. Five nets in 1887–1889, 6 in 1890	59,120	48,280	26,370	16,660	71,030	59,145	32,610	42,720
IX. Five nets in 1888–1890	.....	18,355	23,695	11,585	.....	27,015	29,660	21,850
X. Four nets each year	11,365	20,265	33,210	13,600	15,905	29,535	51,105	24,235
Total	492,905	680,285	734,400	498,920	766,545	1,163,620	1,122,100	978,825

Sets of nets.	November 20—				November 30—			
	1887.	1888.	1889.	1890.	1887.	1888.	1889.	1890.
I. Eleven nets each year	223,455	252,030	299,820	272,620	239,040	283,540	326,855	283,440
II. Eleven nets in 1887–1889, 16 in 1890	197,245	366,270	142,845	218,820	282,315	402,610	155,170	311,030
III. Sixteen nets each year	148,035	423,540	350,930	181,600	157,035	426,030	360,090	191,820
IV. Thirteen nets each year	119,190	206,180	75,130	70,240	129,080	220,340	80,135	72,360
V. Five nets each year	47,700	79,155	98,455	56,130	58,925	110,130	99,820	68,235
VI. Seven nets each year	275,200	36,830	115,950	144,035	313,650	45,395	116,365	145,585
VII. Eight nets in 1888–1890	.....	117,090	214,770	287,055	.....	119,700	215,855	295,100
VIII. Five nets in 1887–1889, 16 in 1890	82,175	71,030	43,965	125,165	96,615	73,465	44,365	162,730
IX. Five nets each year	.....	37,960	31,860	23,965	.....	46,530	31,860	24,215
X. Four nets each year	18,750	223,220	201,500	28,710	19,140	54,940	55,020	28,425
Total	1,112,350	1,813,305	1,575,225	1,408,340	1,295,800	1,783,280	1,485,535	1,582,940

Sets of nets.	Total.			
	1887.	1888.	1889.	1890.
I. Eleven nets each year	803,100	887,450	1,069,955	905,785
II. Eleven nets in 1887–1889, 16 in 1890	586,780	1,061,675	432,705	657,405
III. Sixteen nets each year	618,545	1,567,455	1,351,465	627,995
IV. Thirteen nets each year	476,475	710,935	280,510	215,310
V. Five nets each year	200,010	329,550	417,970	109,195
VI. Seven nets each year	1,056,680	174,550	535,360	567,140
VII. Eight nets in 1888–1890	.....	483,905	927,125	1,086,695
VIII. Five nets in 1887–1889, 6 in 1890	305,430	325,405	181,600	353,675
IX. Five nets in 1888–1890	.....	154,270	145,695	87,550
X. Four nets each year	70,780	336,745	376,965	104,690
Total	4,216,890	6,031,940	5,719,350	4,805,440

NOTE.—Only multiples of 5 are observed by the Sandusky dealers in determining the weight of herring handled.

The following recapitulation of the foregoing table shows that the total and average catch in 1887 was less than in the two following years, and that the yield in 1890 was less than in 1888 and 1889, while the average production per net was less than during any of the other years. In view of the prominent position now occupied by the lake herring, these figures possess special interest.

Years.	Number of nets.	Pounds of herring taken.	Average catch per net.
1887	72	4,210,890	58,568
1888	85	6,031,940	70,964
1889	85	5,719,260	67,285
1890	91	4,805,440	52,807

The group of fishes embraced by the general term "pike perch," and including the wall-eyed pike or yellow pike, the variety of wall-eyed pike known as the blue pike, and the sauger, ranks next to the herring in abundance and economic value. These fish are much more abundant in Lake Erie than elsewhere in the Great Lakes, and each is here taken in larger quantities than in all the other lakes combined.

The most important of these fishes is the blue pike, the catch of which in 1890 was about 7,489,000 pounds, worth $148,200. It is found abundantly in all parts of the lake except along the Michigan shore, and is especially prominent in the fisheries of Erie, Pa., and Cleveland and Sandusky, Ohio. It is taken in large numbers in both pound nets and gill nets, but in larger quantities in the latter than in the former, and constitutes a conspicuous element in the vessel gill-net fishing of Erie and Cleveland and the shore gill netting of the former city. Compared with 1885, a slight decrease in the catch has occurred, amounting to 410,000 pounds. The principal decrease has been in the ice fishery of Erie County, Pa., owing to a deficiency of ice, while most places in Ohio present an increased yield.

The species of this group of which the next largest catch is made is the sauger, which is most important in the fisheries of Erie County, Ohio, where more than half the entire output is obtained, although it is also a very conspicuous factor in the fisheries of Ottawa and Lucas counties, Ohio, and Monroe County, Mich. While a few saugers are taken with gill nets, fyke nets, seines, and lines, the great bulk of the catch is obtained in pound nets. The saugers caught in 1890 amounted to 4,179,867 pounds, with a value of $51,721. In 1885 the quantity taken was 5,466,200 pounds.

The wall-eyed pike, while less abundant than the sauger or blue pike, is more valuable than the former and commands a higher price per pound than either. It inhabits shallower water than the blue pike, and is consequently taken in greater quantities in pound nets than by other means. Nearly half the entire output of the lake is obtained in Erie County, Ohio; Ottawa and Lucas counties in the same State and Monroe County in Michigan also have a relatively large catch. The quantity taken throughout the lake in 1890 was 2,105,733 pounds, valued at $90,615. In 1885 the reported yield was 2,694,500 pounds. The prin-

cipal decrease since has been in Maumee Bay and in Erie County, N. Y., an increased catch being noticed in the vicinity of Sandusky.

In point of value the common whitefish ranks next to the lake herring and the blue pike; but to the fish-culturist, and doubtless to the general fishing public, that species possesses greater interest than any other in Lake Erie. It is the fish which has been the principal subject of fishery controversy and discussion on the lake, and the one whose preservation and increase is most desired by fishermen, dealers, and others.

In 1880 the aggregate yield of this fish was 3,333,800 pounds; the investigation of 1885 disclosed a catch of 3,531,855 pounds in that year; in 1890 the output was 2,341,451 pounds. The decrease in 1890, as compared with 1885, amounting to 1,190,404 pounds, demands careful attention; and it becomes a matter of great importance to note the condition of the fishery in recent years and to determine, if possible, the cause or causes for this serious decline.

In that part of the lake west of Port Clinton, embracing the most important pound-net fisheries of the lake, there has been only a slight decrease in the catch compared with 1885. It is said, however, that the decline since 1888 has been especially marked, which would indicate that between 1885 and 1888 there was a substantial increase, a fact which is borne out by a partial investigation of the region made by this office in the latter year. The extent of the diminution of the catch since 1888 may be judged by the comparative figures which are available for 30 pound nets set off West Sister Island. In 1888 48,000 pounds of whitefish were caught; in 1889 30,000 pounds were taken, while in 1890 the yield was only 20,000 pounds. These figures may be taken as representing the general condition of the whitefish fishery during the period named.

The catch of whitefish in the fisheries of the Bass Islands and other grounds tributary to Sandusky was also smaller in 1890 than in 1885, the decrease amounting to about 110,000 pounds, or 20 per cent. In the fisheries of Ohio east of Sandusky Bay the yield of whitefish was 458,500 pounds in 1885 and 468,577 pounds in 1890.

The whitefish fishery carried on from that part of the lake east of Ohio, viz, in Pennsylvania and New York, is prosecuted chiefly with gill nets, and it is interesting to observe that the catch has decreased phenomenally since 1885, the actual and relative decline being greater than elsewhere in the lake. In 1885 the output of this section was more than that of the entire remaining part of the lake, aggregating 2,149,455 pounds. In 1890 only 1,075,869 pounds were taken.

A study of the statistical returns for 1890 makes evident the fact that the maintenance of the catch of whitefish at present is chiefly accomplished by the employment of larger quantities of apparatus. As an example, the conditions in the region west of Sandusky and the Bass Islands may be cited, though more marked cases could be given.

So few whitefish are taken in this part of the lake in any form of apparatus except pound nets that only the latter need be considered.

Comparing the number set in 1885 with those operated in 1890, the latter year shows an increase of 137 nets, or 26 per cent. The output in the same period declined about 15,000 pounds, or 4 per cent, whereas, other things being equal, there should have been an additional catch of 93,000 pounds.

Coming now to a consideration of the influences which have operated to produce this serious impairment of the whitefish fishery—and the same influences have in a general way affected the other fisheries—it may first be stated that the opinion is quite generally entertained among the fishermen and dealers of some localities that the supply of whitefish is being gradually reduced throughout the entire lake by overfishing, the effects of which nature and art combined are not able to successfully overcome. Others, it should be said, think the decline is only temporary and simply indicates a fluctuation in the catch entirely dependent on natural conditions.

It is well known that the shoal water everywhere in Lake Erie is very favorable to the capture of the whitefish as well as other species. There is scarcely a spot which affords even temporary shelter to the fish. During the greater part of the year, when the great body of whitefish is found in the eastern end of the lake, they are systematically and persistently sought for with gill nets operated from steam, sail, and row boats. In the early winter, when the fish begin to move toward the western end of the lake for the purpose of spawning, the pursuit with gill nets continues with relentless energy. In the western part new dangers await migrating fish in the thousand or more pound nets. These, in some localities, form impassable barriers between individual islands or between islands and the mainland, while other stands extend in almost unbroken lines from the shore half across the lake. It is therefore not surprising that natural reproduction, which supervenes upon the arrival of the fish off the Michigan shore, should be seriously impaired and that the catch of whitefish should be declining.

Mr. Seymour Bower, the agent who canvassed the major part of the fisheries of Lake Erie in 1885, called attention to the great destruction of whitefish in the gill-net fishery independently of the fish necessarily sacrificed for food. It was stated, on Mr. Bower's authority, that—

> Gilled whitefish soon drown if there is much current, as there generally is at this [the eastern] end of the lake, and then bloating and decomposition ensue in a few hours. The arrangement of the nets is such that each gang is lifted not oftener than once in two or three days, and in summer there is invariably a considerable number of spoiled fish at each lift; not infrequently, when a storm or blow occurs and the lifting is delayed a day or two, more than half the fish are found to be rotten and are stripped out and thrown back into the lake.—(Review of the Fisheries of the Great Lakes in 1885, p. 281.)

This condition of affairs is generally recognized, and, while an accurate determination of the amount of this waste is, of course, impossible, and while even a close approximation is difficult, nevertheless some idea may be gained of the enormous destruction of fish by repeating the opinion of a prominent and thoroughly reliable dealer of Erie, Pa.,

who in 1885 estimated that the waste in the gill-net fisheries of that city alone was equal to the entire quantity of marketable whitefish landed from gill nets in the region west of Sandusky, or between 800,000 and 1,000,000 pounds. The same conditions obtain to-day, and there is no reason to doubt that this waste continues on fully as large a scale.

Recapitulating the foregoing remarks, it is seen:

1. That the abundance of whitefish in Lake Erie, as determined by the quantity taken, has been diminishing since 1888, and the decrease in the output in 1890, compared with 1885, amounted to over a million pounds.

2. That the decline in the catch has been most marked in the gill-net fishery carried on from the eastern end of the lake.

3. That the market supply from year to year is being maintained chiefly by employing larger quantities of fixed and floating apparatus.

4. That there is no season when the fish may not be taken; and practically the entire catch in pound nets in the western end of the lake in the fall months consists of spawning fish.

5. That there is enormous unnecessary waste of fish in the gill-net fishery owing to the methods in vogue.

The following important remarks on the deterioration of the Lake Erie fisheries emanate from Mr. Seymour Bower, of the U. S. Commission of Fish and Fisheries, who has on two occasions made a personal inspection of the principal fisheries of the lake, and is well qualified to discuss the subject:

I am not at all surprised at the decreased and decreasing catch of fish in Lake Erie. Indeed, under the conditions that prevail, the catch is remarkably well sustained. I doubt if there is another body of water, fresh or salt, of equal area in the world that is so thoroughly, persistently, and exhaustively canvassed. Surely none of the other lakes of the great fresh-water chain affords a parallel, for the reason that their greater depth precludes successful or, at least, profitable operations over comparatively large areas. In a fishing sense, it is wholly within the power of man to literally "clean out" Lake Erie, though, of course, this event is not likely to occur, since the destruction will naturally cease at the point of profitable returns.

The constantly increasing demand for the products of the lake, due to an ever-increasing population and to improved facilities for distribution—and all, of course, without a corresponding increase in the producing area—has stimulated an excessive drain on the source of supply. Without any thought for the morrow, methods that are extremely wasteful are employed, in reckless disregard of the common welfare and the perpetuity of the industry, legislative regulations and restrictions being for the most part evaded, ignored, or defeated.

In the face of all this, however, the catch seems well sustained. This can be accounted for only on the theory—or I might say, the fact—that Lake Erie undoubtedly possesses much greater productive capacity, greater fertility in water life, than the deeper waters of the upper lakes. That "nature is full of compensations" is well illustrated here; the very shoalness that places its higher forms easily within the reach of man is coincident with a degree of warmth highly favorable to a generous development of fundamental water life.

That the work of propagating whitefish has failed to keep up the supply of that species is not to be wondered at. Wasteful instead of rational methods of capturing the species have been practiced. Gill-net fishing in summer is responsible for the absolute waste of hundreds of tons of whitefish. Whitefish in gill nets drown easily in a moderate current and spoil quickly when the water is warm; but, notwithstanding this fact, the arrangements for setting and lifting are such that the nets are

raised only once in two to four days, and storms that prevent lifting until the catch is almost a total loss are not uncommon. Of course, on the whole, more salable fish are taken in this way than would be with fewer nets lifted daily, but the plan is a highly improvident and wasteful one and, naturally, a considerable proportion of the catch is thrown on the market in a more or less unwholesome state. Summer gill netting in Lake Erie is an evil that should be abolished on sanitary as well as economic grounds.

A considerable number of small whitefish are also taken in the small mesh or "herring" gill nets, and the claim is freely made that the pound nets from Vermillion to Erie take a good many very small whitefish, but I do not know to what extent this is true.

The pound nets west of Sandusky take no small whitefish; in fact, a specimen of less than a pound weight very rarely occurs in that section. But these nets, also those along the Huron shore, catch immense numbers of fish that are too small for market. I have seen thousands upon thousands of small pike perch and other valuable commercial varieties brought ashore and thrown away. Here is a tremendous waste of raw material, for such of these small fish as do not survive to maturity at least serve the purpose of food supply for the larger ones.

The adoption of measures to correct the evils referred to would, no doubt, practically suspend fishing operations in a few cases or places, and for a time place something of a burden on vested interests, but it seems to be one of those rare cases where the end justifies the means. The perpetuity of the interests directly involved is at stake, and individual interests that survive only at such heavy cost to the common welfare, that are sustained only through flagrant though incidental violation of economic law, have no moral right to exist.

Gill-net fishing, as applied to the capture of spawning fish from the spawning beds and reefs, is regarded by many, particularly the pound-net interests, as peculiarly destructive and reprehensible, but I take precisely the opposite view. Comparatively few fish are now enabled to evade the maze of nets and barriers set to intercept their progress and reach the spawning-grounds. If none were allowed to do so, the reproductive function would be wholly subverted; no spawn would be cast, none would be available for artificial treatment, and the inevitable result would be speedy extermination. On the other hand, it would be far better if every fish could reach the spawning-grounds, even though the last one was captured there, for then most of the spawn would be mature and available for natural or artificial processes. Greater freedom should be given the migratory run of spawning fish by restricting the length and number of pound nets in a stand, also limiting the number and length of gill nets per boat or crew.

As we can not "eat the cake and keep it too," I do not think that there should be any closed seasons for Lake Erie, except during the summer, when a good portion of the "cake" is spoiled and wasted. Nor do I think that any form of apparatus should be favored or abolished by law, except as this might occur incidentally through the enforcement of the paramount point of preventing the wholesale waste of adult and immature fish.

It seems to me that there are no seriously objectionable features incidental to the measures above indicated, nor no insurmountable obstacles in the way of applying them in practice. The main points are a closed season in summer, releasing or permitting the escape of immature fish, and restricting the number and length of nets. These measures, in connection with the saving and return, through the medium of artificial propagation, of what would otherwise be a total loss, should develop and hold up indefinitely the productive capacity of Lake Erie or any other water to its highest practical point.

I do not, however, look for the accomplishment of these results through the medium of State legislation. Local and sectional interests, complicated by the friction and antagonisms existing between the advocates of different forms of apparatus, will doubtless continue to act as a bar to the adoption and enforcement of such impartial

and reciprocal measures as are essential to the common welfare. Numerous laws, narrow and sectional in their inspiration and necessarily so in their application, have been enacted by the Commonwealths having or assuming jurisdiction; but the fitful and erratic movements to enforce such laws have generally met with defeat. It is true that the pound-net interests of Ohio have respected the closed season in summer, but there is little merit in this, as the season is unprofitable anyway, owing to the fact that the fish do not run inshore then in paying numbers, and the nets soon rot in the warm water. Very few pound nets would be set in summer in the territory available for that form of apparatus, even if there were no law to prevent. Gill nets, however, are inexpensive, and Canada and Pennsylvania have no closed season in summer, so the gill-net tugs from Cleveland and other Ohio ports fish all summer ostensibly in provincial and Pennsylvania waters. So it is true in the main that State legislation, so far as it applies to Lake Erie, with its five conflicting jurisdictions, has accomplished but little in preventing the capture of fish whenever, wherever, and howsoever it has been profitable to do so.

Under existing conditions I do not look for any improvement, but, on the contrary, a still further decline. If one fact is more conspicuous than another, it is that the arbitrary and intangible lines dividing the lake into several jurisdictions should be obliterated. Rational and effective measures must be based on the fact that in its water life the lake is a unit.

Of the remaining fishes of prominence the sturgeon is the most valuable. It is most abundant in the extreme eastern end of the lake, where more than seven-eighths of the catch is made, and least so along the Michigan shore at the western end. The decreased yield since 1885 has been marked in every region, and has aggregated 2,649,000 pounds, or over 50 per cent. Perch have nearly doubled in quantity, catfish have decreased, and trout, taken only in Pennsylvania and New York, have undergone a slight decrease.

As bearing on the relative abundance of certain fish during a series of years, the following figures showing the average catch during the fall season of some pound nets set at Huron, Ohio, may be presented:

Table showing the average fall catch of fish per net in the pound nets of Messrs. Wickham & Co., of Huron, Ohio, from 1872 to 1890.

Years.	Number of nets.	‡ Hard fish.	‡ Whitefish.	§ Soft fish.	Herring.	Years.	Number of nets.	‡ Hard fish.	‡ Whitefish.	§ Soft fish.	Herring.
		Pounds.	*Pounds.*	*Pounds.*	*Pounds.*			*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1872.....	18	6,300	.....	1,700	23,700	1882†....	34	1,300	.....	2,900	5,400
1873*....	24	4,600	.....	1,560	3,340	1883.....	33	900	.....	3,300	20,100
1874.....	21	9,030	.....	3,190	7,421	1884.....	34	575	.....	2,632	7,327
1875.....	26	2,600	.....	3,100	9,231	1885.....	35	475	.....	1,860	28,640
1876.....	33	3,900	.....	1,890	21,900	1886.....	41	579	.....	4,691	20,114
1877.....	11	2,500	.....	3,400	14,100	1887.....	50	176	693	2,793	14,355
1878.....	14	4,000	.....	3,500	23,800	1888.....	53	253	562	2,477	15,483
1879.....	19	1,700	.....	3,500	17,300	1889.....	54	177	395	1,100	14,079
1880.....	16	4,800	.....	3,800	24,700	1890.....	54	164	334	1,364	14,184
1881.....	13	4,500	.....	7,100	15,700						

*Nets destroyed by a storm October 15.

†Warm season.

‡Until 1887 the whitefish and other hard fish were combined under the name hard fish, which includes, besides whitefish, black bass, muskellunge, wall-eyed pike, large blue pike, large rock bass, and grass pike. Since 1886 the whitefish have been separately designated.

§Includes saugers, small blue pike, small wall-eyed pike, sunfish, and small rock bass.

Apparatus and methods.—In the foregoing notes on the fishes of this lake the influence on their abundance of the apparatus and methods employed was discussed at some length, making further reference to that phase of the subject unnecessary in this place. The most noticeable feature connected with the consideration of the apparatus used in the fisheries of this lake is the extraordinarily large increase since 1885 in the numbers of the most prominent nets employed, an increase unequaled in any other lake. In 1885 the pound and trap nets numbered 1,028, which was about 300 more than were found in Lake Michigan, the lake having the next important pound-net fishery, and about two-fifths the entire number of such nets in the Great Lakes basin. In 1890 the number had increased to 1,893, which was 1,050 more than the number in Lake Michigan during the same year and more than half the number set in all the lakes combined. Gill nets to the number of 22,644 were operated in Lake Erie in 1885, while in 1890 49,320 were set, no other lake showing any increase. A less marked increase has also taken place in the quantities of fyke nets employed. The use of seines and lines, however, is less extensive than formerly.

The feature which has long distinguished the pound-net fishery of Lake Erie is the habit of setting the nets in long continuous strings, extending out many miles from the shore. This is made possible by the general shoalness of the lake and the nature of the bottom, which permits the driving of stakes without difficulty.

Aside from the growth of the pound-net fishery in the regions where the nets were already employed in large numbers, there has been a marked development of the fishery in localities in which the nets were comparatively scarce in 1885. In that year it was recorded that—

> The pound-net fishery of Lake Erie is at the present time practically confined to that portion of the lake west of Cleveland. East of that city the nets are scattered and comparatively few in number, there being but 7 between Cleveland and Fairport, 14 at Fairport, and 19 at Erie, while west of Cleveland there are no less than 888 pounds, which are located at very short distances and in longer or shorter strings along the entire coast line from Cleveland to the mouth of the Detroit River.

The investigation of 1890 showed a large increase in the number of pound nets and traps operated in the eastern end of the lake. There were found to be 108 such nets used in that part of Ohio east of Cleveland, 200 in Pennsylvania, and 37 in New York.

The use of steam vessels in the fisheries is more extensive in this lake than elsewhere in the lake region, although the number of steamers actually engaged in fishing is less than in Lake Michigan. In 1890 34 vessels, carrying over 19,000 gill nets, were employed in the fisheries of the lake, and 22 additional steamers in transporting fish from the fishing-grounds to the markets. Vessel fishing is most important at Erie, Pa., where 14 vessels were employed in 1890, and at Cleveland, Ohio, where 9 vessels were used. The number of collecting vessels is greatest at Sandusky, where 16 made their headquarters in 1890.

The yield of the vessel fishery in 1890 was 14,079,281 pounds, having a market value of $221,289. The fish of greatest importance, as regards

both quantity and value, is the lake herring; over 9,000,000 pounds, worth $102,000, resulted from this fishing in the various parts of the lake. Next in prominence is the blue pike, of which about 2,948,000 pounds, valued at $57,700, were taken. Whitefish is the only other fish of special importance in the vessel fishery; 817,000 pounds of this were secured, with a value of $40,850. The remaining fish obtained are perch, saugers, sturgeon, trout, wall-eyed pike, and a few minor species, all caught in small quantities. The yield of whitefish is largest in the vessel fishery from Dunkirk, N. Y.; herring, blue pike, and trout are most important in Erie, Pa.; perch, saugers, and wall-eyed pike figure most conspicuously in the fisheries of Cleveland, Ohio.

Since 1885 the changes in the vessel fisheries of this lake have consisted in a slight decrease in the number of steam vessels using gill nets, an increase of nearly 100 per cent in the number of collecting steamers, and the introduction of fishing steamers into the fisheries of Dunkirk and Buffalo, N. Y., where they were not previously operated.

Statistics of the fisheries.—The following series of detailed tables illustrates the various features of the extensive fisheries of this lake. The tables, which relate to the counties, show (1) the persons engaged in different capacities; (2) the vessels, boats, apparatus, etc., employed; (3) the quantity and value of the catch; (4) the output of the vessel gill-net fishery; and (5) the quantity and value of the products resulting from the use of each kind of apparatus in the shore and boat fisheries.

Two vessels belonging at Detroit fished during a part of the year in Lake Erie, and took the following quantities of fish, which have been credited to that city: 297,934 pounds of herring, worth $2,979; 46,276 pounds of pike perch, worth $1,851, and 29,243 pounds of perch, valued at $877. The vessels carried 14 men, had a combined tonnage of 19.86, and were worth, with their outfit, $12,800. They used 388 gill nets, having a total length of 245,350 feet, valued at $4,306.

Table showing by States and counties the number of persons employed in the fisheries of Lake Erie in 1890.

States and counties.	Vessel fishermen.	Vessel transporters.	Shore fishermen.	Shoresmen.	Total.
New York:					
Erie	4	.....	883	80	967
Chautauqua	17	.....	107	18	142
Total	21	.....	990	98	1,109
Pennsylvania:					
Erie	92	3	250	58	403
Ohio:					
Ashtabula	7	.....	51	.....	58
Lake	7	.....	71	10	88
Cuyahoga	62	4	63	99	228
Lorain	.....	.....	62	9	71
Erie	29	77	749	301	1,156
Ottawa	.....	.....	389	186	575
Lucas	.....	6	348	208	562
Total	105	87	1,733	813	2,738
Michigan:					
Monroe	.....	7	225	.....	232
Grand total	218	97	3,198	969	4,482

Table showing by States and counties the vessels, boats, apparatus, and capital employed in the fisheries of Lake Erie in 1890.

States and counties.	Vessels fishing.				Vessels transporting.				Boats.	
	No.	Tonnage	Value.	Value of outfit.	No.	Tonnage.	Value.	Value of outfit.	No.	Value.
New York:										
Erie	1	7.50	$2,500	$450	....	.....	.....	.....	96	$2,485
Chautauqua	3	50.20	10,000	1,538	....	.....	.....	.....	71	12,615
Total	4	57.70	12,500	1,988	....	.....	.....	.....	167	15,100
Pennsylvania:										
Erie	14	97.10	41,800	7,420	1	16.76	$2,000	$400	94	32,920
Ohio:										
Ashtabula	1	15.78	4,750	500	....	.....	.....	.....	30	7,210
Lake	1	6.26	2,200	500	....	.....	.....	.....	40	8,935
Cuyahoga	9	119.05	40,150	5,500	1	7.30	2,500	300	28	13,295
Lorain									40	10,765
Erie	5	48.53	14,000	2,250	16	900.81	128,700	11,875	436	83,215
Ottawa	....	.....	.....	.....	.....	.....	.....	.....	248	21,300
Lucas	....	.....	.....	.....	2	79.97	13,000	550	194	15,260
Total	16	189.62	61,100	8,750	19	988 08	144,200	12,725	1,016	159,980
Michigan:										
Monroe	....	.....	.....	.....	2	36.08	8,500	900	116	9,750
Grand total	34	344.42	115,400	18,158	22	1,040.92	154,700	14,025	1,393	217,750

States and counties.	Gill nets, vessel fisheries.		Apparatus of capture, shore fisheries.								Value of lines and spears.
			Pound nets and trap nets.		Gill nets.		Fyke nets.		Seines.		
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.	
New York:											
Erie	1,013	$7,740	.....	.....	1,516	$11,345	.....	.....	.....	.....	$1,351
Chautauqua	109	850	37	$4,850	1,944	14,887	.....	.....	5	$125	228
Total	1,122	8,590	37	4,850	3,460	26,232	.....	.....	5	125	1,579
Pennsylvania:											
Erie	10,177	33,512	200	29,270	12,193	39,056	.....	.....	.....	.....	160
Ohio:											
Ashtabula	322	1,076	50	3,750	2,424	6,744	.....	.....	.....	.....	310
Lake	277	952	58	14,340	2,352	6,728	.....	.....	.....	.....	200
Cuyahoga	6,047	20,084	61	22,950	2,221	6,909	.....	.....	.....	.....	.....
Lorain	.....	.....	88	36,650	981	2,805	.....	.....	.....	.....	.....
Erie	1,101	3,730	703	304,290	918	2,675	915	$58,850	6	780	1,402
Ottawa	.....	.....	160	36,000	5,600	9,520	145	3,000	11	1,400	1,000
Lucas	.....	.....	303	46,200	125	900	50	1 800	16	2,450	800
Total	7,747	25,842	1,423	464,180	14,621	36,281	1,110	63,650	33	4,630	3,712
Michigan:											
Monroe	.....	.....	233	49,800	.....	.....	65	800	6	550	700
Grand total	*19,046	67,944	1,893	548,100	*30,274	101,560	1,175	64,450	44	5,305	6,151

States and counties.	Shore property.	Cash capital.	Total investment.	States and counties.	Shore property.	Cash capital.	Total investment.
New York:				Ohio:			
Erie	$91,317	$391,800	$506,988	Ashtabula	$000	.....	$25,240
Chautauqua	11,033	9,200	65,326	Lake	13,850	$10,000	57,705
Total	102,350	401,000	574,314	Cuyahoga	106,225	70,000	287,913
				Lorain	10,575	6,000	66,795
				Erie	277,200	199,000	1,087,907
				Ottawa	82,400	8,000	162,620
Pennsylvania:				Lucas	96,700	9,000	186,660
Erie	46,700	50,000	283,238				
Michigan:							
Monroe	12,850	.....	83,850	Total	587,850	302,000	1,874,900
				Grand total	749,750	753,000	2,816,302

* Length of gill nets, 12,330,000 feet.

Table showing by States, counties, and species the yield of the fisheries of Lake Erie in 1890.

States and counties.	Black bass.		Blue pike.		Catfish.		Herring.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
New York:								
Erie	300	$10	114,661	$7,017	188,700	$4,274	53,215	$1,723
Chautauqua	15,405	813	173,289	4,835	88,275	2,193	1,753,905	26,708
Total	15,705	823	287,950	11,852	276,975	6,467	1,807,120	28,431
Pennsylvania:								
Erie	19,990	1,032	3,245,945	70,406	121,450	3,301	8,012,510	80,443
Ohio:								
Ashtabula	5,600	305	422,100	9,150	146,300	3,160	970,500	9,605
Lake	4,000	270	430,000	7,295	104,500	2,745	1,649,500	16,480
Cuyahoga	1,020	60	1,804,230	29,138	11,000	220	5,661,800	65,500
Lorain	960	50	381,050	5,053	7,200	144	1,925,240	10,360
Erie	92,643	4,701	860,958	13,757	528,632	12,177	15,427,313	152,235
Ottawa	92,000	5,320	56,670	1,550	400,000	8,850	1,243,300	11,115
Lucas	6,500	390	.....	.....	150,000	3,950	1,011,000	7,583
Total	203,223	11,096	3,955,008	65,943	1,347,632	31,246	27,888,653	281,878
Michigan:								
Monroe	9,500	570	.....	.....	180,000	4,900	1,160,000	8,700
Grand total	248,418	13,521	7,488,903	148,201	1,926,057	45,914	38,868,283	399,452

States and counties.	Perch.		Saugers.		Sturgeon.		Trout.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
New York:								
Erie	17,350	$755	.....	.....	1,425,110	$48,932	.....	.....
Chautauqua	31,270	760	.....	.....	284,554	11,745	39,420	$1,903
Total	48,620	1,515	.....	.....	1,709,664	60,677	39,420	1,903
Pennsylvania:								
Erie	208,540	5,420	31,150	$410	105,750	3,265	82,000	3,280
Ohio:								
Ashtabula	32,800	556	.....	.....	8,100	270	.....	.....
Lake	71,585	997	23,500	205	17,535	465	.....	.....
Cuyahoga	733,692	8,451	172,500	1,405	8,400	280	.....	.....
Lorain	140,000	1,230	174,620	1,580	20,700	690	.....	.....
Erie	1,039,880	8,008	2,223,847	24,410	139,758	6,436	.....	.....
Ottawa	230,200	1,902	594,250	11,311	24,000	480	.....	.....
Lucas	175,000	1,075	654,000	8,820	12,000	240	.....	.....
Total	2,483,247	22,189	3,842,717	47,731	230,493	8,861	.....	.....
Michigan:								
Monroe	130,000	1,175	306,000	3,580	33,000	900	.....	.....
Grand total	2,870,407	30,299	4,179,867	51,721	2,078,907	73,703	121,420	5,183

States and counties.	Wall-eyed pike.		Whitefish.		Other fish.		Turtles and frogs.	Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Value.	Pounds.	Value.
New York:									
Erie	17,671	$1,236	23,150	$1,388	3,800	$114	.....	1,843,057	$65,449
Chautauqua	53,406	1,622	294,700	14,347	63,340	1,345	.....	2,797,564	66,271
Total	71,077	2,858	317,850	15,735	67,140	1,459	.....	4,641,521	131,720
Pennsylvania:									
Erie	125,190	5,620	758,019	36,157	154,300	1,788	.....	12,864,844	211,122
Ohio:									
Ashtabula	2,000	90	44,300	1,970	26,910	339	.....	1,658,700	25,445
Lake	9,800	392	53,450	2,425	49,715	402	.....	2,414,085	31,652
Cuyahoga	87,220	4,212	224,250	11,200	311,308	3,749	.....	9,015,420	124,215
Lorain	69,030	3,022	51,620	2,400	60,910	595	.....	2,831,330	34,214
Erie	922,266	41,067	548,329	28,353	1,252,344	9,726	$574	23,095,970	301,444
Ottawa	258,750	10,529	165,333	8,725	244,800	1,748	2,000	3,309,303	63,530
Lucas	295,500	12,075	42,300	2,115	261,000	1,435	500	2,607,300	38,183
Total	1,644,566	71,387	1,129,582	57,278	2,209,987	18,000	3,074	44,932,108	618,683
Michigan:									
Monroe	264,900	10,750	136,000	6,800	193,000	1,005	1,000	2,412,400	39,380
Grand total	2,105,733	90,615	2,341,451	115,970	2,621,427	22,252	4,074	64,850,873	1,000,905

Table showing by States, counties, and species the yield of the vessel fisheries of Lake Erie in 1890.

States and counties.	Blue pike.		Herring.		Perch.		Saugers.		Sturgeon.	
	Pounds.	Value.	Pounds.	Value.	Pounds	Value.	Pounds	Value.	Pounds	Value.
New York:										
Chautauqua	37,585	$1,081	424,041	$8,459	5,774	$119	.....	.....	.....	.....
Erie	5,563	306	28,715	718	.....	.....	.....	.....	52,000	$1,578
Total	43,148	1,387	452,756	9,177	5,774	119	.....	.....	52,000	1,578
Pennsylvania:										
Erie	1,457,562	31,096	3,983,707	30,658	64,345	1,675	5,186	$41	.....	.....
Ohio:										
Ashtabula	112,500	2,325	315,000	3,125	7,500	150	.....	.....	.....	.....
Cuyahoga	1,165,909	19,371	3,661,364	41,892	602,620	6,896	20,454	209	.....	.....
Erie	133,670	2,930	573,350	6,525	10,666	106	6,660	72	.....	.....
Lake	35,250	619	212,813	2,100	9,900	148	.....	.....	.....	.....
Total	1,447,329	25,245	4,762,527	53,642	630,686	7,300	27,114	281	.....	.....
Grand total	2,948,039	57,728	9,198,990	102,477	700,805	9,094	32,300	322	52,000	1,578

States and counties.	Trout.		Wall-eyed pike.		Whitefish.		Other fish.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
New York:										
Chautauqua	12,655	$558	12,529	$361	171,175	$8,489	4,180	$65	667,939	$19,132
Erie	.....	.....	1,855	102	21,650	1,298	.....	.....	109,783	4,002
Total	12,655	558	14,384	463	192,825	9,787	4,180	65	777,722	23,134
Pennsylvania:										
Erie	42,000	1,675	38,808	1,635	451,175	22,148	5,500	110	6,048,343	98,038
Ohio:										
Ashtabula	.....	.....	.....	.....	11,250	525	.....	.....	446,250	6,125
Cuyahoga	.....	.....	53,182	2,597	120,272	6,015	150,108	2,001	5,773,909	78,981
Erie	.....	.....	.....	.....	40,000	2,300	8,320	100	772,666	12,033
Lake	.....	.....	938	38	1,490	73	.....	.....	260,391	2,078
Total	.....	.....	54,120	2,635	173,012	8,913	158,428	2,101	7,253,216	100,117
Grand total	54,655	2,233	107,372	4,733	817,012	40,848	168,108	2,276	14,079,281	221,289

Table showing by counties, apparatus, and species the yield of the shore fisheries of Lake Erie in 1890.

Apparatus and species.	New York.						Pennsylvania.	
	Erie.		Chautauqua.		Total.		Erie.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Pound nets and trap nets:								
Black bass	.....	.....	3,575	$203	3,757	$203	19,990	$1,032
Blue pike	.....	.....	36,300	1,085	36,300	1,085	300,500	9,000
Catfish	.....	.....	25,000	615	25,000	615	121,450	3,301
Herring	.....	.....	12,000	200	12,000	200	227,300	2,940
Perch	.....	.....	9,000	185	9,000	185	58,600	780
Saugers	.....	.....	.....	.....	.....	.....	19,650	310
Sturgeon	.....	.....	162,000	6,000	162,000	6,000	105,750	3,265
Wall-eyed pike	.....	.....	5,500	288	5,500	288	59,190	2,430
Whitefish	.....	.....	7,000	350	7,000	350	76,229	3,775
Other fish	.....	.....	28,000	439	28,000	439	136,100	1,175
Total	.....	.....	288,375	9,995	288,375	9,995	1,214,849	28,008

Table showing by counties, apparatus, and species the yield of the shore fisheries of Lake Erie—Continued.

Apparatus and species.	New York.						Pennsylvania.	
	Erie.		Chautauqua.		Total.		Erie.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Gill nets:								
Black bass	300	$10	5,430	$254	5,730	$264	.....	.....
Blue pike	11,666	551	98,404	2,009	110,070	3,160	1,383,083	$29,506
Catfish	500	10	.....	.....	500	10	.....	.....
Herring	10,000	115	1,317,864	18,019	1,327,864	18,104	3,801,503	37,845
Perch	5,850	105	11,676	258	17,526	363	58,005	1,522
Saugers	.....	.....	.....	.....	.....	.....	6,314	59
Sturgeon	1,175,610	41,429	113,180	4,770	1,228,790	46,199	.....	.....
Trout	.....	.....	26,065	1,310	26,065	1,310	40,000	1,605
Wall-eyed pike	3,556	184	32,802	870	36,358	1,054	27,132	1,555
Whitefish	.....	.....	116,525	5,508	116,525	5,508	230,615	10,234
Other fish	300	9	6,290	95	6,590	104	.....	.....
Total	1,207,782	42,413	1,728,236	33,723	2,936,018	76,136	5,546,652	82,320
Seines:								
Black bass	.....	.....	1,700	85	1,700	85	.....	.....
Catfish	.....	.....	3,875	155	3,875	155	.....	.....
Perch	.....	.....	1,400	35	1,400	35	.....	.....
Wall-eyed pike	.....	.....	2,575	103	2,575	103	.....	.....
Other fish	.....	.....	24,870	746	24,870	746	.....	.....
Total	.....	.....	34,420	1,124	34,420	1,124	.....	.....
Lines, spears, and grapnels:								
Black bass	.....	.....	4,700	271	4,700	271	.....	.....
Blue pike	97,432	6,100	1,000	60	98,432	6,220	14,800	804
Catfish	188,200	4,261	59,400	1,393	247,600	5,657	.....	.....
Herring	14,500	890	.....	.....	14,500	890	.....	.....
Perch	11,500	650	3,420	163	14,920	813	27,500	1,443
Sturgeon	197,500	5,925	9,374	375	206,874	6,300	.....	.....
Trout	.....	.....	700	35	700	35	.....	.....
Wall-eyed pike	12,200	950	.....	.....	12,260	950	.....	.....
Whitefish	1,500	90	.....	.....	1,500	90	.....	.....
Other fish	3,500	105	.....	.....	3,500	105	12,709	503
Total	526,392	19,034	78,594	2,297	604,986	21,331	55,000	2,750
Grand total	1,734,174	61,447	2,129,625	47,139	3,863,799	108,586	6,816,501	113,084

Apparatus and species.	Ohio.							
	Ashtabula.		Lake.		Cuyahoga.		Lorain.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Pound nets and trap nets:								
Black bass	5,600	$305	4,500	$270	1,020	$60	960	$50
Blue pike	110,100	2,650	242,000	3,990	334,230	4,788	310,050	4,073
Catfish	28,800	710	31,500	875	11,000	220	7,200	144
Herring	71,500	775	514,500	5,280	1,036,800	12,500	1,658,240	16,650
Perch	14,300	185	26,000	285	33,000	330	71,000	570
Saugers	.....	.....	23,500	205	147,500	1,150	161,120	1,450
Sturgeon	8,100	270	17,535	465	8,400	280	20,700	690
Wall-eyed pike	2,000	90	4,800	192	17,220	812	66,030	2,902
Whitefish	12,800	545	45,500	2,035	72,250	3,600	51,620	2,490
Other fish	24,500	290	42,500	300	62,000	620	55,410	510
Total	277,700	5,820	952,335	13,902	1,723,240	24,360	2,402,330	29,520
Gill nets:								
Blue pike	119,500	4,175	152,750	2,681	304,091	4,979	71,080	980
Herring	584,000	5,705	922,187	9,100	903,636	11,108	267,000	2,710
Perch	11,090	221	35,685	534	98,072	1,225	69,000	860
Saugers	.....	.....	.....	.....	4,546	46	13,500	130
Wall-eyed pike	.....	.....	4,062	162	16,818	603	3,000	120
Whitefish	20,250	900	9,469	317	31,728	1,685	.....	.....
Other fish	2,410	49	7,215	108	99,200	1,128	5,550	85
Total	817,250	11,050	1,128,359	12,902	1,518,091	20,874	429,000	4,685
Lines, spears, and grapnels:								
Catfish	117,500	2,450	73,000	1,870	.....	.....	.....	.....
Grand total	1,212,450	19,320	2,153,694	28,674	3,241,511	45,234	2,831,330	34,214

Table showing by counties, apparatus, and species the yield of the shore fisheries of Lake Erie—Continued.

Apparatus and species.	Ohio.							
	Erie.		Ottawa.		Lucas.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Pound nets and trap nets:								
Black bass	44,758	$2,247	20,000	$1,000	4,500	$270	81,338	$4,202
Blue pike	529,128	6,477	.....	.....	.....	.....	1,525,508	21,983
Catfish	85,882	2,257	70,000	1,750	60,000	1,500	294,382	7,436
Herring	13,960,643	135,955	580,000	4,350	990,000	7,425	18,811,683	182,935
Perch	758,710	4,128	95,000	550	135,000	675	1,133,010	6,723
Saugers	1,644,792	15,010	410,000	4,100	540,000	5,400	2,926,912	27,315
Sturgeon	139,758	6,436	24,000	480	12,000	240	230,493	8,861
Wall-eyed pike	575,106	23,787	150,000	6,000	270,000	10,800	1,085,156	44,583
Whitefish	461,664	23,253	34,000	1,475	40,000	2,000	717,834	35,308
Other fish	275,310	2,276	140,000	700	176,000	1,010	775,729	5,706
Total	18,475,760	221,806	1,523,000	20,405	2,227,500	29,320	27,582,045	345,142
Gill nets:								
Black bass	.....	.....	.....	.....	.....	.....	.....	.....
Blue pike	186,660	4,000	56,670	1,550	.....	.....	970,671	18,365
Catfish	.....	.....	.....	.....	.....	.....	.....	.....
Herring	893,320	9,755	663,300	6,765	21,000	158	4,314,443	45,301
Perch	21,334	214	90,000	900	.....	.....	325,181	3,754
Saugers	13,340	148	107,400	6,696	.....	.....	198,786	7,020
Sturgeon	.....	.....	.....	.....	.....	.....	.....	.....
Trout	.....	.....	.....	.....	.....	.....	.....	.....
Wall-eyed pike	.....	.....	83,600	3,344	.....	.....	107,480	4,429
Whitefish	46,665	2,800	131,333	7,250	2,300	115	238,736	12,967
Other fish	16,780	200	.....	.....	.....	.....	131,105	1,570
Total	1,178,099	17,117	1,192,303	26,505	23,300	273	6,286,402	93,406
Fyke nets:								
Black bass	42,085	2,104	40,000	2,400	.....	.....	82,085	4,504
Catfish	236,250	4,620	90,000	1,800	20,000	500	346,250	6,920
Perch	238,670	1,790	20,000	200	25,000	250	283,670	2,240
Saugers	336,055	3,150	12,200	366	10,000	300	360,855	3,816
Wall-eyed pike	291,860	14,220	17,800	734	5,500	275	315,160	15,229
Other fish	926,925	6,550	40,000	400	40,000	200	1,006,925	7,150
Total	2,074,445	32,434	220,000	5,900	100,500	1,525	2,394,945	39,859
Seines:								
Black bass	5,800	350	32,000	1,920	2,000	120	39,800	2,390
Blue pike	11,500	350	.....	.....	.....	.....	11,500	350
Catfish	16,500	570	140,000	2,800	30,000	750	186,500	4,120
Perch	10,500	250	25,200	252	15,000	150	50,700	652
Saugers	15,400	460	4,650	149	104,000	3,120	124,050	3,729
Wall-eyed pike	26,003	1,300	7,350	451	20,000	1,000	53,350	2,751
Other fish	25,000	600	64,800	648	45,000	225	134,800	1,473
Total	110,700	3,680	274,000	6,220	216,000	5,365	600,700	15,465
Lines, spears, and grapnels:								
Catfish	100,000	4,750	100,000	2,500	40,000	1,200	520,500	12,770
Perch	60,000	1,520	.....	.....	.....	.....	60,000	1,520
Saugers	205,000	5,570	.....	.....	.....	.....	205,000	5,570
Wall-eyed pike	29,300	1,760	.....	.....	.....	.....	29,300	1,760
Total	484,300	13,600	100,000	2,500	40,000	1,200	814,800	21,620
Miscellaneous:								
Turtles and frogs	.....	574	.....	2,000	.....	500	.....	3,074
Grand total	22,323,304	289,411	3,309,303	63,530	2,607,300	38,183	37,678,892	518,566

Table showing by counties, apparatus, and species the yield of the shore fisheries of Lake Erie—Continued.

Apparatus and species.	Michigan. Monroe. Pounds.	Michigan. Monroe. Value.	Total for lake. Pounds.	Total for lake. Value.
Pound nets and trap nets:				
Black bass	7,500	$450	112,403	$5,887
Blue pike			1,952,308	32,068
Catfish	30,000	750	470,832	12,132
Herring	1,160,000	8,700	20,210,983	194,775
Perch	70,000	350	1,270,700	8,038
Saugers	280,000	2,800	3,226,562	30,425
Sturgeon	33,000	900	531,243	19,626
Wall-eyed pike	250,000	10,000	1,399,846	57,301
Whitefish	136,000	6,800	937,063	46,323
Other fish	138,000	730	1,077,829	8,050
Total	2,104,500	31,480	31,189,709	414,625
Gill nets:				
Black bass			5,730	264
Blue pike			2,463,824	51,031
Catfish			500	10
Herring			9,443,810	101,310
Perch			400,712	5,639
Saugers			205,100	7,070
Sturgeon			1,288,790	46,109
Trout			66,065	2,915
Wall-eyed pike			170,970	7,038
Whitefish			585,876	28,709
Other fish			137,695	1,674
Total			14,769,072	251,868
Fyke nets:				
Black bass	500	30	82,585	4,534
Catfish	30,000	750	376,250	7,670
Perch	20,000	200	303,670	2,440
Saugers	8,000	240	368,855	4,056
Wall-eyed pike	3,500	175	318,660	15,404
Other fish	25,000	125	1,031,925	7,275
Total	87,000	1,520	2,481,945	41,379
Seines:				
Black bass	1,500	90	43,000	2,565
Blue pike			11,500	350
Catfish	40,000	1,000	230,375	5,275
Perch	25,000	250	77,100	937
Saugers	18,000	540	142,050	4,269
Wall-eyed pike	3,000	150	58,925	3,004
Other fish	30,000	150	189,670	2,369
Total	117,500	2,180	752,620	18,769
Lines, spears, and grapnels:				
Black bass			4,700	271
Blue pike			113,232	7,024
Catfish	80,000	2,400	848,100	20,827
Herring			14,500	890
Perch	15,000	375	117,420	4,151
Saugers			205,000	5,570
Sturgeon			206,874	6,300
Trout			700	35
Wall-eyed pike	8,400	425	49,960	3,135
Whitefish			1,500	90
Other fish			16,200	608
Total	103,400	3,200	1,578,186	48,901
Miscellaneous:				
Turtles and frogs		1,000		4,074
Grand total	2,412,400	39,380	50,771,592	779,616

Canadian fisheries of Lake Erie controlled by Sandusky dealers.—The growing demand for fishery products, and the failure of the American fisheries to supply all the fish required for the trade of the Sandusky dealers, has, during the past ten years, led to an extension of the operations of the Sandusky fishermen into Canadian waters. Several firms now control important pound-net fisheries on the northern shore of Lake Erie. Over 100 pound nets are there employed, and 3 steamers are engaged in transporting the catch to Sandusky. Herring constitutes more than two-thirds of the weight and over one-half the value of the yield. The following tables relate to these fisheries:

Persons employed.

How engaged.	Number.	
	1890.	1891.
In fishing pound nets	130	132
On collecting vessels	26	26
Total	156	158

Vessels, boats, apparatus, etc., employed.

Items.	1890.		1891.	
	Number.	Value.	Number.	Value.
Steamers	3	$36,000	3	$36,000
Boats	68	9,030	70	9,300
Pile-drivers	28	5,035	29	5,210
Pound nets	109	34,960	111	35,650
Shore property	.....	1,200	.....	1,200
Total	.....	86,225	.....	87,360

Products in 1890.

Species.	Pounds.	Value.
Whitefish	117,010	$5,850
Herring	2,492,607	21,659
"Hard" fish	142,185	5,686
"Soft" fish	106,330	1,020
Perch	142,040	722
Black bass	55,215	8,540
Catfish	19,420	485
Sturgeon	23,400	1,560
Total	3,098,267	40,522

The yield of these fisheries during the ten years ending in 1890 is shown in the following table. It appears that during1887, 1888, and 1889 the output was larger than in any other years. The figures are from the official customs-house records, and show separately the fish brought in free and those subject to a duty.

Fish imported at Sandusky, Ohio, from 1881 to 1890, taken in fisheries on the Canadian side of Lake Erie controlled by Sandusky dealers.

Years.	Free of duty.		Dutiable.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
1881	1,113,647	$16,493	13,486	$535	1,127,133	$17,028
1882	1,288,831	20,201	194,981	5,721	1,483,812	25,922
1883	1,024,100	20,446	859,536	11,763	1,883,636	32,209
1884	1,010,289	18,637	722,504	6,517	1,732,793	25,154
1885	1,062,521	19,088	60,547	8,191	2,023,068	27,279
1886	927,027	12,948	346,779	2,267	1,273,806	15,215
1887	3,024,984	37,211	1,109,441	12,094	4,134,425	49,305
1888	4,609,155	54,539	912,186	13,577	5,521,341	68,116
1889	5,135,152	46,428	796,456	9,463	5,931,608	55,891
1890	2,204,463	27,698	893,804	12,824	3,098,267	40,522
Total	22,300,169	273,689	5,909,720	82,952	28,209,889	356,641

Notes on the fish trade of Ohio.—At Cleveland, Sandusky, Toledo, Port Clinton, and other places in Ohio important wholesale trade in fish is carried on. The business is larger than in any other State bordering on the lakes. While most of the supply comes from Lake Erie, important consignments are also received from the other lakes.

The following table is a detailed exhibition of the extent of the wholesale fish trade of Ohio in 1890. The number of persons engaged in connection with the receipt, preparation, and sale of the fish was over 800; the capital devoted to the industry amounted to over $830,000 exclusive of collecting vessels and other property properly included under the statistics for the fishery; the quantity of fish handled was over 46,000,000 pounds, having a value of more than $1,490,000.

Table showing by counties the wholesale fish trade of Ohio in 1890.

Items.	Cuyahoga.	Erie.	Lake.	Lorain.	Lucas.	Ottawa.	Total.
Number of establishments	12	23	3	2	7	4	51
Number of persons employed	99	301	10	9	208	186	813
Value of property	$104,500	$265,900	$9,850	$9,000	$74,000	$68,500	$531,750
Cash capital	$70,000	$199,000	$10,000	$6,000	$9,000	$8,000	$302,000
Fish handled in wholesale trade:							
Fresh lbs.	3,722,270	14,034,145	1,512,550	850,823	2,234,000	1,612,000	23,965,788
Value	$125,470	$427,050	$40,487	$21,289	$92,710	$74,560	$781,566
Frozen lbs.	1,647,000	7,986,643			2,031,000	887,000	12,551,643
Value	$56,005	$270,486			$76,630	$34,030	$137,151
Salted lbs.	2,641,000	3,734,218	603,000	740,000	400,000	394,000	8,512,218
Value	$67,590	$100,105	$19,875	$23,950	$10,000	$10,830	$232,324
Smoked lbs.	128,000	272,800	9,500		52,500		462,800
Value	$10,800	$20,860	$1,140		$2,200		$35,000
Total quantity handled, pounds	8,138,270	26,027,806	2,125,050	1,590,823	4,717,500	2,893,000	45,492,449
Value	$259,865	$818,501	$61,502	$45,239	$181,540	$119,420	$1,486,071
Fish utilized in canning lbs.		520,000					520,000
Value paid		$5,850					$5,850
One-pound cans prepared		140,000					140,000
Value		$8,200					$8,200
Two-pound cans prepared		36,000					36,000
Value		$3,240					$3,240
Secondary products prepared:							
Caviar lbs.	1,700	56,100	3,100		31,000	1,100	96,600
Value	$375	$11,260	$654		$10,850	$330	$23,989
Isinglass lbs.		1,500	60		600	20	2,180
Value		$2,250	$90		$900	$30	$3,270
Oil galls.					400	50	450
Value					$100	$13	$113

NOTE.—In Ashtabula County, 3,600 pounds of caviar, valued at $520, were prepared.

Sandusky has the distinction of maintaining the largest trade in fresh-water fish of any city in the country. Most of the trade shown for Erie County in the preceding table represents the fish business of that city. The following special statistics relating to the salt-fish and frozen-fish trade of that place are more detailed than those contained in the previous table for the entire State of Ohio:

Statistics of the salt fish handled in the wholesale trade of Sandusky, Ohio, in 1890.

Trade names.	Pounds.	Value.
"Herring"	1,336,756	$33,297
"No. 1 whitefish"	6,130	398
"Ciscoes" (herring split in belly)	314,352	7,504
"Family whitefish" or "No. 2 whitefish" (large herring)	316,650	12,786
"No. 1 pickerel"	16,105	235
"No. 2 pickerel" (saugers, etc.)	220,035	5,107
"Medium pickerel" (blue pike)	45,540	1,456
"Shad" (suckers, etc.)	75,764	1,490
Skinned catfish	570	40
Total	2,331,902	62,313

Statistics of the fish frozen by Sandusky wholesale dealers in 1890.

Species.	Pounds.	Value.
Whitefish	162,487	$12,832
Herring	5,194,487	155,306
Blue pike	56,005	2,785
Saugers	151,366	4,539
White bass	6,742	270
Perch	62,994	1,549
Shad, suckers, etc	12,583	316
Miscellaneous "hard" fish	13,726	1,094
Total	5,660,390	178,691

LAKE ONTARIO.*

General importance of the fisheries.—The present relative unimportance of the fisheries of this lake, as compared with the extent of the industry in other lakes, is coexistent with a decrease since 1880 in two of the most important fishes that has been unparalleled in the history of the lake fisheries. The scarcity of fishes that were formerly abundant and the possibility of further reduction in the fish supply have drawn to the fisheries of Lake Ontario more attention than has been accorded to the industry in any other lake except Lake Erie, and have resulted in a very extensive movement on the part of legislators, sportsmen, fish-culturists, and the general public, having for its object the preservation and increase of the valuable fishery resources of the lake. While a few persons express the opinion that there has been no actual diminution in the abundance of fish life, and that the small yield is due to natural causes, there seems little ground for doubt that the lake has been overfished, that some of the best fishes have not had proper protection during the spawning period, and that artificial propagation has not been resorted to on a sufficiently large scale to offset or overcome the depletion caused by man.

The previous abundance of fish in the lake shows that the waters are capable of sustaining much more important fishing than has been carried on for a number of years. While it is possible that the vast quantities of alewives now found in the lake may affect in some indirect way the growth of young fish and the increase in the numbers of marketable fish, it is extremely improbable that the natural conditions have undergone any marked changes that militate against the renewal of fisheries of as great extent as have ever existed. The U. S. Commissioner of Fish and Fisheries has stated that "it is not only possible, it is entirely practicable, to restore and maintain these fisheries by adequate resort to means and agencies entirely within our control"—the "means and agencies" consisting of the application of well-known fish-cultural principles, which, under similar conditions in other waters, have been satisfactorily applied.

The principal fishing centers in this lake are Cape Vincent, Sacketts Harbor, Oswego, and Wilson. Much the largest fishing interests are located in Jefferson County, which occupies the eastern part of the lake and includes most of the important fishing-grounds. Oswego County, which joins Jefferson on the west, and Niagara County, at the extreme western limit of the State, also have relatively valuable fisheries. In the remaining counties of Cayuga, Wayne, Monroe, and Orleans, however, the fisheries are of slight extent.

* A report on the fisheries of this lake, prepared by the present writer, has already appeared in the Bulletin of the U. S. Fish Commission for 1890. It contains some information that it is not necessary to incorporate in this article, and may be consulted by those especially interested in the fisheries of this lake.

Notes on the commercial fishes.—The fish now of greatest economic value in Lake Ontario does not occupy a corresponding rank in any other lake, although of great prominence in other parts of the Great Lakes basin; this is the wall-eyed pike, locally known also as the pickerel and yellow pike. Its relative as well as its actual importance has greatly increased of late years, owing to the scarcity of whitefish and trout, which requires the fishermen to take other fish in order to make their business remunerative. The fish is always in demand, at higher prices than are commanded by any other fishes, and throughout the eastern end of the lake its abundance determines the financial success of the fishermen. Fishermen who formerly sought only whitefish and trout, now confine their attention to the wall-eyed pike, and it is of the utmost consequence to the fishing interests that the supply of this fish be maintained. Fortunately the spawning season is such as to insure the almost uninterrupted completion of the reproductive function before the opening of the fishing operations. The fish spends the winter in the deeper parts of the lake. In April it appears in the inshore waters and then and there undergoes the spawning process. In early summer it frequents the shoals in the lake, where the principal part of the catch is taken; and on the approach of cold weather it again retires to the deep water. The fish subsist in large part on the alewive (*Clupea pseudoharengus*) and are reported to have increased in size as the result of the abundant food furnished by the presence of that exotic species. The fish is taken chiefly in the trap nets set in the eastern part of the lake. In Jefferson County, where most of the traps are owned, it constitutes one-third the total quantity of the catch, and yields three-fifths the income of the fishermen. Small numbers are taken with gill nets, seines, and lines. The average weight of the fish is 4 pounds and the maximum about 14 pounds.

The subspecies of the wall-eyed pike, generally known as the blue pike, which is a prominent fish in Lake Erie, is not very common in this lake. In 1891, however, it was found in very large numbers in the vicinity of Oswego, attaining greater abundance than at any previous time in many years. The other species of pike perch, the sauger, which is also a conspicuous factor in the fisheries of the adjoining lake, does not occur in commercial abundance in Lake Ontario.

The sturgeon, which occupies the second position in this lake, is likewise far from having the same relative importance in other parts of the lake region. While the fish is manifestly scarcer than formerly, the present supply is about the same as in 1880, owing to the increased efforts made by the fishermen to keep up the output as a result of steady demand and good prices. It is taken chiefly with gill nets and set lines, and is most abundant in the eastern end of the lake, although considerable quantities are also taken on set lines in Niagara and Orleans counties, which occupy the western shore line.

Three species of whitefishes have commercial importance in this lake. The common whitefish has been of late years so scarce that it has had

little economic value, although less than ten years ago it was the principal fish taken. The decrease in the catch in a single decade was over 86 per cent, a change that is without precedent in any other lake. The fish is now taken almost wholly in Jefferson County. The grounds chiefly resorted to are Charity Shoal and the vicinity of the Duck Islands. These islands are in Canada, and support the most extensive whitefish fishery now carried on in the lake. The scarcity of whitefish on the American side of the lake is not without precedent, although the length of the period of scarcity is greater than ever before recorded. The lake herring or cisco is abundant in this lake, although it is much less plentiful than formerly. The largest quantities are now taken in Jefferson County in gill nets. In fall and winter the fish resort to the shore for the purpose of spawning, and it is then that the principal fishing is done. Since the longjaw or bloater whitefish became prominent in the fisheries of this lake, the cisco has occupied a gradually diminishing importance, and in some places where it was formerly the principal fish it is now taken in only one-tenth the quantity that the longjaw is. The latter, known also by the names bloater, ciscoette, silver whitefish, etc., is now the most abundant whitefish inhabiting the lake. It frequents the deepest water and is taken only in gill nets.

The lake trout deserves mention not because of its present importance, but because of its former abundance and marked decrease. In 1880 it was, next to the whitefish, the most prominent fish of this lake; now it has less value than any fish of sufficient importance to be separately designated in the accompanying statistical tables. The decrease since 1880 has been even more pronounced than in the case of the whitefish, amounting to nearly 93 per cent. In many places in which trout were formerly taken in large quantities they are now rarely observed. The decline of the trout, coincident with that of the whitefish, and the apparent supplanting of these fish by others respectively similar in habits—the wall-eyed pike and the long-jaw whitefish—constitute the most prominent features of this lake and demand careful consideration. While some fishermen think the decrease in the abundance of these fish has been only apparent, as shown by the large catches made on the Canadian side of the lake, the most plausible explanation seems to be that the fish have not had any protection immediately prior to and during the spawning season, and that the fish-cultural operations undertaken have not been sufficiently extensive to overcome the destruction of eggs and breeding fish.

Among other fishes of the lake of some commercial value, but not worthy of separate discussion, are, in order of importance, catfish, eels, pike, yellow perch, suckers, and black bass.

Notes on apparatus and methods.—The fishing apparatus in this lake which represents the largest investment is the trap net, which is practically restricted to Jefferson County at the eastern end of the lake. The trap net here used is similar in construction to the one in common

use in the southern New England States. It is smaller than the ordinary lake pound net, is held in position by means of weights and buoys instead of poles, and the escape of the fish from the bowl is prevented by a top of netting.

The use of trap nets is more extensive in this lake than in any other member of the lake system. The explanation is that the stony character of the bottom in the most favorable fishing regions prevents or makes difficult the driving of pound-net poles, and that legal enactments have prohibited the setting of such apparatus in the inshore waters in most places.

The important advantages which the trap net has over the pound net are that it may be readily moved from place to place to correspond with the movements of the fish, and that an entire net may be taken ashore from time to time, repaired, cleaned, and dried. It is comparatively inexpensive, and individual fishermen can afford to operate as many as 8 or 10 at one time. It is set on the bottom in water from 10 to 25 feet deep, and is drawn daily or less frequently, according to the abundance of fish, the condition of the weather, state of the market, etc. It is well adapted to the capture of whitefish, lake trout, sturgeon, perch, suckers, and wall-eyed pike. More trout and wall-eyed pike are thus taken than with all other appliances combined. A form of trap with a finer mesh, known as an eel trap, is used in some numbers for eels, which are thus caught in larger quantities than with any other apparatus except fyke nets.

A few pound nets are operated by fishermen of Three-Mile Bay, Black River Bay, and Sacketts Harbor, about a dozen nets being used annually in recent years. They are of small size, and are set close inshore, catching herring and other fish that resort to the shores.

Gill nets rank next to traps in value and surpass them in the quantity and value of the catch. They are generally used throughout the lake, but are most extensively employed in Jefferson and Niagara counties. Whitefish and trout gill nets have a 3-inch mesh; 20 or 22 rods of rigged netting represent 1 pound of twine. The usual complement of a boat in the eastern part of the lake, where most of the whitefish and trout are caught, is 100 to 600 rods. Herring and long-jaw gill nets have 1⅞-inch mesh; when ready for fishing 1 pound makes 14 to 20 rods of netting. The price of a fully rigged net ranges from $4 to $6 per pound, depending on various circumstances. In the important long-jaw fisheries of Niagara County each gill-net boat employs about 50 pounds of netting in a season, about 12 pounds being in the water at one time. These nets, fitted for deep-water fishing, cost $6 per pound when fully rigged. In the eastern end of the lake the quantity of netting used by a boat varies from 100 to 600 rods, the average being about 300 rods. The gill nets fished for sturgeon have a 6-inch mesh, bar measure; 1 pound of the twine makes a net about 120 feet long. In some places only 9 to 12 pounds are fished by a single boat, but in the eastern end of the lake the sturgeon nets are very long, single boat crews operating several hundred rods of netting.

The principal fish taken in gill nets are lake herring, long-jaw whitefish, and sturgeon, all of which are thus caught in larger quantities than with any other kind of apparatus. The gill-net catch of black bass and whitefish is also larger than by other means.

Fyke nets are the most important of the remaining forms of apparatus employed in this lake. In the eastern part of the lake they are, to a great extent, operated by trap-net fishermen, and in other sections of the lake very few nets are used by men not engaged in other fisheries. Fykes are mostly set for catfish, which constitute nearly half the catch, the other fish of importance being pike, pike perch, eels, and suckers. Trawl lines are sparingly used at a number of places, but are not an important means of capture. They take chiefly sturgeon. Seines and dip nets, which complete the list of apparatus, are unimportant and capture mostly suckers.

Fishing-grounds.—The grounds resorted to by the gill-net fishermen of this lake extend 10 miles offshore. Whitefish and trout are taken mostly in deeper water, but lake herring, sturgeon, and pike are caught chiefly in the inshore waters. The fishery for the long-jaw whitefish, which is most extensive in the western counties of the lake, is carried on in deep water at a distance of 3 to 10 miles from shore.

Trap nets are operated only in the eastern part of the lake, being set principally in the vicinity of Charity Shoal and around the islands which are favorite resorts for the whitefish, trout, and pike perch.

Fyke nets are fished in the numerous bays, ponds, and creeks along the shores of the lake where catfish, eels, perch, pike, and suckers, to the capture of which the fyke net is especially adapted, naturally resort. The principal fyke-net grounds are in Jefferson and Oswego counties.

The set-line fishing-grounds for sturgeon are chiefly in Jefferson and Oswego counties, in the eastern part of the lake, and in Monroe, Orleans, and Niagara counties, in the western part.

In addition to the suckers taken incidentally in trap and fyke nets, there is a special fishery for them with dip nets and small seines in creeks in Niagara County, to which the fish resort in the early spring for the purpose of spawning.

Statistics of the fisheries.—The following series of tables illustrates the extent of the various phases of the fishing industry in Lake Ontario. The tables relate to persons employed, apparatus, boats, and vessels used, and quantity and value of the catch, the figures being by counties.

Table showing by counties the number of persons employed in the fisheries of Lake Ontario in 1890.

Counties.	In vessel fisheries.	In shore fisheries.	On shore.	Total.
Jefferson	4	152	16	172
Oswego	5	53	4	62
Cayuga	2	11	2	15
Wayne	.....	41	.....	41
Monroe	.....	28	.....	28
Orleans	.....	17	.....	17
Niagara	.....	54	.....	54
Total	11	356	22	389

Table showing by counties the vessels, boats, apparatus, and capital employed in the fisheries of Lake Ontario in 1890.

Designation.	Jefferson.		Oswego.		Cayuga.		Wayne.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels, with outfits	1	$5,880	1	$3,300	1	$405	.....	.....
Boats	202	15,700	48	1,390	13	595	54	$2,245
Apparatus of capture:								
Gill nets.....feet.	696,425	10,911	57,180	792	18,315	296	66,591	935
Pound nets and traps	286	24,455	.....	.....	.....	.....	2	122
Fyke nets	458	6,859	140	2,100	26	315	80	365
Seines	3	60	4	240	.....	.....	2	60
Set lines.....feet.	17,192	35	37,200	75	.....	.....	1,210	4
Miscellaneous apparatus	.....	45	.....	4	.....	.....	.....	.....
Shore property	.....	18,882	.....	3,980	.....	200	.....	1,525
Cash capital	.....	12,390	.....	500	.....	.....	.....	.....
Total	.....	95,208	.....	12,381	.....	1,871	.....	5,256

Designation.	Monroe.		Orleans.		Niagara.		Total.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels, with outfits	.....	.....	.....	.....	.....	.....	3	$9,585
Boats	20	$172	11	$305	25	$870	373	21,577
Apparatus of capture:								
Gill nets.....feet.	42,240	434	76,395	1,775	146,799	2,067	1,103,945	18,110
Pound nets and traps	.....	.....	.....	.....	.....	.....	288	24,577
Fyke nets	21	192	.....	.....	.....	.....	684	9,822
Seines	4	48	.....	.....	14	248	27	656
Set lines.....feet.	.....	.....	59,200	296	24,840	80	139,632	490
Miscellaneous apparatus	.....	.....	.....	.....	.....	.....	.....	49
Shore property	.....	600	.....	71	.....	453	.....	25,777
Cash capital	.....	.....	.....	.....	.....	.....	.....	12,890
Total	.....	1,752	.....	2,447	.....	4,618	.....	123,533

Table showing by counties and species the yield of the fisheries of Lake Ontario in 1890.

Species.	Jefferson.		Oswego.		Cayuga.		Wayne.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Black bass	11,855	$1,058	6,201	$340	2,676	$148	3,993	$231
Catfish	315,711	8,360	108,650	2,173	15,100	302	16,030	757
Eels	247,400	8,396	3,600	188	910	44	2,890	173
Herring	369,334	14,199	24,525	981	1,600	48	26,210	776
Perch	241,520	2,383	70,600	1,765	3,960	109	33,985	715
Pike	39,950	1,595	61,795	3,361	10,370	463	15,000	753
Pike perch	296,832	26,955	24,673	1,245	3,454	172	1,900	76
Sturgeon	374,235	14,949	22,532	1,083	.....	.....	2,330	70
Suckers	168,820	1,900	51,115	935	4,865	72	5,410	113
Trout	40,400	2,048	500	30	.....	.....	.....	.....
Whitefish	143,771	6,517	3,550	213	.....	.....	720	72
Other fish	166,540	1,782	67,880	1,697	4,498	72	9,480	124
Total	2,416,458	90,142	445,621	14,011	47,433	1,430	118,008	3,860

Species.	Monroe.		Orleans.		Niagara.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Black bass	2,800	$224	3,000	$210	2,567	$153	33,092	$2,364
Catfish	11,564	653	1,500	30	3,400	169	471,955	12,444
Eels	2,300	112	.....	.....	.....	.....	257,190	8,913
Herring	10,960	438	6,000	120	160,340	4,374	598,978	20,936
Perch	4,115	245	1,150	35	3,617	116	358,947	5,368
Pike	2,000	100	.....	.....	315	12	129,490	6,284
Pike perch	.....	.....	.....	.....	4,143	281	331,002	28,729
Sturgeon	.....	.....	90,675	3,830	51,980	2,359	541,752	22,291
Suckers	7,420	312	910	27	40,630	1,219	279,170	4,578
Trout	.....	.....	.....	.....	110	11	41,010	2,089
Whitefish	.....	.....	.....	.....	730	73	148,771	6,875
Other fish	2,753	129	440	13	3,500	98	255,091	3,915
Total	43,912	2,213	103,675	4,265	271,341	8,805	3,446,448	124,786

Table showing by counties, apparatus, and species the yield of the fisheries of Lake Ontario in 1890.

Apparatus and species.	Jefferson.		Oswego.		Cayuga.		Wayne.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Gill nets:								
Black bass	5,625	$450	5,283	$290	2,676	$148	3,300	$190
Herring	364,220	14,056	18,500	740	1,600	48	25,000	740
Perch					2,110	61	26,400	528
Pike			24,100	1,210	6,250	253	9,300	465
Pike perch			21,606	1,072	3,454	172	1,350	54
Sturgeon	344,329	13,784	8,710	450			2,330	70
Suckers			6,250	125	2,200	32		
Trout	10,027	525	500	30				
Whitefish	75,379	3,510	2,000	120			720	72
Other fish					1,218	20	4,010	50
Total	799,580	32,325	86,949	4,037	19,508	734	73,010	2,169
Pound nets and trap nets:								
Black bass	6,230	608					258	15
Catfish	49,010	1,222						
Eels	196,204	6,550						
Herring	5,114	143					610	18
Perch	149,100	1,390					1,875	37
Pike							520	26
Pike perch	206,832	26,955					300	12
Sturgeon	26,075	992						
Suckers	93,800	938						
Trout	30,181	1,513						
Whitefish	68,392	3,007						
Other fish	118,690	1,260					1,660	18
Total	1,039,628	44,578					5,223	126
Fyke nets:								
Catfish	260,374	7,000	105,000	2,100	15,100	302	14,265	704
Eels	46,636	1,660	3,000	188	910	44	2,890	173
Perch	92,420	993	68,800	1,720	1,850	48	3,460	105
Pike	37,450	1,520	28,000	1,400	4,120	210	4,200	210
Suckers	47,080	434	18,665	280	2,665	40	4,410	98
Other fish	47,850	522	67,200	1,680	3,280	52	2,300	46
Total	531,810	12,179	291,265	7,368	27,925	696	31,525	1,336
Seines:								
Catfish			3,400	68			935	28
Herring			6,025	241			600	18
Perch			1,800	45			1,250	25
Pike			820	41			640	32
Pike perch			885	53			250	10
Suckers			3,250	65			1,000	15
Whitefish			1,550	93				
Other fish			680	17			910	10
Total			18,410	623			5,585	138
Lines:								
Black bass			918	50			435	26
Catfish	1,767	47	250	5			830	25
Eels	4,650	186						20
Perch							1,000	20
Pike			8,875	710			400	
Pike perch			2,182	120				
Sturgeon	3,621	167	13,822	633				
Suckers			1,250	25				
Trout	192	10						
Total	10,230	410	27,297	1,543			2,665	91
Minor apparatus:								
Catfish	4,560	91						
Pike	2,500	75						
Sturgeon	210	6						
Suckers	27,940	478	21,700	440				
Total	35,210	650	21,700	440				
Grand total	2,416,458	90,142	445,621	14,011	47,433	1,430	118,008	3,860

Table showing by counties, apparatus, and species the yield of the fisheries of Lake Ontario—Continued.

Apparatus and species.	Monroe.		Orleans.		Niagara.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Gill nets:								
Black bass	2,800	$224	3,000	$210	600	$35	23,284	$1,547
Catfish	6,030	275	1,500	30	1,000	25	8,530	330
Herring	10,960	438	6,000	120	160,349	4,374	586,629	20,516
Perch			1,150	35	550	24	30,210	648
Pike	2,000	100			90	4	41,740	2,032
Pike perch					560	32	20,970	1,330
Sturgeon			43,425	1,880	30,125	1,423	428,919	17,007
Suckers	3,920	158	910	27	300	9	13,580	351
Trout					110	11	10,637	566
Whitefish					150	15	78,249	3,717
Other fish	1,200	36	440	13	1,500	58	8,968	177
Total	26,910	1,231	56,425	2,315	195,334	6,010	1,257,710	48,821
Pound nets and trap nets:								
Black bass							6,488	623
Catfish							49,010	1,222
Eels							196,204	6,550
Herring							5,724	161
Perch							150,975	1,427
Pike							520	26
Pike perch							297,132	20,967
Sturgeon							26,075	992
Suckers							93,800	938
Trout							30,181	1,513
Whitefish							68,392	3,007
Other fish							120,350	1,278
Total							1,044,851	44,704
Fyke nets:								
Catfish	5,534	378					400,273	10,484
Eels	2,900	112					56,336	2,177
Perch	4,115	245					170,645	3,111
Pike							73,770	3,340
Suckers	3,500	154					76,320	1,056
Other fish	1,553	93					122,183	2,393
Total	17,002	982					899,527	22,561
Seines:								
Black bass					1,967	118	1,967	118
Catfish					2,400	144	6,735	240
Herring							6,625	259
Perch					3,067	92	6,117	162
Pike					225	8	1,685	81
Pike perch					3,583	249	4,718	312
Sturgeon					2,480	78	2,480	78
Suckers					40,330	1,210	44,580	1,290
Whitefish					580	58	2,130	151
Other fish					2,000	40	3,590	67
Total					56,632	1,997	80,627	2,758
Lines:								
Black bass							1,353	76
Catfish							2,847	77
Eels							4,650	186
Perch							1,000	20
Pike							9,275	730
Pike perch							2,182	120
Sturgeon			47,250	1,950	19,375	858	84,068	3,608
Suckers							1,250	25
Trout							192	10
Total			47,250	1,950	19,375	858	106,817	4,852
Minor apparatus:								
Catfish							4,560	91
Pike							2,500	75
Sturgeon							210	6
Suckers							49,640	918
Total							56,910	1,090
Grand total	43,912	2,213	103,675	4,265	271,341	8,865	3,446,448	124,780

III.—THE FISHERIES CONSIDERED BY STATES.

Explanatory note.—In the foregoing chapter, the fisheries have been considered primarily by lakes, and secondarily by States and counties. To facilitate the comprehension of the extent of the fisheries in each State, the following statistics have been prepared, consisting (1) of a series of general tables by States, and (2) of special tables, by lakes, for the States having a frontage on two or more lakes; these are Michigan, Wisconsin, and New York. The figures are presented without detailed explanatory notes, which previous discussions render unnecessary.

Statistics.—The figures show that in the matter of persons employed Michigan takes precedence over all other States; more than one-third of the entire fishing population of the Great Lakes is here employed. The other States in the order of their rank are Ohio, New York, Wisconsin, Pennsylvania, Illinois, Indiana, and Minnesota. The number of vessel fishermen and of shore fishermen is greatest in Michigan, while the number of shoresmen is greatest in Ohio.

Ohio leads in the matter of invested capital, closely followed by Michigan; after which come New York, Wisconsin, Illinois, Pennsylvania, Minnesota, and Indiana. The number of fishing vessels, boats, gill nets, and pound nets is greatest in Michigan; the number of collecting vessels, fyke nets, and the amount of shore property and cash capital are greatest in Ohio.

The value of the fisheries of Michigan is greater than that of any other State, although the quantity of products taken is greatest in Ohio. The rank of the States, based on the value of the catch, is Michigan, Ohio, Wisconsin, New York, Pennsylvania, Illinois, Indiana, and Minnesota. The largest catch of bass, lake herring, and pike perch is taken in Ohio. Perch, trout, and whitefish are caught in largest quantities in Michigan. The yield of sturgeon is greatest in New York.

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

States.	On fishing vessels.	On transporting vessels.	In shore fisheries.	On shore, in fish-houses, etc.	Total.
New York	26	6	1,346	120	1,498
Pennsylvania	92	3	250	58	403
Ohio	105	87	1,733	813	2,738
Michigan	220	24	2,693	400	3,343
Indiana	5	.....	89	.....	94
Illinois	12	.....	309	65	386
Wisconsin	126	.....	956	143	1,225
Minnesota	6	13	17	15	51
Total	598	133	7,393	1,614	9,738

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

Designation.	New York.		Pennsylvania.		Ohio.		Michigan.		Indiana.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	5	$15,300	14	$41,800	16	$61,100	38	$126,850	1	$1,20
Tonnage	71.39		97.10		189.62		521.01		5.51	
Outfit		2,488		7,420		8,750		19,703		420
Vessels transporting	2	5,280	1	2,000	19	144,200	8	32,800		
Tonnage	32.48		16.76		988.08		199.27			
Outfit		1,005		400		12,725		2,645		
Boats	530	36,677	94	32,920	1,016	159,980	1,481	96,076	52	3,870
Apparatus of capture, vessel fisheries:										
Gill nets	1,172	8,790	10,177	33,512	7,747	25,842	12,796	95,229	363	1,640
Apparatus of capture, shore fisheries:										
Pound nets and trap nets	325	29,427	200	29,270	1,423	464,180	1,460	333,950	32	11,800
Gill nets	5,755	44,142	12,193	39,056	14,621	36,281	16,547	102,443	890	2,165
Fyke nets	684	9,822			1,110	63,650	446	12,030		
Seines	32	781			33	4,630	58	9,010		
Lines, spears, dip nets, etc		2,118		160		3,712		4,982		309
Shore property		128,127		46,700		587,850		455,591		845
Cash capital		413,890		50,000		302,000		169,600		
Total		697,847		283,238		1,874,900		1,460,909		21,549

Designation.	Illinois.		Wisconsin.		Minnesota.		Total.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	2	$7,000	20	$68,200	1	$2,000	97	$323,450
Tonnage	40.11		261.29		11.23		1,197.26	
Outfit		485		10,155		900		50,321
Vessels transporting					1	25,000	31	209,280
Tonnage					165.62		1,402.21	
Outfit						7,000		23,775
Boats	33	1,280	478	30,510	16	835	3,706	361,648
Apparatus of capture, vessel fisheries:								
Gill nets	550	2,650	7,357	37,124	200	2,000	40,362	206,787
Apparatus of capture, shore fisheries:								
Pound nets	10	3,750	209	77,380	1	200	3,750	949,957
Gill nets	95	475	11,309	64,517	223	2,230	61,193	291,309
Fyke nets			728	11,366			2,968	96,868
Seines	3	380	28	2,435			154	17,236
Lines, spears, dip nets, etc		315		1,207		249		13,052
Shore property		248,210		115,080		52,668		1,634,871
Cash capital		165,000		63,400		20,300		1,184,100
Total		429,545		481,374		113,382		5,362,744

Products of the fisheries of the Great Lakes.

Species.	New York.		Pennsylvania.		Ohio.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Bass	48,797	$3,187	19,990	$1,032	203,223	$11,096
Herring	2,406,098	49,367	8,012,510	80,443	27,888,653	281,878
Perch	407,567	6,883	208,540	5,420	2,483,247	22,189
Pike and pike perch	819,519	49,723	3,402,285	70,436	9,442,291	185,061
Sturgeon	2,251,416	82,908	105,750	3,265	230,493	8,861
Trout	80,430	3,992	82,000	3,280	.....	.....
Whitefish	466,621	22,610	758,019	36,157	1,129,582	57,278
Other fish	1,607,521	37,776	275,750	5,089	3,554,619	52,320
Total	8,087,969	256,506	12,864,844	211,122	44,932,108	618,683

Species.	Michigan.		Indiana.		Illinois.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Bass	97,987	$5,109	5,393	$270	.....	.....
Herring	6,393,756	87,437	160,408	3,206	88,375	$1,768
Perch	3,029,464	40,380	106,064	3,184	511,009	14,009
Pike and pike perch	2,689,891	86,677	.....	.....	.....	.....
Sturgeon	1,480,256	45,073	70,716	2,780	16,480	640
Trout	8,542,952	309,616	154,733	7,730	71,660	3,479
Whitefish	7,725,105	312,411	66,901	2,951	27,835	1,400
Other fish	2,912,578	47,302	75,278	1,572	107,035	2,540
Total	32,871,989	934,005	639,493	21,693	822,394	23,836

Species.	Wisconsin.		Minnesota.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Bass	87,696	$4,379	.....	.....	463,086	$25,073
Herring	3,798,220	57,502	5,329	$102	48,753,349	561,703
Perch	1,008,137	21,195	.....	.....	7,754,028	113,260
Pike and pike perch	481,118	19,141	.....	.....	16,835,119	417,038
Sturgeon	134,648	4,779	.....	.....	4,289,759	148,366
Trout	3,820,178	175,334	138,488	4,519	12,890,441	507,950
Whitefish	2,187,667	84,467	39,605	1,617	12,401,335	518,891
Other fish	1,978,033	32,888	.....	.....	10,511,414	179,487
Total	13,490,312	399,685	183,422	6,238	113,898,531	2,471,768

Michigan.—This State abuts on four of the Great Lakes, as well as on Lake St. Clair and the St. Clair and Detroit rivers. The fisheries in Lake Michigan have the greatest extent, followed by those in lakes Huron, Superior, St. Clair, and Erie.

Table showing by lakes the number of persons employed in the fisheries of Michigan.

How employed.	Lake Erie.	Lake St. Clair.*	Lake Huron.	Lake Michigan.	Lake Superior.	Total.
On fishing vessels	.....	28	18	149	31	226
On transporting vessels	7	.....	8	9	.....	24
In shore fisheries	225	517	590	1,040	321	2,693
In fish-houses, etc	.....	66	110	180	44	400
Total	232	611	726	1,378	396	3,343

*Includes St. Clair and Detroit rivers.

Table showing by lakes the apparatus and capital employed in the fisheries of Michigan.

Designation.	Lake Erie.		Lake St. Clair.*		Lake Huron.	
	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	.....	.....	4	$21,000	3	$9,700
Tonnage	.....	.....	38.56	.....	37.94	.....
Outfit	.....	.....	.....	3,400	.....	1,960
Vessels transporting	2	$8,500	.....	.....	4	2,800
Tonnage	36.08	.....	.....	.....	41.11	.....
Outfit	.....	900	.....	.....	.....	130
Boats	116	9,750	162	4,375	410	22,308
Apparatus of capture, vessel fisheries:						
Gill nets	.....	.....	814	9,418	324	3,933
Apparatus of capture, shore fisheries:						
Pound nets	233	49,800	34	9,450	551	88,515
Gill nets	.....	.....	.....	.....	1,882	17,732
Fyke nets	65	800	148	4,480	221	6,385
Seines	6	550	28	6,240	6	600
Lines, spears, and dip nets	.....	700	.....	1,100	.....	770
Shore property	.....	12,850	.....	106,082	.....	208,025
Cash capital	.....	.....	.....	44,000	.....	45,400
Total	.....	83,850	.....	210,145	.....	408,858

Designation.	Lake Michigan.		Lake Superior.		Total.	
	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	26	$78,950	5	$17,200	38	$126,850
Tonnage	382.85	.....	61.66	.....	521.01	.....
Outfit	.....	10,643	.....	3,700	.....	19,703
Vessels transporting	2	21,500	.....	.....	8	32,800
Tonnage	122.08	.....	.....	.....	199.27	.....
Outfit	.....	1,615	.....	.....	.....	2,645
Boats	605	43,883	188	15,760	1,481	96,076
Apparatus of capture, vessel fisheries:						
Gill nets	10,012	66,304	1,046	15,574	12,796	95,229
Apparatus of capture, shore fisheries:						
Pound nets	552	161,850	90	24,335	1,460	333,950
Gill nets	11,928	58,302	2,737	26,409	16,547	102,443
Fyke nets	8	285	4	80	446	12,030
Seines	10	1,115	8	505	58	9,010
Lines, spears, and dip nets	.....	853	.....	1,559	.....	4,982
Shore property	.....	88,269	.....	39,765	.....	455,591
Cash capital	.....	44,600	.....	35,000	.....	169,600
Total	.....	578,169	.....	179,887	.....	1,460,909

* Includes St. Clair and Detroit rivers.

Table showing by lakes and species the yield of the fisheries of Michigan.

Species.	Lake Erie.		Lake St. Clair.*		Lake Huron.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Bass	9,500	$570	9,086	$544	29,351	$2,167
Herring	1,160,000	8,700	400,334	5,797	2,514,551	28,181
Perch	130,000	1,175	763,093	10,160	1,817,628	20,792
Pike and pike perch	570,900	14,330	524,069	17,533	1,483,072	50,834
Sturgeon	33,000	900	309,003	7,794	365,718	8,924
Trout	.....	.....	244,847	12,242	1,505,619	51,042
Whitefish	136,000	6,800	238,764	14,753	1,004,094	37,247
Other fish	373,000	6,905	414,775	4,754	1,336,348	21,880
Total	2,412,400	39,380	2,994,571	73,577	10,056,381	221,067

Species.	Lake Michigan.		Lake Superior.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Bass	50,050	$1,828	.....	.....	97,987	$5,109
Herring	2,129,181	42,140	99,690	$2,619	6,393,756	87,437
Perch	318,743	8,253	.....	.....	3,029,464	40,380
Pike and pike perch	103,270	3,712	7,980	268	2,689,891	86,677
Sturgeon	732,711	26,292	39,824	1,163	1,480,256	45,073
Trout	4,673,726	175,625	2,118,760	70,707	8,542,952	309,616
Whitefish	4,281,921	173,315	2,064,326	80,296	7,725,105	312,411
Other fish	772,580	13,148	15,875	615	2,912,578	47,302
Total	13,062,182	444,313	4,346,455	155,668	32,871,989	934,005

* Includes St. Clair and Detroit rivers.

Wisconsin.—This State has a frontage on lakes Superior and Michigan. The fisheries in the latter lake are much more important than those of the former.

Table showing by lakes the persons employed in the fisheries of Wisconsin.

How employed.	Lake Michigan.	Lake Superior.	Total.
On fishing vessels	118	8	126
Inshore fisheries	777	179	956
In fish-houses, etc	124	19	143
Total	1,019	206	1,225

Table showing by lakes the apparatus and capital employed in the fisheries of Wisconsin.

Designation.	Lake Michigan.		Lake Superior.		Total.	
	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	19	$64,700	1	$3,500	20	$68,200
Tonnage	243.10	.....	18.19	.....	261.29	.....
Outfit	.....	8,155	.....	2,000	.....	10,155
Boats	362	23,130	116	7,380	478	30,510
Apparatus of capture, vessel fisheries:						
Gill nets	7,285	36,260	72	864	7,357	37,124
Apparatus of capture, shore fisheries:						
Pound nets	250	67,480	49	9,900	299	77,380
Gill nets	9,673	48,118	1,696	16,399	11,369	64,517
Fyke nets	723	11,031	5	335	728	11,366
Seines	17	1,985	11	450	28	2,435
Lines and spears	.....	667	.....	540	.....	1,207
Shore property	.....	97,635	.....	17,445	.....	115,080
Cash capital	.....	48,800	.....	14,600	.....	63,400
Total	.....	407,961	.....	73,413	.....	481,374

Table showing by lakes and species the yield of the fisheries of Wisconsin.

Species.	Lake Michigan.		Lake Superior.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Bass	87,696	$4,379	.....	.....	87,696	$4,379
Herring	3,704,118	55,607	94,102	$1,895	3,798,220	57,502
Perch	1,008,137	21,195	.....	.....	1,008,137	21,195
Pike and pickerel	462,751	18,275	18,382	866	481,133	19,141
Sturgeon	126,990	4,541	7,658	238	134,648	4,779
Trout	3,464,048	162,359	356,130	12,975	3,820,178	175,334
Whitefish	1,078,422	41,393	1,109,245	43,074	2,187,667	84,467
Other fish	1,978,035	32,874	598	14	1,978,633	32,888
Total	11,910,197	340,623	1,586,115	59,062	13,496,312	399,685

New York.—New York maintains fisheries in lakes Erie and Ontario. The fishing population and the invested capital are much greater in Lake Erie, but the value of the catch is about the same in both. The most prominent fish in waters of Lake Erie under the jurisdiction of the State is the sturgeon, while in Lake Ontario the wall-eyed pike takes precedence.

Table showing by lakes the number of persons employed in the fisheries of New York.

How employed.	Lake Ontario.	Lake Erie.	Total.
On fishing vessels	5	21	26
On transporting vessels	6	.....	6
In shore fisheries	356	990	1,346
In fish-houses, etc	22	98	120
Total	389	1,109	1,498

Table showing by lakes the apparatus and capital employed in the fisheries of New York.

Designation.	Lake Ontario.		Lake Erie.		Total.	
	No.	Value.	No.	Value.	No.	Value.
Vessels fishing	1	$2,800	4	$12,500	5	$15,300
Tonnage	13.69	.....	57.70	.....	71.39	.....
Outfit	.....	500	.....	1,988	.....	2,488
Vessels transporting	2	5,280	.....	.....	2	5,280
Tonnage	32.48	.....	.....	.....	32.48	.....
Outfit	.....	1,005	.....	.....	.....	1,005
Boats	373	21,577	167	15,100	540	36,677
Apparatus of capture, vessel fisheries:						
Gill nets	50	200	1,122	8,590	1,172	8,790
Apparatus of capture, shore fisheries:						
Gill nets	2,295	17,910	3,460	26,232	5,755	44,142
Pound nets and trap nets	288	24,577	37	4,850	325	29,427
Fyke nets	684	9,822	.....	.....	684	9,822
Seines	27	656	5	125	32	781
Lines, spears, and grapnels	.....	490	.....	1,579	.....	2,069
Other apparatus	.....	49	.....	.....	.....	49
Shore property	.....	25,777	.....	102,350	.....	128,127
Cash capital	.....	12,890	.....	401,000	.....	413,890
Total	.....	123,533	.....	574,314	.....	697,847

Table showing by lakes and species the yield of the fisheries of New York.

Species.	Lake Ontario.		Lake Erie.		Total.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Black bass	33,092	$2,364	15,705	$823	48,797	$3,187
Catfish	471,955	12,444	276,975	6,467	748,930	18,911
Eels	257,190	8,913	.....	.....	257,190	8,913
Herring	598,978	20,936	1,807,120	28,431	2,406,098	49,367
Perch	358,947	5,368	48,620	1,515	407,567	6,883
Pike	129,490	6,284	.....	.....	129,490	6,284
Pike perch	331,002	28,729	359,027	14,710	690,029	43,439
Sturgeon	541,752	22,291	1,709,664	60,677	2,251,416	82,968
Trout	41,010	2,089	39,420	1,903	80,430	3,992
Whitefish	148,771	6,875	317,850	15,735	466,621	22,610
Other fish	534,261	8,493	67,140	1,459	601,401	9,952
Total	3,446,448	124,786	4,641,521	131,720	8,087,969	256,506

IV.—COMPARATIVE STATISTICS OF THE FISHERIES OF THE GREAT LAKES.

Perhaps the most useful purpose which the statistics now available serve is the opportunity afforded for making comparisons with 1880 and 1885. The following tables give a detailed contrast, by lakes, of the principal phases of the fishing industry in the three years named, and are self-explanatory. In view of the attention now being devoted to the fisheries of this region, such comparisons will doubtless furnish suggestive information.

Comparative table showing the number of persons employed in the fisheries of the Great Lakes in 1880, 1885, and 1890.

Lakes.	1880.	1885.	1890.
Superior	414	914	653
Michigan	1,578	3,379	2,877
Huron	470	892	726
St. Clair	356	272	611
Erie	1,620	4,298	4,482
Ontario	612	600	389
Total	5,050	10,355	9,738

Comparative table showing the vessels, boats, apparatus, and other property employed in the fisheries in the Great Lakes in 1880, 1885, and 1890.

Lakes and years.	Steamers.		Other vessels and boats.		Pound nets and trap nets.	
	No.	Value.	No.	Value.	No.	Value.
Superior:						
1880	4	$9,400	157	$16,840	43	$14,950
1885	15	68,100	504	32,635	230	67,520
1890	8	61,300	320	23,975	140	34,435
Michigan:						
1880	30	63,400	806	60,975	476	185,425
1885	82	207,600	1,320	100,726	715	253,840
1890	50	194,668	1,052	71,663	844	244,880
Huron:						
1880	3	7,000	108	13,905	189	49,425
1885	10	41,300	551	31,046	586	113,350
1890	3	11,660	414	25,238	551	88,515
St. Clair:						
1880	2	3,000	50	5,000	.....	.....
1885	2	1,150	213	6,307	57	12,550
1890	4	24,400	162	4,375	34	9,450
Erie:						
1880	9	38,400	593	45,480	758	238,600
1885	53	178,200	1,483	120,557	1,028	259,785
1890	56	302,283	1,393	217,750	1,893	548,100
Ontario:						
1880	1	3,600	166	9,500	34	14,000
1885	2	4,800	465	15,648	350	19,445
1890	2	9,180	374	21,982	288	24,577
All lakes:						
1880	49	124,800	1,880	160,700	1,500	497,400
1885	164	561,160	4,536	307,519	2,966	726,490
1890	123	603,491	3,715	364,983	3,750	949,957

Comparative table showing the vessels, boats, apparatus, and other property employed in the fisheries in the Great Lakes in 1880, 1885, and 1890—Continued.

Lakes and years.	Gill nets.		Seines.		Value of all other apparatus.	Shore property and cash capital.	Total investment.
	No.	Value.	No.	Value.			
Superior:							
1880	4,630	$25,280	32	$2,010	$200	$12,700	$81,380
1885	7,557	78,082	43	2,920	1,165	177,521	427,933
1890	5,974	63,476	19	955	2,703	179,778	366,682
Michigan:							
1880	24,599	124,740	19	2,040	1,455	104,100	551,135
1885	58,516	326,902	87	6,950	13,457	788,356	1,757,831
1890	40,896	215,914	30	3,480	13,460	693,159	1,437,224
Huron:							
1880	3,360	20,600	28	5,600	3,500	3,700	103,730
1885	3,444	35,333	.....	.....	23,100	140,620	385,349
1890	2,206	21,665	6	600	7,155	254,025	408,858
St. Clair:							
1880	180	1,080	42	6,000	1,500	24,000	40,580
1885	23	160	34	8,825	3,819	218,270	251,081
1890	814	9,418	28	6,240	5,580	150,682	210,145
Erie:							
1880	5,775	22,500	18	2,800	8,645	163,675	515,100
1885	22,644	75,507	71	8,320	72,205	847,564	1,562,188
1890	49,320	169,513	44	5,305	70,601	1,592,750	2,816,302
Ontario:							
1880	6,000	20,000	9	1,950	.....	5,000	54,050
1885	4,722	23,952	69	3,177	12,627	50,100	135,749
1890	2,345	18,110	27	656	10,361	38,667	123,533
All lakes:							
1880	44,544	214,200	148	20,400	15,300	313,175	1,345,975
1885	96,906	539,936	304	30,192	126,363	2,228,431	4,520,081
1890	103,800	498,096	154	17,236	109,920	2,819,061	5,362,774

Comparative table showing the primary products of the fisheries of the Great Lakes in 1880, 1885 and 1890.

Lakes and years.	Whitefish.	Trout.	Herring.	Sturgeon.	All others.	Total.*	
	Pounds.	Pounds.	Pounds.	Pounds.	Pounds.	Pounds.	Value.
Superior:							
1880	2,257,000	1,464,750	34,000	.....	60,875	3,816,625	$118,370
1885	4,571,947	3,488,177	324,980	182,760	258,416	8,825,980	291,528
1890	3,213,176	2,613,378	109,121	47,482	42,835	6,115,992	220,968
Michigan:							
1880	12,030,400	2,650,450	3,050,400	3,839,600	1,562,025	23,141,875	668,400
1885	8,682,986	6,431,298	3,312,493	1,406,678	3,684,693	23,518,148	878,788
1890	5,455,079	8,364,167	6,082,082	946,897	5,586,041	26,434,266	830,465
Huron:							
1880	2,700,778	2,084,500	246,800	204,000	1,969,195	7,205,273	195,277
1885	1,425,380	2,539,780	1,265,650	215,500	6,010,860	11,457,170	276,397
1890	1,004,094	1,505,619	2,514,551	305,718	4,666,399	10,056,381	221,067
St. Clair:							
1880	77,922	.....	250,700	998,500	523,805	1,850,927	36,273
1885	41,125	.....	1,208,150	227,780	708,740	2,185,795	40,193
1890	238,764	244,847	490,334	300,003	1,711,623	2,994,571	73,577
Erie:							
1880	3,333,800	26,200	11,774,400	1,970,000	11,982,900	29,087,300	474,880
1885	3,531,855	106,900	19,354,900	4,727,950	23,734,912	51,456,517	1,109,096
1890	2,341,451	121,420	38,868,283	2,078,907	21,440,812	64,850,873	1,000,005
Ontario:							
1880	1,064,000	569,700	611,217	545,283	849,800	3,640,000	159,700
1885	90,711	26,510	403,585	386,974	1,496,686	2,398,466	95,869
1890	148,771	41,010	598,978	541,752	2,115,937	3,446,448	124,786
All lakes:							
1880	21,463,900	6,804,600	15,967,517	7,557,383	16,948,600	68,742,000	1,652,900
1885	18,344,004	12,586,665	25,869,458	7,147,642	35,844,307	99,842,076	2,691,800
1890	12,401,335	12,890,441	48,753,349	4,280,759	35,563,647	113,898,531	2,471,768

* Does not include oil, caviar, isinglass, and other secondary products.

V.—FISH PROPAGATION IN THE GREAT LAKES.

Since the inception of practical fish-culture in behalf of the commercial fisheries of the United States, the Great Lakes have been a favorite and favorable field for the practice of artificial methods for the preservation and increase of the supply, and more extensive operations have here been carried on than in any other part of the country.

The fishes to which the most attention has been devoted are those caught in largest quantities and having the greatest food value, viz, the common whitefish, the lake trout or salmon trout, and the wall-eyed pike. Besides these there are others of growing importance, the artificial increase of which should be considered, chief of which is the sturgeon.

The propagation of other fish besides those now cultivated is desired by fishermen and dealers of the several lakes. The increase of fishes not hitherto extensively propagated will not only be for the immediate benefit of the industry, but will indirectly inure to its advantage by diverting some attention from fishes whose abundance has been depleted and afford them an opportunity to reproduce with less molestation. In Lake Ontario the fish now most important to the fishing interests is the wall-eyed pike; the decline in the fisheries for whitefish and trout have brought this fish into great prominence, the supply is inadequate for the demand, and the increase of the fish by artificial means is earnestly sought.

The growing demand for sturgeon, for both its flesh and eggs, has in several of the lakes resulted in a noticeable diminution in the abundance of the fish within a comparatively short time, and there seems no reason to believe that the supply will, under natural conditions and present methods, be much longer maintained in lakes Erie, St. Clair, Michigan, and, doubtless, all the other lakes.

In the foregoing pages some references have been made to the results of propagation in the different lakes. It now remains to illustrate the extent of the efforts made to replenish the lake fisheries, and to record some general observations on fish-culture in the Great Lakes.

The following table represents the fish-cultural work in the Great Lakes accomplished by the U. S. Commission of Fish and Fisheries to and including the year 1890–91. It shows for each lake the number of fry of each species deposited in the lake waters.

Table showing the number of whitefish, lake trout, and pike-perch fry deposited in the waters of the Great Lakes by the U. S. Commission of Fish and Fisheries from 1876 to 1891, inclusive.

Species and years.	Lake Superior.	Lake Michigan.*	Lake Huron.	Lake Erie.†	Lake Ontario.	Total.
Whitefish:						
1876	.....	130,000	.....	1,000,000	.....	1,130,000
1881	.....	5,000,000	2,000,000	2,250,000	.....	9,250,000
1882	.....	7,500,000	2,000,000	4,750,000	3,500,000	17,750,000
1883	4,000,000	11,000,000	16,000,000	7,000,000	9,000,000	47,000,000
1884	6,000,000	20,000,000	27,500,000	12,000,000	6,000,000	71,500,000
1885	4,000,000	25,000,000	34,000,000	25,000,000	.....	88,000,000
1886	6,000,000	29,000,000	30,000,000	15,000,000	12,000,000	92,000,000
1887	.....	17,000,000	30,000,000	12,000,000	3,000,000	62,000,000
1888	.....	1,000,000	15,000,000	.....	2,912,000	18,912,000
1889	8,000,000	3,000,000	20,320,000	40,700,000	4,595,000	76,615,000
1890	24,850,000	6,000,000	24,400,000	31,028,000	3,800,000	90,078,000
1891	13,830,000	7,000,000	14,560,000	10,000,000	3,312,000	48,702,000
Total	66,680,000	131,630,000	215,780,000	160,728,000	48,119,000	622,937,000
Lake trout:						
1890	935,000	.....	.....	.....	.....	935,000
1891	538,000	.....	.....	192,000	.....	730,000
Total	1,473,000	.....	.....	192,000	.....	1,665,000
Pike perch:						
1889	3,000,000	.....	.....	.....	.....	3,000,000
1890	12,580,000	.....	.....	.....	.....	12,580,000
1891	100,000	.....	.....	2,800,000	.....	2,900,000
Total	15,680,000	.....	.....	2,800,000	.....	18,480,000
Grand total	83,833,000	131,630,000	215,780,000	163,720,000	48,119,000	643,082,000

*Includes Mackinac Strait. †Includes Detroit River.

The U. S. Commission of Fish and Fisheries has also made large plants of fish fry in the waters of the Great Lakes through the various State commissions, to which eggs were donated and by which the eggs were hatched and the fry deposited. While considerable numbers of the fry thus obtained by the State commissions were not deposited in the Great Lakes but in the interior waters, it is not possible to separate the plants, and in the following table the aggregate donations are shown:

Table showing the number of whitefish and pike-perch eggs donated by the U. S. Commission of Fish and Fisheries to the fish commissions of the States bordering on the Great Lakes.

Species and years.	Minnesota fish commission.	Wisconsin fish commission.	Ohio fish commission.	Pennsylvania fish commission.	New York fish commission.	Total.
Whitefish:						
1880	250,000	.....	.....	.....	.....	250,000
1882	5,000,000	.....	.....	2,000,000	1,000,000	8,000,000
1883	5,000,000	.....	.....	.....	1,000,000	6,000,000
1884	20,000,000	.....	.....	.....	1,000,000	21,000,000
1885	15,000,000	.....	.....	16,500,000	1,000,000	32,500,000
1886	10,000,000	.....	.....	10,000,000	1,000,000	21,000,000
1887	10,000,000	.....	.....	15,000,000	1,000,000	26,000,000
1888	.....	5,000,000	.....	24,400,000	.....	29,400,000
1889	.....	6,000,000	.....	10,000,000	1,000,000	17,000,000
1890	.....	10,000,000	47,500,000	14,000,000	4,000,000	75,500,000
Total	65,250,000	21,000,000	47,500,000	91,900,000	11,000,000	236,650,000
Pike perch:						
1890	.....	.....	.....	18,000,000	1,000,000	19,000,000
1891	.....	.....	.....	58,000,000	.....	58,000,000
Total	.....	.....	.....	76,000,000	1,000,000	77,000,000
Grand total	65,250,000	21,000,000	47,500,000	167,900,000	12,000,000	313,650,000

Reference should also be made to the efforts of the State fish commissions to replenish the fish supply of this region. Michigan, Wisconsin, Pennsylvania, New York, and Ohio have done excellent propagation work and hundreds of millions of fry of food and game fishes have been deposited in the lake waters. The fisheries department of Canada has also engaged extensively in the culture of the native fish of the lake region.

The importance of the efforts made to maintain and increase the abundance of food-fishes is very generally recognized among the fishing interests of the lakes, and the fish-cultural operations meet with the hearty indorsement of fishermen, fish-dealers, and the public. Reliance on the efficacy of artificial methods in preserving the fishery resources of the lakes is almost universal in the important fishing districts, and there are few well-informed persons practically interested in the lake fisheries who are not willing to accord praise to fish-culture for the results achieved in arresting a diminution in the supply or in maintaining a profitable industry in the face of an enormous annual catch, a great increase in the amount of apparatus used, and the prosecution of fishing under circumstances that are extremely unfavorable for the natural increase of the fishes taken.

In the extreme western end of Lake Erie, to which region the whitefish naturally resorts for the purpose of spawning, the supply is almost wholly cut off by the multiplication of nets in other parts of the lake. Here the fishermen are beginning to depend on other fishes for their catch, and are desirous of having the supply of species with more localized habits increased. Writing in 1891 on the Maumee Bay and Monroe sections, Mr. Seymour Bower said:

> As to the intrinsic merits of artificial propagation as a factor in multiplying water life, the fishermen of this section, almost without exception, believe in it; but, so far as whitefish are concerned, the opinion is quite prevalent that, under the circumstances, the interests of this section are practically debarred from participating in the benefits. Naturally, therefore, there is some indifference regarding the propagation of whitefish, but a growing interest in behalf of any means to increase the supply of sturgeon, catfish, and pike perch.

The foregoing comparative statistics of the products of the fisheries show that in nearly every lake the catch of whitefish—the species having the greatest interest to fish-culturists—has decreased since 1885. No well-informed person, however, will argue from this that fish-culture in the Great Lakes is a failure. The repeated successes which have attended the culture of the lake fishes in some smaller bodies of water, where the natural conditions were certainly not superior to those of the Great Lakes, demonstrate the feasibility of the propagation of the lake fishes and afford a suggestive example. The absence of more conspicuous results in the Great Lakes may be regarded in the light of the following considerations:

1. Owing to the large size of these lakes, it is possible that the fish-cultural operations have not been sufficiently extensive to overcome the destruction by man of fish and undeposited spawn. The planting of a

billion fry annually in a body of water as large as Lake Michigan would be equivalent to only one fish to every 600 square feet of lake surface, and when the great natural destruction of fry, by natural enemies and unfavorable physical conditions, is taken into account, the disparity of this proportion is vastly increased.

2. Assuming that the plants of fry are sufficiently large to compensate for the capture of fish now going on, the fish-cultural work may not do more than maintain an already diminished supply and may be inadequate, owing to previous depletion and present methods, to produce a substantial increase in the abundance of a given fish.

3. Artificial propagation may be extensive enough to counteract the influence of previous overfishing and permit the continuance of fisheries of great magnitude under proper conditions, but the methods followed may be so destructive to the adult fish prior to and during the spawning season and so deleterious to the growth of young fish that the natural tendency to multiply may be made abortive and even enormous fish-cultural operations be rendered nugatory.

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