PART XVII.

THE FISHERIES OF THE GREAT LAKES.

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ELABORATED FROM NOTES GATHERED BY MR. LUDWIG KUMLIEN.

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PART XVII.

THE FISHERIES OF THE GREAT LAKES.

A.—STATISTICAL RECAPITULATION.

227. TABLE OF THE GREAT LAKE FISHERIES.

The fisheries of the Great Lakes, which will be considered in the following pages, are summed up in the following statements, showing in detail the number of persons employed, the amount of capital invested, and the quantities and values of the products:

Summary statement of persons employed.

Persons employed.	Number.
Fishermen	5,050

Detailed statement of capital invested and apparatus employed.

Apparatus specified.	Number.	Value.
Vessels and boats	1,656	$266,600
Pounds	1,500	497,400
Gill-nets	44,544	214,200
Seines	148	20,400
Other apparatus, including outfits		34,200
Shore property		313,175
Total		1,345,975

Detailed statement of the quantities and values of the products.

Products specified.	Quantity.	Value.
Primary products.		
Fresh fish ... pounds	43,122,270	$1,102,950
Salt fish ... do	16,793,540	402,670
Frozen fish ... do	2,821,650	126,100
Smoked fish ... do	1,721,770	109,970
Secondary products.		
Caviare ... pounds	230,160	34,315
Isinglass ... do	3,909	5,765
Oil ... gallons	5,680	2,280
Total		1,784,050

B.—LAKE SUPERIOR AND ITS FISHERIES.

228. STATISTICAL SUMMATION.

Summary statement of persons employed.

Persons employed.	Number.
Fishermen	414

Detailed statement of capital invested and apparatus employed.

Apparatus specified.	Number.	Value.
Vessels and boats	155	$26,150
Pounds	43	14,950
Gill-nets	4,630	25,280
Seines	32	2,010
Other apparatus, including outfit		290
Shore property		12,700
Total		81,380

Detailed statement of the quantities and values of the products.

Products specified.	Pounds.	Value.
Fresh fish	1,494,500	$47,780
Salt fish	1,549,500	57,755
Total		105,535

229. THE FISHERIES OF THE NORTHWESTERN SHORE, INCLUDING DULUTH.

THE NORTHWESTERN SHORE.—The northwestern shore of Lake Superior is hilly and mountainous in character, and for the most part deeply wooded. The small hamlets which exist here are chiefly lumbering stations, and the fisheries receive little or no attention. Fish are abundant, however, in the neighboring waters, as is proven by the fact that they are visited by fishermen from Duluth and other towns on the south shore.

DULUTH AND VICINITY.—Duluth, named after the French explorer and soldier, J. Duluth, is the most westerly village on the lakes, which is interested to any considerable extent in the fisheries. It is situated on the side of one of the numerous hills which exist in this section, at the head of a harbor known as Duluth Bay. The Government has spent considerable money in improving the entrance to the harbor and in building light-houses and breakwaters, not, however, in the interest of the fisheries, but for the grain trade and other branches of commerce in which Duluth is more especially engaged. The village was formerly chartered as a city, but has recently given up its charter.

The fisheries are carried on by thirty-five men. About sixteen of them participate in gill-net fishing, eleven in pound fishing—five being in charge of the steam-tug, and six managing the nets—and the rest in seine fishing.

The gill-net fishery is the more important and about four hundred and eighty nets are in use.

The boats used are Mackinaws, about 32 feet in length and worth $100. A tug also is employed in transporting products from the fishing grounds. Only two pounds are owned at Duluth, both small and set in shoal water. They are usually established about the 10th of June. The seiners fish only for a few days or weeks.

The gill-net grounds visited by the Duluth fishermen extend along the south shore to the Apostle Islands and along the north shore to Isle Royale. The former are visited in spring and summer, the latter in fall. The pound-nets are set at the entrance of Superior Bay near Superior City, about eight miles distant from Duluth. Seining is prosecuted in the vicinity of Fond du Lac, at the head of Saint Louis Bay.

In the pound-nets and gill-nets principally whitefish, trout, and herring are taken. The catch of the two former species amounted in 1879 to about 280,000 pounds. The seine fishery yields only pike, of which during the same year, about 16,000 pounds were caught.

The shipping business was carried on by one firm until 1880, when another made a beginning. All the fish are shipped fresh, being sent as far west as Deadwood, Dak., and south to Omaha, Nebr. The larger proportion, however, is sold in Saint Paul and Minneapolis, Minn.

The fisheries of this section, as a whole, are growing in importance, although the pound-fishery seemed to have declined somewhat since five pound-nets were in use here a few years ago. There are few historical matters of importance to be recorded. No disasters occurred for twelve years prior to 1879, but in the fall of that year one fisherman was drowned.

Superior City, the next town eastward, does not engage in the fisheries to any considerable extent.

230. THE FISHERIES OF THE SOUTHERN SHORE.

BAYFIELD AND ASHLAND.—These villages are situated east of the Apostle Islands, the former at the mouth and the latter at the head of Chequamegon Bay. They are approximately of equal size and importance. Both are interested in the lumber trade, and each supports a local journal. Ashland is a watering place of some note.

Bayfield surpasses Ashland in the importance of its fisheries, and indeed the people are dependent upon them. In the former village about one hundred and thirty men were employed in the fisheries in 1879, and nearly twice that number during 1880, while at the latter point only twenty-five or thirty men found occupation in fishing. The fishermen are principally Canadian French and half-breed Indians in about equal numbers.

Gill-nets, pounds, seines, and lines are in use, but the first kind of apparatus is that most extensively employed. About 1,680 gill-nets are owned at Bayfield, but considerably less than one-fourth that number at Ashland. Their average length is about 65 fathoms. The pound fishery is prosecuted with 27 nets at Bayfield and 3 or 4 more at Ashland. They are of various sizes and depths, but all formed after the usual model. Seventeen or eighteen seines are employed, their average length being about 60 rods. In winter hook fishing is carried on among the islands near Bayfield.

The principal boat is the famous Mackinaw, but a few clinker built boats also are in use. For the pound fishery the ordinary flat-bottomed pound-boat prevails. A schooner, used in carrying fishery products, is also owned at Bayfield.

The gill-net grounds extend 90 or 100 miles eastward from the village. Pounds are set among the Apostle Islands and in Chequamegon Bay. The winter hook fishery and the seine fishery are both prosecuted among the islands, but much seining is done, also, in the shallow bays west of the Apostle Islands

The catch consists mainly of whitefish, trout, herring, and pike. The yield of both fisheries, in 1879, was about 300,000 pounds of fresh fish and 9,000 half-barrels of salt fish, worth together about $45,000.

The shipping business is controlled mainly by three firms. At least seven-ninths of the salt fish is sent to other lake distributing points—Buffalo, Toledo, Chicago, and Port Clinton. The remainder goes to Saint Paul and Minneapolis. The fresh fish is shared about equally by Chicago and Saint Paul.

The fishermen fish on shares, the outfitters furnishing boats, nets, and other apparatus, and paying a certain sum for the fish when salted. Provisions are advanced to fishermen's families on credit during the fishing season.

Fish are somewhat less abundant in this region than formerly, especially in Chequamegon Bay, but the decrease is not considered at all alarming. It is the experience of the fishermen that if fishing is desisted from on a ground which has been depleted, fish will return to it in the course of a couple of years, and the catch will again be as large as previously. The year 1879 was not considered an altogether profitable one, but the yield in 1880 was thought to have been larger than ever before. It must be taken into consideration, however, that more nets were used and that the grounds were better known than formerly.

The boats now in use are not materially different from those formerly employed. They may be, however, a trifle larger and more valuable.

We find record of only two disasters of recent occurrence. In 1878 a boat, with four men, was lost. In the same year another fisherman was lost while fishing through the ice.

ONTONAGON, PORTAGE ENTRY, L'ANSE, AND INTERVENING STATIONS.—Ontonagon is situated on the west side of Keweenaw Point, at the mouth of the Ontonagon River. Its principal industry is copper-mining, but the people are incidentally engaged in fishing. L'Anse, located at the head of Keweenaw Bay, is also sustained by mining and lumber trade, but its fisheries are important. Between these villages there are a number of hamlets, the population of which is engaged in fishing to a greater or less extent.

In this section we find about one hundred and thirty-four fishermen, eighty-eight of whom are engaged in gill-netting, thirty in the pound-net fishery, and the rest in seining and other minor fisheries. The nationalities represented, as at the villages westward, are Canadian French and half-breed Indians, in equal proportions. The owners of fisheries, however, are principally Americans.

Gill-net fishing ranks first in importance. About eleven hundred nets are in use, each 60 fathoms or a little less in length, and with $4\frac{3}{4}$ or 5-inch mesh. They are in use at all seasons of the year. The catch consists principally of whitefish, trout, and siscowet and a few suckers. The pound fishery is prosecuted with twelve nets, each worth about $350. The season lasts from May to November, unless heavy storms should make it necessary to remove them earlier. The principal fish taken are whitefish, trout, and pickerel. The seiners use eight seines, worth about $75 each, and catch mainly whitefish.

One small steam-tug of about 12 tons burden is employed in the gill-net fishery and in transporting the catch to shipping points, and a little schooner is also used for carrying the products from place to place. In regard to the boats it may be said that they are not so seaworthy as those used farther west. The cause is to be found in the fact that this section of coast is not so exposed as many others. The pound boats especially are not much better than those employed at Green Bay.

The gill-netters fish west of Keweenaw Point, in Keweenaw Bay, and eastward almost to

Marquette. The pound-nets are set in different parts of Keweenaw Bay. The seining reaches are in the vicinity of L'Anse and Portage Entry.

The yield of the fisheries during 1879 amounted to about 405,000 pounds of fresh fish and about 4,200 half-barrels of salt fish. A considerable proportion was sold at the mines in the vicinity of the fisheries and in inland towns, and the remainder was shipped to Detroit, Cleveland, Buffalo, Chicago, and Milwaukee, but the exact apportionment of the amount could not be ascertained.

The fishermen consider that whitefish have decreased appreciably within ten years, and point to sawdust, increased navigation, and overfishing as the causes of the diminution.

MARQUETTE AND VICINITY.—Marquette, the capital of Marquette County, is a small city, and a summer resort of some note. It is situated at the head of a fine harbor. The iron and lumber trades take precedence over the fisheries.

The number of fishermen at Marquette in 1879 was about thirty-three, twelve of whom were engaged in gill-netting, twelve in seining, and the remainder in the pound fishery. They are of various nationalities, only about one-third being native Americans. There is also one fisherman living at the south end of Grand Island, east of Marquette.

Pound-net, gill-net, and seine fisheries are all carried on to a greater or less extent in different years. The gill-netters fish at different points along about 50 miles of shore east of Marquette, while the pounds are set in sheltered positions in the shallow bays and the mouths of rivers between the town and Grand Island. Seining is prosecuted entirely in Marquette Harbor. Some fishing is also carried on at the trout bank, known as Stannard's Rock.

About sixty boxes of gill-nets, or three hundred and sixty nets, were employed in 1879, together with eight pound-nets and four small seines. The gill-net fishermen employ several steam-tugs of the usual model and size. Larger and better boats are used than formerly.

The catch consists of whitefish, trout, siscowet, herring, and lawyers. The yield in 1879 was about 450,000 pounds, of which enough to make 200 half-barrels was salted and the remainder sold fresh. About 25,000 pounds of the latter were shipped to Milwaukee, and of the remainder part sold to the steamboat companies and to the miners living in the vicinity and part sent to inland towns in Wisconsin and Illinois. The shipping business is entirely in the hands of three firms.

The fish are caught on shares. The dealers furnish outfits, including boats, and take one-half the fish caught as compensation. They also buy the remainder from the fishermen, paying a uniform price of 7 cents apiece.

Fifteen or twenty years ago trout fishing with hand-lines was the most important branch prosecuted, gill-nets being used only for whitefish. Pound-nets were not introduced until 1869. Seines were in use many years before gill nets were introduced, but they are now fast falling into disuse.

Some fishermen hold the opinion that there has been a gradual decrease in the abundance of all species, but particularly of whitefish and trout. Others think that this theory is without foundation in truth. They say that the spawning grounds are not disturbed, and that spawning or young fish are rarely taken; and claim that the species which appear to have decreased in number have simply moved to inaccessible or undiscovered grounds.

WHITEFISH POINT AND SAULT DE SAINTE MARIE.—Fishing has been carried on at Whitefish Point for many years, but the fishery did not assume proportions of any magnitude until the year 1870, when it was purchased by Messrs. Jones & Trevalle, of Buffalo, N. Y. A pier has been constructed and a number of buildings erected. During the fishing season twenty or thirty persons live at the Point, but in winter the place is deserted. Communication with other places is carried on entirely by water. Steamers stop at the pier, if the weather is sufficiently calm, and take away the fish.

In 1879 about twelve fishermen were employed in attending the pounds, setting gill-nets, hauling seines, and preparing fish for market.

The gill-netters use about two hundred nets. They fish in different places about the Point, but not farther than 5 or 6 miles from land. At certain seasons the tug goes 5 or 6 miles west of the Point.

Only two pounds are employed, the character of the shore being unfavorable for this kind of fishing. One is set a short distance west of the Point and the other south of it.

The seine fishery is of little moment. Only two nets are employed. The catch consists of whitefish, trout, and a few suckers. The yield in 1879 was about 350,000 pounds. Three hundred and fifty half-barrels of whitefish and trout and a few suckers were salted and shipped to Milwaukee and Chicago. The remainder of the fish was shipped fresh to Chicago, Cleveland, Erie, and Buffalo.

Fishing in this region has not been very profitable during the past five or six years. The pound and seine fisheries have been the least productive, the success of the gill-netters, on the other hand, being materially improved. The fishermen unanimously agree that the cause of the lack of success in the two former branches is to be found in the fact that the water has considerably receded from the shore. In 1874 about 2,300 half-barrels of fish were salted and a considerable amount sold fresh.

Pound-nets were introduced about ten years ago.

At Sault de Sainte Marie the majority of the fish taken are caught by Indians, with dip-net, in the rapids. One stands at the bow of the canoe with a net, and a second propels and steers the craft. Several hundred pounds are frequently taken in this way by a single canoe in one day. A few fish are also taken in traps set in Whisky Bay.

The catch consists exclusively of whitefish, trout, and pike. During 1879 about 2,500 half-barrels of fish were shipped from the Sault, all but about 50 half-barrels of which were whitefish. They were all salted and shipped to Chicago, Detroit, and Cleveland.

C.—LAKE MICHIGAN AND ITS FISHERIES.

231. STATISTICAL SUMMATION.

Summary statement of persons employed.

Persons employed	Number.
Fishermen	1,578

Detailed statement of capital invested and apparatus employed.

Apparatus specified.	Number.	Value.
Vessels and boats	642	$125,895
Pounds	476	185,425
Gill-nets	24,599	124,740
Seines	19	2,040
Other apparatus, including outfits		8,935
Shore property		104,100
Total		551,135

Detailed statement of the quantities and values of the products.

Products specified.	Quantity.	Value.
Primary products.		
Fresh fish ..... pounds..	10,728,250	$343,070
Salt fish ..... do....	7,730,740	203,425
Frozen fish ..... do....	100,000	6,000
Smoked fish ..... do....	788,590	52,930
Secondary products.		
Caviare ..... pounds..	31,330	6,620
Isinglass ..... do....	265	265
Oil ..... gallons .	200	100
Total	.....	612,410

232. THE FISHERIES OF THE WESTERN SHORE.

ESCANABA AND THE NORTH SHORE OF GREEN BAY.—Escanaba, Mich., the capital of Delta County, is situated on Green Bay, at the mouth of the Escanaba River, and of Little Bay de Noquette. It is the center of an extensive iron and lumber trade, being on the line of the Northwestern Railroad.

The fisheries of Escanaba are not unimportant. A large proportion of the fishermen who visit the islands at the entrance of Green Bay reside here, and avail themselves of the facilities for shipping which the direct railroad connection affords. In 1879 they numbered about ninety-two, thirty being employed in the pound fisheries, fifty-three in gill-netting, and nine in seining. They belong to different nationalities, but native Americans predominate.

The gill-net fishery, as appears from the number of men employed, ranks first in importance, the pound fishery taking the second place. Seining is carried on only to a limited extent.

The grounds are very extensive, occupying almost the whole northern portion of Green Bay, including Little and Big Bays de Noquette. Those about Washington and Saint Martin's Islands, which had been quite depleted, are again becoming very profitable. The fishermen disagree, however, in their statements regarding the abundance of fish. At Fish Creek, near Escanaba, they asserted that the Washington Island grounds were ruined and unproductive, but it was ascertained later that a thousand nets were in use there in 1879, and that the catch was not small. The general impression seems to be that whitefish are growing constantly more abundant in some places.

During the year 1879 about 300,000 pounds of fresh fish and 2,300 half-barrels of salt fish were received at Escanaba. The fresh fish were almost entirely whitefish and trout. About one-half of the salt fish were whitefish and trout, and the remainder suckers and herring.

The amounts given do not represent the entire yield of the fisheries of northern Green Bay. Among the islands probably seven-eighths of the amount taken is bought by traders and taken to Chicago and other centers of distribution.

The fresh fish received at Escanaba are shipped to other points by rail. About two-thirds of the whole amount is sent to Chicago, and the remainder to Saint Louis, Kansas City, and other inland towns.

About $40,000 are invested in boats, nets, and other apparatus.

During the past decade only two disasters occurred. In 1873 two fishermen were lost off the Gull Islands, and in 1879 one fell through the ice and perished.

The most important event which has taken place in the history of the fisheries is the intro-

duction of steam-tugs in both gill-net and pound fishing. The smaller boats are of better model than formerly, and the fishermen have grown more skillful in the management of them.

The yield of the fisheries of Escanaba was larger in 1879 than during the four or five years preceding. The increase was most noticeable on the grounds about Washington and Saint Martin's Islands.

MENOMINEE, MENEKAUNEE, AND VICINITY.—The communities resident on the west side of Green Bay, between Cedar River and Peshtigo Point, are more extensively engaged in and dependent upon the fisheries than those farther north.

The fishermen, as a rule, are well fitted for their occupation, but for the past four or five years their gains have been but barely sufficient to support them. Their houses are scantily furnished and are always built near the fishery and close to the beach. A few have cleared fields of considerable extent about their dwellings, but the majority cultivate only sufficient land to enable them to raise a few vegetables.

The different fisheries are scattered along the shore quite regularly. A few miles north of Menominee the road is replaced by an indistinct trail which leads through the almost impenetrable pine forests which cover the shore, and is the only line of communication between the fishing stations, except by water.

Between Cedar River and Peshtigo Point, we find about thirty families of professional fishermen, aggregating about one hundred and fifty persons. A few of the net-owners are single men, but the majority are married and have large families. The owners are principally Swedes, Americans, and Norwegians, but many other nationalities are represented among the fishermen. The Swedes and Norwegians are said to be most successful.

The pound-net fishery is the most important, and occupies the fishermen during the summer. In winter the pounds are replaced by gill-nets. The summer grounds are near shore, but in winter the fishermen venture far out on the ice. The pounds increase in depth from Peshtigo Point northward. Many in use in the vicinity of the former station are only 8 or 10 feet deep, while near Ingleston, north of Menominee, they are frequently 60 or 70 feet deep.

The value of fishery apparatus used in the fisheries of this section of shore is about $30,000. There are no special peculiarities in the nets or boats which demand attention. Steam-tugs are not employed. The Menominee dealers send boats along the shore to the different stations every day during the height of the season to collect fish from the pounds. There are also two vessels which cruise along the shore periodically, gathering up the fish which the fishermen have salted, and supplying the latter with salt and barrels.

During 1879 about 1,500,000 pounds of fish were taken, of which 500,000 pounds were sold fresh, and the remainder salted. Whitefish and herring formed the most important factor in the amount of fresh fish, but trout, sturgeon, dory, and many other kinds were included. Few fish, except whitefish, trout, and herring are salted in this locality.

The larger proportion of fresh fish is sent directly to Chicago by rail in boxes or refrigerators. One firm in Menominee uses about twenty refrigerators constantly, and considers this method of preparation for shipment less expensive and troublesome than packing in boxes. Salt fish are sent to Chicago and to several distributing points on Lake Erie.

There have been many changes in the methods of fishing at Menominee and the neighboring towns, as well as in the form of apparatus and the location of the fishing grounds. Summer gill-net fishing, which was carried on extensively in former years, has been almost entirely abandoned. In the canvass of this region in the summer of 1879, but one fisherman could be found engaged in this occupation.

Gill-net fishing through the ice was begun in the winter of 1867. Prior to this time hook-and-line fishing, which is now of minor importance, was carried on quite extensively. The favorite grounds were the shoals south of Green Island.

In this region, as well as all others, at the advent of pound nets, seines began gradually to disappear. At present only two seines are in use.

Prior to fifteen years ago the most profitable fishing grounds of this section were in Menominee River, near its mouth. Racks were constructed, in which fish were captured as they came down the stream from their spawning beds. As many as 600 barrels of whitefish were sometimes taken from one of these racks during a single season.

The spring run of whitefish was always light, but as great numbers of pike were usually taken at this season, the total catch assumed large proportions. Pike still run up the river in limited numbers, perhaps about one eighth as many as formerly, but no whitefish. Mr. Eveland stated that not a single whitefish had been taken for twelve years, and gave it as his opinion that the pollution of the water by sawdust was the chief cause of their disappearance.

The establishment of saw-mills upon Menominee River, and the consequent deposition of great quantities of sawdust in the water has effected the ruin of the fisheries in the vicinity. There are no less than thirteen mills within two miles of the mouth of the river, in the three towns Menominee, Marinette, and Menekaunee, besides planing-mills and other similar establishments. At least two of these mills turn all their refuse into the river. Mr. Kumlien states in his notes that during his stay in Menominee he noticed that there was always a large mass of sawdust, from a quarter of a mile to two miles broad, and many miles long, floating about in the bay. According to Mr. Eveland the condition of affairs has been much the same for many years, and the spawning grounds of the whitefish for a long distance outside the mouth of the river and on either shore, north and south, have been completely ruined. It is not unusual for vessels to meet portions of the mass of sawdust 20 or 30 miles from Menominee, and the water at the entrance of the bay is often covered with it. It is said to have accumulated at the mouth of the river, forming masses in some places eight feet deep.

Many of the beautiful sandy beaches of former times are now covered with spongy masses of decaying sawdust, interspersed with slabs and broken sticks. Pound nets set in 69 or 70 feet of water, miles away from the mills, become choked with all kinds of mill refuse. Bars and shoals, once the home of the whitefish, are deserted. Grounds once abounding in fish, yielding large profits, are now abandoned and new and distant ones sought, where, for the establishment of nets, increased labor and expense are necessary. Some are so far distant from any shipping point that the expenses of transportation absorb the greater portion of the profits of the fishermen.

Seines were introduced at Menominee, about 35 years ago. Those first used were about 80 rods long, the mesh at the center being 3 inches, and in the wings 4 inches. It was not unusual to take 8 or 10 barrels of fish at a haul.

Oconto, Pensaukee, Little Suamico, and vicinity.—All the communities residing on the west shore of Green Bay, between Peshtigo and Little Tail Points, are interested in and engaged in the fisheries to a considerable extent, although perhaps a larger amount of capital is invested in the lumber trade. All the larger villages are connected with Milwaukee and Chicago by rail, and, therefore, possess abundant facilities for disposing of their fishery products to the best advantage.

The most important class connected with the fisheries are the pound owners, of which there were thirty in 1879 within the limits marked out. Besides these there are ten men who own only gill-nets, which they employ in winter. The seiners, as a rule, are married, and have families of

four or five persons, making in all two hundred or two hundred and fifty people dependent upon the fisheries. For about ten weeks in spring, and for about the same period in fall, each of the net owners requires a number of assistants, varying from one to eight. Thus about seventy-five men additional find employment for five months. Not more than ten or twelve of the assistants are married, the remainder being young men. There are in all therefore about fifty families and sixty-five unmarried men dependent on the fisheries of this region.

With the exception of two men, a Frenchman and an Irishman, the pound-net owners represent three nationalities—American, German, and Norwegian. Among the assistants a great number of nationalities are represented.

The fishermen of this region are, almost without exception, in comfortable financial circumstances, and some have amassed considerable fortunes. They are nearly all land owners to a greater or less extent, some possessing valuable farms in addition to their fisheries.

There are few localities on the lakes where the fishermen control the business so completely. They buy their own supplies directly from the manufacturers, and in many cases ship the fish which they catch. There is one dealer, however, who buys nearly all the salt fish and a considerable portion of the fresh fish. He employs continually about five men in preparing products for market. Besides this firm there are several others of minor importance.

The practice of supplying fishermen with outfits on credit has been abolished, and although there are some men who would engage in fishing if they could secure an outfit in advance, the dealers wisely abstain from yielding to their requests.

As already intimated, the principal fishery carried on is the pound-net fishery. The pounds about Suamico form the southern section of that great line of nets extending all along the west shore of Green Bay. They are all set comparatively near shore, in from 10 to 34 feet of water.

With the approach of cold weather and the formation of ice in the bay the pound fishery gives way to the winter gill-net fishery. There are no peculiarities, however, in the mode of its operation in this region.

Seining has been almost abandoned, many of the nets having been used in the construction of pounds. The two seines still in use—one at the mouth of Suamico River, the other at the mouth of Oconto River—are small, and the amount of fish taken by means of them is insignificant.

The amount of capital invested in the apparatus and accessories employed in the fisheries in 1879 was about $33,000. The principal factors in this amount are the cost of the pound-nets and the repairs made upon them, of the boats, and of the packages in which the salt fish were shipped. These items combined amount to about five-sixths of the total sum.

As the result of the activities of the fishermen during 1879, about 600,000 pounds of fresh fish, worth $13,500, and 17,000 half-barrels, worth not less than $27,000, were sent to market. The profits were distributed among seven firms of shippers, and through them to the fishermen. The fresh fish consisted of whitefish, trout, and the various kinds—herring, black bass, pike, catfish, &c.—shipped together under the name of "rough" fish. The amount of salt fish was made up almost entirely of whitefish and herring.

At Oconto we meet for the first time with an establishment for the manufacture of caviare and isinglass. About 65 pounds of crude isinglass were prepared here in 1879.

The dealers find markets for their products in Chicago, Saint Louis, and Kansas City, the former city receiving by far the largest share. Little or no salt fish is sent to Saint Louis or Kansas City.

The principal change which has occurred in the methods of fishing employed in this region is that already referred to, namely, the substitution of pound-nets for seines.

The most productive season ever known to the fishermen of this shore occurred in the autumn of 1876. A sufficient amount of fish was taken in seventy-six pound-nets to fill, when salted, 22,722 half-barrels. The catch consisted almost entirely of herring, a species which is also the most abundant at the present time. Only 500 half-barrels of whitefish were taken.

GREEN BAY CITY AND VICINITY.—Green Bay City, situated on the Fox River, near its entrance into Green Bay, as regards its connection with the fisheries, is in some respects one of the most important towns on the bay. A large amount of fish taken in the fisheries of both the eastern and western shores of the bay is shipped through the town, and supplies of salt, twine, netting and provisions are purchased there. The fisheries of the town itself, however, are quite insignificant when compared with those of the villages farther north.

The number of fishermen permanently resident at Green Bay does not exceed twenty-five. It is increased, however, during the fall and spring, by an addition of seventy-five or one hundred semi-professional fishermen. Among seventeen of the twenty five men first mentioned, the following nationalties were found to be represented: English, 2; French, 2; American, 2; Norwegian, 2; German, 3; Polish, 2; Swiss, 1; Belgian, 1; Swedish, 2. An equally remarkable diversity prevails in many other localities on the lakes.

A few of the fishermen are in comfortable circumstances financially, while one or two are moderately wealthy. On the other hand, some are negligent and seem to have no tact in providing for their families, although their gains are usually sufficient to enable them to live well.

Several different branches of the fisheries are carried on at Green Bay, but only to a limited extent. Gill-nets are set in the inlets which penetrate the marshy shores of the Fox River, near its mouth, and just beyond the delta four pounds are established. About one hundred and fifty small fykes and some seventeen small pounds, technically known as "baby" pounds, are also employed. Five large seines, hauled ashore by means of capstans, are still in use. In spring the number of nets is increased, seventy-five or more being employed by fishermen from Oshkosh and other inland towns, who fish here at that season.

The boats are small and not so well built as those used in the fisheries of the upper part of the bay.

The amount of fresh fish which passed through the hands of the dealers at Green Bay during 1879, coming partly from the fisheries of the city and partly from those of the upper portion of the bay, was about 811,500 pounds, worth $32,500. In addition, 10,850 half-barrels of salt fish, worth about $25,000, were shipped during the year. The fresh fish were of many kinds, whitefish, trout, herring, wall-eyed pike, and catfish being, perhaps, the most important. Whitefish of different grades, trout, and herring are the principal kinds salted. A large part of the salt fish is purchased from the fishermen in half-barrels and repacked in kits of different sizes.

Probably fully one-half of all the fish received at Green Bay is sent to Chicago, the remainder being sent to different cities and towns in the interior of Wisconsin.

During 1879 the firms dealing in netting, twine, and cordage sold about $2,200 worth of these commodities, while the salt dealers sold nearly 2,800 barrels of salt, worth about $4,000.

The boat factory located at Green Bay city has only a small and local trade. The business has decreased materially within the decade, so that that transacted in 1878 was scarcely more than one-fourth the magnitude of that carried on in 1873. At present more repairing than building is done. Three men are constantly employed, more being added when an increase of work demands it.

The firm of W. D. Britton & Co., manufacturers of barrels and other packages, during 1879 sold 16,000 half-barrels, 10,000 quarter-barrels, and 500 caviare barrels for use in the fisheries.

There has been a marked decrease in the sale of half-barrels since the practice of returning the empty ones to the fishermen was originated. The demand for caviare barrels, however, is rapidly increasing. The firm employs sixty men, but not all are engaged in making fish barrels.

Green Bay city having been for many years the chief shipping point for the bay, the fluctuations in the abundance of fish and the changes in the fishing business have been perhaps more carefully noted than elsewhere. A considerable amount of information was obtained in regard to these matters by Mr. Kumlien from Mr. Kalmbach and other dealers of the city, and may perhaps be most conveniently inserted here.

Green Bay has long had an enviable reputation for its extensive and valuable fisheries, but of late years their yield has been growing noticeably less, the decrease being most marked in the case of whitefish and other kinds which are commonly salted. The fresh fish trade has not declined, but is rather on the advance, owing to the improved facilities for shipping fish in that condition. Fresh fish are at present shipped to Kansas City, Saint Louis, Saint Joseph, and other places in the hottest weather, in perfect safety.

Mr. M. F. Kalmbach gives an instance of the abundance of whitefish in former years. In 1860 he began fishing with pound-nets in Bay de Noquette. Pounds were not generally in use at that time, his trial of them being, in fact, one of the first. He employed two nets, one 18 feet deep, the other 20 feet deep, and each about 28 by 32 feet square. In these nets, between the 10th of October and the 25th of November, he took a sufficient quantity of whitefish to fill 1,750 half-barrels when salted, and was prevented from preparing double the quantity merely from lack of the needed supplies of salt and packages. For more than a month the nets were so full that a simple dip-net was the only implement necessary to be used in securing a quantity for salting. The fish crowded about the nets seeking entrance.

In late years pound-nets with very small mesh have been extensively employed, and large quantities of small fish taken. In the fall of 1878, at one locality in the bay, over 5,000 barrels of whitefish, equal to fully 7,500,000 fish, were thrown away, being too small for market. The same practice having been in force in many other places, it would seem that the supply of whitefish must be considerably diminished.

Another cause of the decrease of whitefish may perhaps be found in the fact that they have been driven from their old spawning grounds by sawdust and other mill refuse. Prior to 1865 there were few mills on the rivers, and large numbers of fish were hatched in them rather than at the grounds about the reefs.

De Pere and West De Pere.—The towns De Pere and West De Pere are situated on opposite sides of the Fox River, about 10 miles above Green Bay City. Large dams have been erected here, which give power to numerous manufacturing establishments, including many lumber mills. The river below the dams is wide and deep, and resembles an arm of a bay rather than a portion of a river.

The fisheries at this point, which are now insignificant, were formerly of considerable importance. The most favorable shore from which to operate was frequently rented for as much as $1,500 for the season, lasting from April to June. At this time whitefish came up the river, and were caught in abundance.

Of late years the increasing settlement of the country, the establishment of mills, and other causes have combined to render these fisheries much less productive than formerly. A recent State law has made fishing in the Fox River illegal at all seasons, but nevertheless it is still carried on to a limited extent. A considerable quantity is taken by laborers and others for family use,

the exact amount of which cannot be ascertained, although it is probably not more than 5,000 pounds.

The total yield in 1879 was about 14,000 pounds of fresh fish and 15,500 pounds of salt fish, worth together about $1,300. The fresh fish consisted principally of whitefish, trout, pickerel, and dory, in about equal proportions. The salt fish were whitefish, trout, herring, and skinned catfish.

The apparatus consists of a number of small gill-nets, two seines, and about one hundred large dip-nets. The total sum invested does not exceed $500.

A large barrel factory is located at West De Pere, in which in 1879 at least 350,000 barrels and kits were manufactured. Among them were about 60,000 herring kits, a kind of package made here for the first time in 1878. The majority of the stock is shipped to Chicago, and is used by the packers of that city. The firm employs constantly about one hundred and fifty men.

THE EAST SHORE OF GREEN BAY.—The fisheries of the east shore of Green Bay are carried on at present principally by the farmers who live along the shore. The professional fishermen, who are pound-owners, are only seven in number, six living on the mainland and one on Chambers' Island. South of Little Sturgeon Bay there are about forty-eight farmers who participate in the gill-net fishery in winter, and north of it about six more. Thus it appears that there are about sixty-two families on this shore which are more or less dependent upon the fisheries for their support. In addition, about twenty assistants are employed during the winter months.

Both the pound-owners and the farmers are almost without exception Belgians.

The men who fish with pound-nets have made but a scanty living in latter years, but the winter fishermen are usually fairly compensated for their toil.

There has been a decided decrease in the abundance of fish within the past decade. In 1873 Mr. Blakefield, of the firm of Blakefield & Minor, of Fish Creek, sold more than $4,000 worth of fresh fish from two small pound-nets, set in the vicinity of Chambers' Island. During 1879, on the same grounds, with twice the number of nets, the product was worth only about $400. On certain grounds, where a few years ago two men caught $9,000 worth of fish in their gill-nets, no fishing is now carried on. Those who formerly engaged in fishing and were successful have turned their attention to other pursuits, or have sought other fishing grounds in Lake Superior and elsewhere.

The apparatus, which consists of about 1,800 gill-nets, 15 pounds, a single seine, and a number of boats and accessories, is worth about $11,000, a large amount when compared with the catch. The fact that in 1869 at least $40,000 were invested in apparatus on this same extent of shore, the profits being more than double those now accruing, in proportion to the money invested, shows how great has been the decrease of the fisheries on this side of the bay.

Some further details in regard to the destruction of the celebrated fishing grounds at the entrance of Green Bay may be interesting in this connection. The grounds between Washington and Saint Martin's Islands were probably the most productive in the bay, and the most frequented by the fishermen. Their abandonment was due to several causes, and not least to the terrible losses of nets which occurred there in the fall of several seasons. As many as three thousand nets have been lost in one autumn, carrying down with them 500,000 or 600,000 whitefish. Although the loss of the nets was a great discouragement to the fishermen, it is the opinion of all that the presence of so large a mass of decaying fish on the spawning beds effected a much more serious injury in that it drove away the fish which were wont to congregate there. Many of the nets were grappled up in spring completely filled with fish, but the stench from them was so horrible that the fishermen could not take them into their boats.

The loss of nets occurred generally during the last days of the fishing season, early in December, after the whitefish had deposited their spawn.

The height of the prosperity of the gill-net fishery about Washington Island occurred between the years 1864 and 1867. After the latter date the decline became apparent. Fifteen years ago between four and five thousand nets were in use on the grounds, and a yearly business of $100,000 was transacted there.

Five years ago Chambers' Island supported nine pound-nets, in all of which large quantities of fish were taken, but in 1879 only two were established there, and both proved failures.

Between 1870 and 1873 not less than 60 tons of fish were shipped from Fish Creek, all taken from within a radius of ten miles.

PORTE DES MORTES, AT THE ENTRANCE OF GREEN BAY, TO AND INCLUDING MANITOWOC.—The principal fishing stations on this shore are Jacksonport, Whitefish Bay, Clay Banks, Rowley's Point, Two Rivers, and Manitowoc, of which the last two are the most important.

During the year 1879 about fifty-three men were engaged in fishing, being distributed as follows: Jacksonport, Cana Islands, and Whitefish Bay, eight; Manitowoc, four; Two Rivers and vicinity, forty-one. These, with their families, comprising in all about two hundred and thirty persons, derive their support solely from the fisheries. Besides those mentioned, ten or twelve men, principally from Two Rivers, are hired, during a part of the season at least, as assistants.

The fishermen north of Whitefish Bay are Americans, but from that point southward all, with the exception of five or six Germans, are French Canadians.

The French are all Roman Catholics. Their profession is handed down from father to son. The boys assist in fishing when very young, and develop into good fishermen and skillful boatmen.

At Two Rivers the fishermen and their families live in one locality, forming quite a colony, which is known locally as "Canada."

Most of the elder fishermen are in good circumstances, but when their business is very prosperous they are all apt to live extravagantly and expend a large part of their gains. Intemperance, which was formerly quite prevalent here, has almost entirely disappeared.

The fisheries differ in character at different points along the section of shore under consideration. At Jacksonport and Whitefish Bay the pound-net fishery takes precedence, the grounds opposite the latter station having been for a long time noted for their supply of whitefish. North of Clay Banks the gill-net fishery is unimportant, but the fishermen of that village and of Stony Creek, a few miles farther south, engage in that branch exclusively. At Two Rivers and Manitowoc both gill-net and pound-net fishing are extensively engaged in.

Along the entire shore, in 1879, about 2,200 gill-nets and 40 pound-nets were employed, the total value of which was about $26,000, according to the estimates of the owners. For the management of these nets and for the preparation and storage of the fish taken, boats and other apparatus and accessories, worth about $15,000, were employed.

The yield of the fisheries for the year ending October 1, 1879, was approximately as follows: Fresh fish, principally whitefish and trout, 550,000 pounds; salt fish—whitefish and herring—355,000 pounds; smoked fish, about 10,000 pounds. The total value of these products was about $33,300.

The whole catch, with the exception of 20,000 or 30,000 pounds, is sent to Chicago by cars or boats. One firm at Manitowoc carries on a strictly local trade, selling to the people of the town and neighborhood. All kinds taken from their nets find ready sale, even lawyers, which are purchased by the Germans and Scandanavians.

The fishermen of Manitowoc and Two Rivers complain of the decrease in the abundance of

fish, but the statistics in the report of the late Mr. James Milner, published by the United States Fish Commission in 1874, the only reliable ones available, do not show such an alarming decrease as, according to their opinion, exists. Nevertheless, it is undeniable that there have been important changes, especially at Two Rivers, within the past fifteen years. About five years ago the salt-fish trade became so unprofitable that many of the fishermen of Two Rivers left the town in search of more lucrative grounds. The fresh-fish trade, on the other hand, received a new impetus at that time, greatly encouraging the fishermen engaged in it.

SHEBOYGAN, OOSTBURGH, CEDAR GROVE, AND PORT WASHINGTON.—These four villages, situated on the west shore of Lake Michigan, are about equally interested in the fisheries. Investigation showed that the number of fishermen at Sheboygan in 1879 was about twenty; at Cedar Grove, about twenty; at Oostburgh, twenty-one; and at Port Washington, thirteen; making a total of seventy-four men. Those residing at Cedar Grove and Oostburgh are principally Hollanders, while those at Port Washington are Americans, and at Sheboygan Germans and Americans in about equal numbers.

Pound-net fishing is the only branch engaged in, except at Sheboygan, where gill nets are used exclusively. The apparatus employed, comprising 54 pound-nets, about 750 gill-nets, two steam-tugs, and a number of smaller boats and accessories, is valued at about $39,000. Four steam-tugs are, in reality, owned at Sheboygan, but two of them were employed at other places during the year 1879.

The catch on this shore consists almost entirely of the four kinds, whitefish, herring, trout, and sturgeon. During 1879 not less than 865,000 pounds of fresh fish, 500 half-barrels of salt fish, and 33,500 pounds of smoked fish were shipped to market, together with about 400 gallons of fish oil.

At least three-fourths of the products are sent to Chicago, the remainder being partially consumed in the villages about the fisheries, and in part sent to Saint Louis and other inland cities and towns.

In 1866 the grounds at Sheboygan became entirely depleted, and the fishermen crossed the lake and for two years fished along the east shore. On returning, at the end of that time, they found the old grounds were again productive, and they fished there with success. Pound-net fishing was attempted at Sheboygan in 1871, but the experiment ended in utter failure, and gill-netting was consequently resumed. The principal change which has taken place in connection with the latter mode of fishing is one which has occurred along the entire shore, namely, the substitution of steam-tugs for boats.

At Cedar Grove gill-nets and seines were formerly extensively employed. Gill-net fishing was abandoned on account of the remoteness of the grounds and the lack of a good harbor which the boats might enter in stormy weather. Pounds were not introduced until 1862. In the opinion of some of the fishermen of this place there has been a marked decrease in the abundance of fish during the last twenty years.

Pounds were introduced at Oostburgh and Port Washington about the year 1865, and have been constantly in use since that time. The fishermen state that, although the number of nets has greatly increased within a decade, the yield of the fisheries has remained about stationary, and that consequently the fish are decreasing in number.

MILWAUKEE.—The fisheries of Milwaukee, although of considerable importance in themselves, do not occupy a prominent place among the industries in which the people of that city are engaged. During the year 1879 only about eighty men, one-half of them fishermen and the others dealers, clerks, and peddlers, were employed in the business. It is a singular fact, but one which shows

that the city is entirely independent of the fisheries carried on there, that the larger proportion of the fish taken by Milwaukee fishermen are shipped to Chicago and other places, while the supply for the city is obtained largely from Lake Superior.

Both gill-net and pound-net fishing are engaged in, the former more extensively than the latter. In 1879 about 2,000 gill-nets and 10 pound-nets were employed, the value of which, according to the owner, is about $9,500. In the management of the nets five steam-tugs, and a number of smaller boats and accessories, valued at about $13,000, are employed.

As a result of the activities of the fishermen during 1879, about 980,000 pounds of fish were taken, 900,000 pounds of which were whitefish and trout, and the remainder lawyers, sturgeon, and other minor varieties. About 500,000 pounds of whitefish and trout were sent to Chicago, and the rest, in part, sent to inland towns, and in part consumed in the city. The value of the products to the fishermen, who, it must be remembered, usually ship for themselves the fish they catch, was about $28,600. It may not be inappropriate to mention that in addition to the amount caught in Lake Michigan, about 75,000 pounds of fish, principally bass and pickerel, were received into the city from various inland lakes in the State.

The trade in fish received from other places is of considerable importance. Six dealers are engaged in the business. During the year 1879 they received an aggregate of 5,969 half-barrels of salt fish, which, with the exception of about 28 half-barrels, consisted of various grades of whitefish, trout, and herring. They were received in part from the east shore of Lake Michigan, north of Ludington, and from Lake Superior. More than 4,000 half-barrels were sold to the wholesale grocers of the city, by whom they were sent to the retail grocers in the surrounding country, the remainder being sent to Saint Louis, Cincinnati, and other inland cities and towns.

The decline of the importance of Milwaukee as a distributing point is shown by the striking decrease in the amounts handled by the dealers in 1879 as compared with those of former years. One firm, which disposed of 2,000 half-barrels of salt fish in 1879, in 1867 received 13,000 half-barrels, and in 1869, 14,000 half-barrels. Another firm, which also handled about 2,000 half-barrels in 1879, received nearly 7,000 half-barrels in 1872, and over 10,000 barrels in 1873.

In addition to the salt fish, about 100,000 pounds of fresh whitefish and trout, and a small amount of minor varieties, were received from outside the city, principally from Lake Superior, and sold partly in Milwaukee and partly in the neighboring inland towns.

The fisheries of Milwaukee are less extensive than formerly, owing, no doubt, in part, to their being less productive than formerly. In 1865 about seventy fishermen, employing twenty-three boats, engaged in the industry, making a very comfortable living. Since that time the number has constantly decreased.

Gill-nets and seines have been employed since the first settlement of the country, but it was not until 1865 that pounds were introduced. The Norwegian sloops, formerly in use, have given place, in large measure, to steam-tugs, within the last five or six years.

RACINE, KENOSHA, AND WAUKEGAN.—On that portion of the west shore of Lake Michigan on which these three towns are situated, the fisheries are not so important as those farther north. Only about forty-five men—twenty-six at Waukegan, nine at Kenosha, and ten at Racine—are engaged in fishing.

At Racine gill-net fishing is the only branch pursued, and at Kenosha, also, the gill-net is the most important apparatus, but at the latter place two pound-nets are owned. At Waukegan, on the other hand, pound-nets alone are in use, about twenty-seven of them being set at different points along twelve miles of shore, partly north and partly south of the village. The variety displayed in the fisheries prosecuted is due principally to the nature of the shore. Gill-nets were for-

merly extensively employed at Waukegan, but the lack of a harbor at that place made the fishing very dangerous, and it was abandoned.

At Waukegan the fishermen are of different nationalities, Americans predominating. At Kenosha they are Germans, and at Racine, Scandinavians.

The value of the apparatus employed is large, as compared with the worth of the products of the fisheries, which would seem to indicate a decline in the abundance of fish, or lessened activity among the fishermen. The nets, boats, and accessory apparatus employed, according to the estimates of the fishermen, are worth in all, about $19,000, while the products for the year 1879 brought the fishermen but about $13,500 gross. This is probably the smallest catch ever known on this portion of the shore, by at least one-fourth. It is possible that the value given does not represent the value of the entire catch, as a considerable portion of the products are sold out of the boats as soon as the latter come in, and of this amount nothing more than an insufficient estimate could be obtained.

The catch consists of whitefish, trout, sturgeon, and pike, and several of the minor varieties. At Kenosha, few of any kinds except whitefish and trout are taken, and at Racine these two, with the addition of sturgeon, make up the whole amount. On account of the proximity of the towns to Chicago, much of the fish is sent to that city fresh in ice. About one-half the yield of the Waukegan and Racine fisheries, however, is consumed in the neighboring inland villages. At Waukegan considerable quantities of small whitefish are smoked, and during 1879, about 225 half-barrels of that fish were salted. The sturgeon taken, about 30,000 pounds in 1879, are sent to Chicago to be smoked.

There are several facts connected with the history of the fisheries of this section which it may be well to have recorded. Several disasters have occurred within the last decade. In 1875 two boats, in which were eight fishermen of Kenosha, were lost during a northwest gale. The accident seriously disheartened those remaining, and many ceased fishing entirely. The only other disaster, of which information could be obtained, occurred at Racine, where, in 1876, one fisherman was drowned.

Changes have taken place in the apparatus used and the manner of fishing, as well as in the extent of the industry. In 1868 the Kenosha fisheries supported eight boats, and the occupation was considered profitable, but now, according to the fishermen's phraseology and belief, it is "played out." The cause is attributed to too exhaustive fishing and the influence of the pound-nets established south of the city. Small-mesh gill-nets were formerly employed for the capture of ciscoes, but the custom has been almost entirely abandoned. Mr. Bergerhagen, a gentleman resident at Kenosha, and conversant with the condition of the fisheries, is of the opinion that not one-fourth as many fish frequent this shore as formerly, and denounces the use of pound-nets in strongest terms.

At Waukegan pound-nets have been in use for twelve years, previous to which time gill-nets and seines were employed. Mr. D. D. Parmlee, a well informed man, residing here in 1879, stated that during the last four or five years the fishermen had not made a living by their occupation. He thought an increase was apparent at that time, however, and considered that the fishermen had no reason for alarm, as the same fluctuation had occurred in other years.

The only change in the apparatus used at Racine, is the substitution of nets with fine thread for those with coarser thread.

CHICAGO AND SOUTH CHICAGO.—Although Chicago is beyond all question the most important receiving and distributing point on the lakes, the fisheries carried on there are comparatively insignificant. They are more extensive now, however, than formerly, when the river, polluted with

the sewerage and refuse of the city, flowed into the lake. There has been little change since 1875, and in that year about three hundred men, according to Mr. Nelson (Report United States Commissioner of Fish and Fisheries, Part IV, 1875–'76, page 785), were engaged in fishing. The majority used well-built Mackinaw boats and ventured 15 or 20 miles from the city, but some fished with hand-lines near the city and caught only the less important kinds of fish.

Three pound-nets and about one hundred boats were employed, which, together with minor apparatus, were valued at about $10,000.

The catch consists principally of trout, sturgeon, and catfish. Under the general head of fish markets in another section of this report, the fish trade of Chicago is treated of at length, and it will not be necessary to give more than a summary here. According to the investigations and estimates made the amount of fresh and smoked fish received into Chicago during 1879 was as follows:

Description.	Quantity.
	Pounds.
Fresh fish:	
Whitefish	3,658,567
Trout	1,705,761
Sturgeon	41,560
Miscellaneous	274,162
River fish	230,520
Smoked fish:	
Whitefish	232,000
Sturgeon	300,000

The total amount of fresh fish was, therefore, 5,910,570 pounds, and of smoked fish 532,000 pounds. Of this amount about 2,000,000 pounds were consumed in the city and its suburbs, of which amount about 1,000,000 pounds were fresh whitefish, and the remainder river fish, trout and smoked sturgeon, and whitefish. In addition to the fresh and smoked fish, about 10,805,000 pounds of salt fish were received. The aggregate amount, therefore, handled by the dealers in 1879 was not less than 17,247,570 pounds. This amount is less by 9,552,430 pounds than that given in the newspapers for the same year, but it is more by about 10,000,000 pounds than the aggregate given in the tables for 1872, published by the late Mr. Milner in the Report of the United States Fish Commissioner.

The fisheries of South Chicago are similar in character to those carried on on the west shore of the lake. They are not very extensive, only fifteen fishermen being engaged in them. The principal apparatus, consisting of one steam-tug, three sail-boats, eleven pound-nets, and about one hundred gill-nets, is worth about $10,000. To this amount, Mr. Nelson, in the Report of the United States Fish Commissioner for 1875–'76, adds $60,000 for the value of "ice-houses, fish-houses, wagons, and various other material and property belonging strictly to the business," but this amount appears to us very large. A letter from M. Hausler & Brother, one of the principal firms at South Chicago, contains the following information regarding the yield:

"The amount of fish caught here in 1879 was about 150,000 pounds. Two-fifths were whitefish and three-fifths sturgeon and herring. All were sold fresh in Chicago."

232. THE FISHERIES OF THE EASTERN SHORE.

MICHIGAN CITY, IND., AND NEW BUFFALO, MICH.—Michigan City is the only community in Indiana interested in fishing in Lake Michigan. The grounds lie between the city and New Buffalo, the adjoining village in Michigan.

The number of fishermen at these two places is a varying one, owing to the fact that at certain seasons some come from other places, and have no residence here. During 1879 the whole number of professional fishermen did not exceed twenty-six, representing fifteen firms. Of these, four firms belonged in other places, one coming from South Chicago, two from Sheboygan, and one from Saugertauk. In addition there were thirty-four hired assistants, fifteen of whom have families, and eight peddlers and smokers. In all, fifty men having families, and twenty single men were connected with the industry. The majority of the fishermen are Germans, but there are also a number of Swedes and Americans among them.

Pound-net fishing takes precedence in importance, twelve firms being engaged in that branch, while but three are engaged in gill-net fishing. Fishing with hook-and-line is also quite extensively carried on. In 1879 the apparatus of capture consisted of twenty-five pound-nets, nine hundred gill-nets, and hand-lines carrying fifteen thousand hooks. In the management of the gill-nets one steam-tug is employed, besides three sail-boats. The value of the apparatus employed in 1879, including that already mentioned, together with twelve pound-boats, twelve fish-houses, and twelve hundred shipping-boxes, and the cost of repairs made upon the pound-nets amounted to about $32,300.

The yield of the fisheries for 1879 was a comparatively small one. The pound-net fishing was not very successful. The fishermen pronounced the catch to be below the average. At Michigan City the products consisted of 500,000 pounds of fresh fish, 25,000 pounds of salt fish, and 70,000 pounds of smoked fish, principally sturgeon. About 2,080 pounds of caviare were manufactured. At New Buffalo 75,000 pounds of fish were taken and all sold fresh.

A large part of the fish are sent directly to Chicago, but considerable quantities are also sent to the following places, named in order of their importance: Lafayette, Ind.; Kalamazoo, Mich.; Jackson, Mich.; La Porte, Indianapolis, South Bend, Valparaiso, Peru, in Indiana; Cincinnati, Ohio; and Saint Louis, Mo. Besides those sent to these places, certain quantities are retailed in the towns in the vicinity of the fisheries. Twelve wagons leave Michigan City twice every week, taking loads of about 400 pounds each.

Considering the distance from the shore at which the fishermen habitually prosecute their business, it is remarkable that so few accidents have occurred. There is one, however, which we must record. It occurred in 1874. One boat in which were four men was lost, and all on board perished. Another disaster occurred three years later, but fortunately no lives were lost. On the 22d of June, 1877, a tremendous northerly gale struck the shore, and tearing up all the pound-nets carried them as far as South Chicago. The amount of the loss was estimated at $18,000, fully equal to the value of the products obtained during the prior part of the season.

The gill-net fishery was pronounced as prosperous in 1879 as at the beginning of the decade. In 1862 and 1863 it became entirely unproductive in July, while ordinarily the season lasts until August.

Many years ago this part of the shore was famous as a seining-ground. About 1860 it was not unusual to take 1,000 or 1,500 pounds of fish at a single haul, but within ten years nothing has been done in this branch, the fish having kept farther from shore than formerly.

In 1874, the first year in which pound-fishing was carried on, three firms engaged in it made together not less than $19,500, clear of all expenses.

SAINT JOSEPH, SOUTH HAVEN, AND SAUGERTAUK.—The fisheries of Saint Joseph are more important than those of the other two villages. In 1879 ten sail-boats and one steam-tug were employed here, carrying together about sixty-four men. At South Haven but one boat was

employed, and at Saugertauk three. In all, therefore, there were fourteen boats and one steam-tug, employing about eighty-eight men. Besides these professional fishermen there are four or five men who fish with what are known as "plump-nets," and four or five others who make a living by oil rendering. Fifty of the fishermen have families, the rest being single. Although many nationalities are represented among these fishermen, the larger proportion are Germans.

Gill net fishing is the principal branch engaged in, and during 1879 no less than two thousand eight hundred nets were in use. Pound-net fishing is not carried on extensively on account of the nature of the shore. In former years seining was prosecuted to a considerable extent, but at the present time there are no seines in use. The entire value of the apparatus employed, including boats, nets, and accessories, is about $29,000. This is certainly a large amount when compared with the yield of the fisheries of the three villages.

The total catch in 1879 amounted to about 668,000 pounds, of which about 500,000 pounds were taken by the Saint Joseph fishermen. About one-third of the fish were trout, the remainder being whitefish and other species of minor value. With the exception of about 10,000 pounds the fish were sent fresh to Chicago. A small amount excepted was sent to the neighboring inland towns.

The fishermen of Saint Joseph have probably suffered more from disaster than any others on the whole of the lakes. In 1869 two boats were lost, carrying down nine fishermen. On the 29th of April, 1875, while eleven boats were fishing at a long distance from shore, a sudden and violent squall sprang up from the northwest, striking the fleet with great violence. Some of the boats were returning home and had all the canvas up; they were unable to get their sails down before the storm was upon them. Out of the whole number of boats four were lost, carrying down with them eleven of the fishermen. Not one, however, of the boats returned in safety. Some were driven upon the beach many miles from their harbor, and nearly all sustained some injury besides losing their nets, sails, and other parts of their apparatus and rigging. In 1876 one boat and one fisherman were lost, the rest of the crew being picked up by a passing vessel.

These disasters, together with the decrease of fish and the low prices received, discouraged many fishermen, and numbers of them have given up the pursuit and gone into other occupations. For several years prior to 1879 the fishermen have been losing money, but the prospect for that year was much more satisfactory.

Mr. C. P. Haywood, the famous boat-builder, is located at Saint Joseph, but during later years he has been unable to sell any boats, as the fishermen have been too poor to invest in them. He has, however, the reputation of being the best boat-builder on the lakes. His boats, known as the "Haywood," "Huron," or "Square Stern," have a great reputation in Lake Huron, but have not sustained it well at Saint Joseph, where they have been subjected to very severe trials. The first boat used here was the "Mackinaw," after which the unwieldy "Norwegian sloop" was in vogue for many years, the latter being finally superseded, as already mentioned, by the Haywood boat. There seems to be a determination on the part of the fishermen to return to the Norwegian sloop again, as it is considered absolutely safe in all weathers and is best suited for the boisterous off-shore fishing.

SAUGERTAUK TO GLEN HAVEN.—The principal fisheries on this shore are at Grand Haven, Little and Big Points Sable, Whitehall, Pent Water, Ludington, Manistee, and Point Betsy. The most important of these points is Grand Haven, where more men are engaged in fishing than in all of the other villages together. The following is the number of fishermen in each place: Grand Haven, 86; Pent Water, 4; Whitehall, 12; Ludington, 31; Manistee, 6; Frankfort, 4.

Among those enumerated are twenty-four boys. About one hundred of the fishermen have families, the remainder being young men. In addition to those mentioned there are about a dozen families of semi-professional fishermen, including some half-breeds who dress fish for the offal from which to fry out oil.

The majority of the fishermen about Ludington are Swedes and Norwegians, but a number of those having the largest trade are Americans. As a rule the fishermen are reported to be in good circumstances, and making a comfortable living for themselves. At Pent Water there are but two firms, one American and the other Norweigan. At South Haven the fishermen are almost without exception Hollanders, and they are said to be a thrifty and industrious class.

On account of the nature of the shore very little pound-net fishing is carried on from any of these villages, and the fishermen therefore have resort to gill-net fishing. Various attempts have been made to establish pounds, but they have usually been blown ashore in a short time and completely wrecked. In 1879 there were but seven in use between Glen Haven and Saugertauk. During the same year not less than 4,400 gill-nets, worth approximately $26,500, were in use. These nets, which were formerly knit by the fishermen's wives and daughters, are now bought ready-made. A variety of boats are employed, including Norwegian sloops, Mackinaw boats, Huron boats, and the ordinary pound-boats. The Norwegian sloops are used principally at Grand Haven, where the fishermen employ a large number of nets, and pursue their occupation at a long distance from shore. The value of the apparatus in use in 1879 was about $57,000, including boats, nets, and repairs of the same, fish-houses, pile-drivers, shipping-boxes, and other minor accessories.

Most of the fishermen along this shore are accustomed to ship the fish which they catch, and few of them keep any record of their trade; great difficulty, therefore, was experienced in securing the statistics of the yield of the fisheries. The total product in 1879, however, yielded a return of about $70,000. Of the amount taken about 1,060,000 pounds were caught by the fishermen of Grand Haven; this portion consisted entirely of whitefish and trout, which were shipped by boat to Chicago. Grand Haven has better facilities for shipping fish than some of the other villages, and therefore a higher price is realized here than at other points. The Whitehall fishermen are estimated to have taken 100,000 pounds, which were also sent to Chicago. At Pent Water there were but two boats in use in 1879; the owner of one of them shipped his fish to Chicago, the other selling his at retail in the village. Both together did not secure more than 7,000 pounds of fish in 1879. At Manistee the catch amounted to about 75,000 pounds, and at Frankfort to about 37,500 pounds.

About the only change that has taken place in the fisheries here has been the introduction of steam-tugs for gill-net fishing; they have not been in use more than five or six years. Many years ago a few seines were employed at different places along the shore. At these same points seines have now become abundant. The same grounds have been visited for more than twenty years.

It is the general impression of the fishermen that there has been a great decrease in the abundance of fish. They consider that the habit of throwing offal on the grounds has had a very decided effect in bringing about this condition of affairs, and they also suppose that the capture of so many young fish has had an injurious effect. In proof that there has been a decided decrease of late, one of the fishermen stated that in 1876 he took an amount of fish worth $1,400 from one pound-net, and that from the same net in 1879 he took only $600 worth. At Big Point Sable large numbers of small fish are taken, but it is said to be the practice of the fishermen to throw them into the water again, thus giving them a chance to survive. At Little Point Sable, however, none but large fish are taken, most of them being rated "No. 1."

Mr. Putnam, of Pent Water, stated that fishing during 1879 was but little better than that of prior years, and that at no point on the shore is there a more alarming decrease than here. At Grand Haven the fishing was reported to be in as good a condition as in prior years. Between 1875 and 1877 the yield was very small, but since that time it has been increasing. At Holland fishing has almost entirely died out; not, however, on account of the decrease of fish, but because the place has very poor shipping facilities, and the fishermen are able to secure but little profit from the fish which they take.

LITTLE AND GRAND TRAVERSE BAYS.—The principal fisheries of this region are carried on from Traverse City, Northport, Charlevoix, and Petoskey. The last-mentioned village has lately assumed new relations to the fisheries, being at present a shipping point of considerable importance. An enterprising firm built a large freezing-house here early in 1878, and since that time fishing in the locality has been prosecuted with increased energy. The grounds in the two bays were visited, however, many years ago by fishermen from Mackinac, with good success, but their distance from any shipping point proved too great, and the enterprise was abandoned. For a number of years afterwards no other fishermen resorted here, except a few Indians. The firm now located at Petoskey handles all the fish taken between Cross Village on the north, and Charlevoix on the south.

Sufficient has been already written to show that but little variety exists in the kinds of fisheries carried on in different parts of the lakes, or in the manner of their operation. In the region now under consideration we find the same condition of affairs which exists in other localities. Gill-net and pound-net fishing take the lead, while seining is of minor importance. Fifteen hundred gill-nets, nineteen or twenty pounds, and three seines constitute the sum of the apparatus of capture employed. Two steam-tugs, one hailing from Petoskey and one from Charlevoix, together with twenty Mackinaw boats, serve in the gill-net fishery, while in the management of the pounds about sixteen of the ordinary scow-like pound-boats are employed. These nets and boats, together with the buildings established at the fisheries, and other structures and implements of minor importance, are valued by their owners at not less than $32,000.

A large proportion of the fish taken in Little and Grand Traverse Bays are whitefish and trout, next to which herring, suckers, and black-fins are the most important. The amount of all kinds caught here in 1879 and sent fresh to different markets was not less than 224,000 pounds, in addition to which 100,000 pounds of fish were frozen, and 700 half-barrels of salt fish prepared. The fresh fish are disposed of at different points on the line of the Grand Rapids and Indiana Railroad; none, however, at least in 1879, going south of Fort Wayne, Ind. The fish frozen at Petoskey during the same season were all shipped to Philadelphia. A large part of the salt fish find sale in Chicago.

What little could be learned by investigation regarding the history of the fisheries of Little and Grand Traverse Bays has been already given.

THE STRAITS OF MACKINAC.—In this section it is necessary to include the northern shores of Lakes Michigan and Huron, from the entrance of Green Bay to the mouth of river Sainte Marie as well as the islands of Mackinac and Bois Blanc, and the south shore of the straits east from Point Wagoshance. Within these limits we find no less than eleven hundred persons dependent, to a greater or lesser extent, upon the fisheries, including the fishermen and their families, shop-keep-

ers, clerks, dealers, and others. The number of men in each branch of the fisheries and in the occupations accessory thereto, in 1879, was somewhat as follows:

Persons employed.	Number.
Pound-owners and their assistants	60
Gill-net fishermen	175
Sailors on fishing vessels	10
Clerks	5
Dealers, shopkeepers, &c	15
Fish-dressers and general assistants	10

Among these people every conceivable condition may be found from that of the poor fisherman, whose scanty profits scarcely furnish him his livelihood, to that of the wealthy merchant who owns extensive grounds and fishes by proxy. The tendency, however, is towards concentration of interests, many of the smaller fishermen selling out their stock and privileges to the wealthier firms, contenting themselves with giving their service as hired employés. Firms with large capital are now fishing with many nets, where formerly the occupation was distributed among a large number of fishermen of limited means.

The pound-owners, as a rule, are in very comfortable circumstances, and have considerable money invested in their fisheries, which are managed with commendable zeal and enterprise. A majority of them are Americans. The gill-net fishermen, on the other hand, are largely French Canadians, and among them many extremely shiftless people are to be found. A large proportion barely succeed in making a living. They often allow their nets to remain in the water for a number of weeks without removing the fish caught in them. At other times they expose them unduly to storms, and, as a result, frequently lose great amounts of twine.

A principal cause of the decrease of fishermen of small means in this region is to be found in the fact that fitters refuse to supply them with apparatus and stores on credit—a practice extensively in use here in former years.

In matter of importance, the gill-net and pound-net fisheries hold about equal rank. It is true that the whole number of nets used in the former branch, considered by themselves, are less valuable than the pounds but when we consider the worth of all the apparatus, the nets, the boats, and accessories, employed in either fishery, the amount of capital invested appears about equal The following table shows the value of all kinds of apparatus employed during the year 1879:

Apparatus employed.	Number.	Value.
Steam-tugs	4	$8,000
Schooners	1	3,000
Mackinaw boats	75	11,250
Pound-boats	40	2,400
150-ton lighter for anchor-fishing	1	1,000
Pound-nets	116	58,000
Gill-nets	6,000	30,000
Twine for repair of nets	.....	5,000
Steam pile-driver	1	500
Hand pile-driver	30	1,200
Packing-houses	6	1,800
Shanties	100	2,000
Shipping cars	30	1,200
Total	.....	125,350

Whitefish, trout, and herring are by far the most important species of fish taken in this region. Considerable quantities of pike, however, are also caught. The yield in 1879 was as follows:

Description.	Pounds.
Fresh fish:	
Whitefish and trout	770,000
Salt fish:	
Whitefish	2,200,000
Trout	167,000
Herring	162,000
Pickerel, &c	25,000
Total	3,324,000

The principal markets to which these fish were sent were Chicago, Cleveland, Detroit, and Sandusky. Of the fresh fish Chicago received about 540,000 pounds and of the salt fish 2,529,000 pounds, while 50,000 pounds of the former were sent to Cleveland, 75,000 pounds to Detroit, and 17,000 pounds to Sandusky, and about 88,000 pounds to various other places; and of the latter, 100,000 pounds to Cleveland, 75,000 pounds to Detroit, 350,000 pounds to Sandusky, and the remainder to other places. It appears, therefore, that Chicago absorbed by far the larger part.

Very little in regard to the history of the fisheries was obtained at Mackinac, except so far as relates to the products of other years. According to Captain Ketchum, in 1872 about 20,000 half-barrels of salt fish and 5,000 half-barrels, containing 140 pounds each, of fresh fish. The whole amount, with the exception of about 4,000 half-barrels trout and herring, consisted of whitefish. In 1867 the single firm of Brownlow & Bates shipped about 8,500 half-barrels of fish to Chicago, selling them at an average price of $4 per half-barrel. In 1868 they shipped about 13,000 half barrels, of which 357 were herring and the remainder whitefish and trout. The price obtained during that year was about $5 per half-barrel. Another firm carried on a still more extensive business, shipping not less than 1,400 pounds of fish per week for three or four months at a time.

THE BEAVER ISLANDS.—The Beaver Islands, one of the most important groups in the lakes, are located at the northern end of Lake Michigan, about midway between the shores of the upper and lower peninsulas of Michigan. The island from which the group is named is the only one of considerable size in the group, and contains the village and post-office of Saint James.

The shores of Beaver Island itself, and of others of the group, are suitable in nature for the establishment of pound-nets, while many of the shoals in the vicinity, particularly those about Gull Island, are noted gill-net grounds. Seining is but little attended to; in 1879 only two seines being in use. During the same year, however, the fisheries were actively prosecuted by the use of about thirty-seven pounds and not less than seven hundred and fifty gill-nets. Mackinaw boats are most in favor for gill-net fishing, thirty-eight of them having been employed and but two Hayward boats. The ordinary pound boats are used in that branch of fishing. The value of all the apparatus employed, according to the estimates of Mr. Albert Miller, who is well acquainted with the fisheries of the group, will not exceed $26,670.

The salt-fish trade of the islands is more important than the fresh-fish trade. About 4,000 half barrels of salt fish were prepared and sent to market in 1879, while about 100,000 pounds will represent the amount of fresh fish disposed of. Whitefish, trout, herring, and suckers make up the amount.

Mr. Charles R. Wright, who has been acquainted with the fisheries of the Beaver Islands for about twenty years, and who has furnished some material for this report, is of the opinion that there has been a decrease of 40 or 50 per cent. in the abundance of fish about the islands within two decades.

D.—LAKE HURON AND ITS FISHERIES.

234. STATISTICAL SUMMATION.

Summary statement of persons employed.

Persons employed.	Number.
Fishermen	976

Detailed statement of capital invested and capital employed.

Apparatus specified.	Number.	Value.
Vessels and boats	154	$29,029
Pounds	189	49,425
Gill-nets	3,540	21,680
Seines	75	12,800
Other apparatus, including outfits	.....	6,360
Shore property	.....	36,600
	.....	155,914

Detailed statement of the quantities and values of the products.

Products specified.	Quantity.	Value.
Primary products.		
Fresh fish ... pounds	10,354,850	$267,300
Salt fish ... do	800,800	16,000
Frozen fish ... do	1,165,000	63,360
Secondary products.		
Caviare ... do	20,250	2,025
Isinglass ... do	300	500
Oil ... gallons	600	180
Total	.....	349,365

235. THE FISHERIES OF THE AMERICAN SHORE.

HAMMOND'S BAY TO POINT SABLE.—The principal fisheries of this section of shore are those at Alpena and the Thunder Bay Islands. During 1879 about seventy-nine men were employed in fishing, many of the assistants being "Canuck" (Canadian) Indians. Nearly all of those who own boats ship the fish which they catch.

Both pound-nets and gill-nets are employed here. The gill-net fishery, however, is the most important. Pounds have been in use for twenty-five years, prior to which time gill-nets and seines were exclusively employed. Except in this particular, there has been but little change in the manner of fishing for many years. In 1879, two thousand gill-nets and about twenty-two pound-nets were in use. The apparatus employed in the management of these nets, together with the nets themselves and the accessories, were valued at $35,000.

The quantity of fresh fish taken in 1879 was about 2,344,000 pounds, and of salted fish about 100,000 pounds. The fresh fish consisted exclusively of whitefish and trout, while the salt fish were principally lake herring. These amounts were taken by the fishermen belonging to fourteen firms, in quantities varying from 20 to 230 tons. The fresh fish, with the exception of about 150

tons, were sent to Sandusky and Detroit. The salt fish were distributed to various inland towns in Michigan. It should be held in mind that a large number of the fish taken at Alpena were caught by the fishermen belonging at Detroit; the portion taken by Alpena fishermen could not have amounted to more than 300,000 pounds of fresh fish and 100,000 pounds of salt fish.

At Alcona, a small village near Alpena, two men were engaged in fishing in 1879, using a boat and a pound-net, together worth about $325. They took, as the results of their activities, about $550 worth of fish, principally of whitefish, herring, and sturgeon.

Record could be found of but two disasters, one of which occurred in 1860, when three fishermen were drowned, and the other in 1877, when a similar loss of life occurred.

In 1855 there are said to have been about fifty boats fishing at Au Sable, where at the present time there are but two. It is supposed that the refuse from the lumber mills has driven the fish away; at any rate the fish have disappeared, and fishing at this point is decidedly unprofitable. Several of the fishermen made statements in regard to the amounts of fish which they had taken in former years. Mr. Case, of Alpena, stated that he was formerly able to prepare at least 1,200 barrels of salt fish, as the result of one season's fishing, but that in 1879 he did not take more than 30 tons of fish. From three pound-nets, as the result of two nights' fishing, he has taken 450 half-barrels of whitefish. At another time, at Hammond's Bay, he took 100 half-barrels of whitefish from one net, as the result of three nights' fishing; and besides whitefish, it was estimated that there were 20 barrels of smothered fish in addition.

There is considerable talk among the fishermen about the fact of Canadian fish being brought into competition with American fish. One dealer from Detroit, who fishes in Canadian waters, and brings his fish to Alpena to be shipped to Detroit, stated that he would ship 1,000,000 pounds of Canadian fish into the United States during the season of 1879.

SAGINAW BAY AND THE CHARITY ISLANDS.—The fisheries of Saginaw Bay are among the most important on Lake Huron. During 1879 the total number of men employed in pound-net fishing, according to the best information obtainable, was one hundred and fifty-six, of whom about one-third had families. These men are employed nearly the entire year. In summer they fish with pound nets in the bay, and in winter they continue the pound-net fishing in the river under the ice or turn their attention to spearing fish. Besides these, there are at least three hundred and fifty men who fish only in the winter. The fishermen are chiefly French Canadians.

As already intimated, the principal branches pursued in Saginaw Bay are pound-fishing and spearing. The pounds are of two kinds; one kind being used in summer in the bay and the other at the mouth of the river in the winter. During 1879 not less than one hundred and sixty-five pound-nets of both kinds were in use together with spearing apparatus to the value of $4,500. About ten seines are also employed and ninety or one hundred fyke-nets. The whole apparatus in use is worth not far from $53,000.

During 1879 the fishermen sold about 2,790,000 pounds of fresh fish, of which fully 638,000 were whitefish and herring, the remainder being pike and other minor varieties. During the same season about 230,000 pounds of salt whitefish, 100,000 pounds of herring, and 80,000 pounds of pike were sent to market. About 350,000 pounds of fresh fish were shipped to various distributing points on the lake. The salt fish were sent to inland towns, principally to Cincinnati and Louisville.

A number of disasters have occurred during the past decade, but it is impossible to learn any particulars regarding them. Pound-net fishing was begun here in 1860, prior to which time fyke-nets and seines alone were employed. The fishermen are of the opinion that fish of all kinds are decreasing, the decrease being most noticeable among the whitefish. The decline of the fishery is

most apparent in the branches carried on in winter. The decrease has been so great that a supply can no longer be depended upon. The same is true of the river fisheries, which were at one time considered the most profitable in this locality. The principal cause for the decrease in the number of fish in the rivers is supposed to be the accumulation of a vast amount of refuse from the lumber mills.

POINT AUX BARQUES TO WINDMILL POINT, INCLUDING LAKE AND RIVER SAINT CLAIR.—The principal fishing points included within these limits are at Lexington, Port Sanilac, Forestville, White Rock, Sand Beach, Port Hope, Huron City, Au Sable, Grindstone City, Whitehall, and Port Huron. At none of these villages are the fisheries very extensive. The largest number of boats is employed at Sand Beach and Grindstone City. The total number of men employed in this section is about ninety. The seine fishermen, twenty-eight in number, are, however, employed for only about two and a half months. Seine-fishing, outside the river Saint Clair, is insignificant.

The principal branch carried on is the gill-net fishery. In 1879 one thousand five hundred and eighty nets were in use. The shore being altogether unsuited for pound-nets none are employed. The principal fish taken in the gill-nets are whitefish, trout, and herring. In the seines, sturgeon, herring, and yellow pike are the kinds most commonly caught.

The larger part of the total amount was sent to Cleveland, Toledo, and other distributing points. All the fish caught in the seines are sold fresh. It is the habit of some of the fishermen to keep the fish which they catch in artificial ponds, taking out only so many as are required to supply the market. This method of preserving the fish has resulted, however, several times in considerable loss. One fisherman lost 20,000 pounds of fish at one time, the fish having died in the ponds from a lack of sufficient fresh water.

As far as could be ascertained, no disaster has occurred on this shore within the past decade. The principal change in the manner of fishing has been that which has taken place at many other points, namely, the introduction of steam-tugs in the gill-net fishery. According to the statements of the fishermen, seine-fishing, especially on the lake shore, has declined, while gill-net fishing has considerably increased. Most of the boats employ less nets, but larger ones, than formerly. The boats themselves are considerably smaller than those in use ten or twelve years ago.

E.—LAKE ERIE AND ITS FISHERIES.

236. STATISTICAL SUMMATION.

Summary statement of persons employed.

Persons employed.	Number.
Fishermen	1,470

Detailed statement of capital invested and persons employed.

Apparatus specified.	Number.	Value.
Vessels and boats	538	$72,430
Pounds	758	233,600
Gill-nets	5,775	22,500
Seines	13	1,600
Other apparatus, including outfits		18,595
Shore property		154,775
Total		503,500

Detailed statement of the quantities and values of the products.

Products specified.	Quantity.	Value.
Primary products.		
Fresh fish ..... pounds..	17,054,670	$312,250
Salt fish ..... do....	6,712,500	125,490
Frozen fish ..... do....	1,406,650	51,240
Smoked fish ..... do....	933,180	57,040
Secondary products.		
Caviare ..... pounds..	178,580	25,670
Isinglass ..... do....	3,344	5,000
Oil ..... gallons..	4,880	2,000
Total	.....	578,690

237. THE FISHERIES OF THE WESTERN END, INCLUDING DETROIT AND TOLEDO.

DETROIT.—There is no fishing carried on in the immediate vicinity of Detroit, but the city is, nevertheless, an important receiving and distributing point. The following table shows the total amount of fresh fish received at Detroit in 1879:

Description.	Quantity.
	Pounds.
Whitefish	2,260,000
Trout	1,340,000
Pike	1,100,000
Miscellaneous	400,000
Total	5,100,000

The amount of salt fish was as follows:

Description.	Quantity.
	Half-barrels.
Whitefish	13,350
Trout	8,350
Herring	7,965
Pike	250
Total	29,915

Of the fresh fish about 1,165,000 pounds were frozen, all of which, with the exception of about 500,000 pounds, were sent out of the city. The entire amount of salt fish also found a market outside of the city. Large quantities are sent to different cities in New York State, and also to Boston, Philadelphia, and other cities on the coast. One firm shipped a considerable amount to Kentucky. Toledo, Sandusky, Cleveland, and other cities of Lake Erie also receive considerable quantities, which are distributed to various inland towns.

Detroit is one of the principal points at which fish are frozen. During 1879 at least 580 tons were frozen. There are several firms engaged in the business, all doing a large trade.

Regarding the amount of fish consumed in the city itself very little information could be obtained. Few of the peddlers and retailers have any idea of the extent of their business. It is probable, however, that about 500,000 pounds were consumed in 1879, 200,000 pounds of which were bought from the city wholesalers and the balance from the fishermen on the river and on Lake Saint Clair. The trade is divided among seventeen firms, most of whom have a stall in the

market. Many varieties of fish are exposed for sale, a large percentage being pike, bass, and perch. The average selling price of all kinds is not far from 6 cents a pound.

The State hatching-house of Michigan is located at Detroit, and is under the management of Mr. Owen Chase. It is estimated that the house has a capacity for hatching 20,000,000 eggs. In 1879, however, they were unable to procure more than 11,000,000 whitefish eggs. The house contains 30 Holton boxes and 75 glass jars. The hatchery has been in operation for five years and is considered in every respect a success. Those who have the management of the establishment claim that the results from the reproduction of fish give great encouragement in the work. There is said to have been a great increase in the catch, especially in Lake Saint Clair. There are some, however, who are very skeptical on these points.

DETROIT RIVER.—The fisheries of Detroit River differ in character from those of any other part of the Great Lakes. Between Windmill Point, at the head of the river, and Bar Point, at its mouth, there are no less than thirty separate stations at which fishing is carried on. The only form of apparatus in use is the seine. No pounds have ever been established in the river on account of the swiftness of the current and the comparative shallowness of the water. At each of the seining stations a small house has been built, and at each seining reach a pen is constructed of planking, varying from a few feet square to an acre or two in size, in which the fish are kept, being held for the winter market. The arrangement of ponds or pens is said to be not very satisfactory; the fish, particularly in the smaller pens, die in great numbers, causing great loss to the fishermen. The freshets, which occur from time to time in the river, bring great quantities of muddy water into the pens, and the gills of the fish become clogged with various kinds of *débris*, so that large numbers of them frequently die from this cause. About six of the stations are on the Canadian side of the river, the remainder being partly on the islands, which exist in various parts of the river, and on the American side.

The seines used at these stations are about 60 fathoms in length, 30 feet deep, and have a mesh of from 1¾ inches to 2 inches, bar measurement. The boats used are simple skiffs 24 to 30 feet long, usually manned by five to seven men. The seines are hauled every hour and are drawn in by horse-power. The greater part of the fishing is carried on in the fall, usually from about the 1st of October to the 1st of December.

The number of men at each fishery at the present time is not more than ten, but formerly sixteen or eighteen men were hired for the fall work. There is usually a boarding place at each fishery, established especially for the convenience of fishermen.

The catch consists principally of whitefish and pike. A few days before the appearance of the whitefish there is usually a run of herring, and at some of the fisheries a small-mesh seine is used for the purpose of taking them. Fishermen differ very much in their opinions regarding the amount of fish taken. Mr. Clark, one of the principal fishermen on the river, stated that usually not more than sixteen hauls were made in each twenty-four hours, and that usually forty fish were taken at a haul. Others, on the contrary, said that the number of fish taken at each haul did not exceed ten. Mr. David Davis, another intelligent man engaged in the fishery here, was of the opinion that at each fishery not more than 1,800 fish were taken during the season of 1879. He also stated, however, that the season was an unusually poor one, and that formerly 4,000 fish were not considered a large catch.

The value of the apparatus in use at each fishery, including seines, boats, pens, and houses, according to estimates made by Mr. J. P. Clark, would not exceed $1,000. The entire investment in fishery apparatus on the river, therefore, will not exceed $30,000.

MOUTH OF THE DETROIT RIVER TO TOLEDO.—The principal villages at the east end of Lake

Erie, which are interested in the fisheries, are Brest, Stony Point, and Monroe. The total number of men engaged is about one hundred and fifty, one hundred and thirty-six of whom are employed in pound-net fishing and about fourteen in fyke-net fishing. Probably about three-fourths of the pound-net fishermen have families. A large proportion of the fishermen are French Canadians.

During 1879 there were no less than one hundred and eighty-two pound-nets established on this shore. There were also about thirty fyke-nets and five seines in use. The value of these nets and of the boats and other apparatus employed in the management of them and for the storage of fish was about $60,000.

On this part of the shore there is a somewhat different arrangement, in regard to the manner of fishing, from that followed at any other localities. Some of the pounds are in use only in spring, while others are employed exclusively in fall, and others still at both seasons. Of the whole number of nets about seventy-two are in use in fall only, thirty-three in spring, and about seventy-seven at both seasons. The spring nets are deeper than those in use at other seasons, and in fall they are usually divided into two parts, each part being used as a separate net. The fall fisheries are commonly carried on in shallower water than the spring fisheries.

The small amount of seining done here is prosecuted only in winter, late in fall, and early in spring. There are no peculiarities about the fyke-net fishery.

The catch in the pounds consists principally of whitefish. In the seines, what are known as panfish are taken, consisting of the smaller species of bass, catfish, and other varieties of minor value.

The total yield in 1879 was about 2,480,000 pounds. Nearly the whole of this amount was sold fresh. The sturgeon were sent to Sandusky and Toledo, and about one-third of the other kinds was also shipped to Toledo. The remainder was shipped to different villages and towns in the interior. Only a very small amount of fish is salted in this locality.

There have been but three men drowned on this shore within the past twenty years.

In regard to the decrease of fish, Mr. Dewy, one of the leading fishermen, stated that, in his opinion, the season of 1879 was as profitable a one as the fishermen at that locality had ever known.

About the only change that has taken place in the manner of fishing has been the increase in the size of the boats and a general improvement in their model and make.

TOLEDO.—The city of Toledo, besides receiving large quantities of fish from other parts of the lake, has extensive fisheries of its own. The fishing-grounds begin just below the bridges in the Maumee River, and extend to the bay and along the shore east and west. From Cedar Point eastward to Locust Point there are a great number of pound-nets, some of them being among the most productive on the entire shore. The grounds are all shoal, especially in Maumee Bay, and, being in such a sheltered locality, nets can be set at any point where they will not interfere with navigation to too great an extent. In the pounds set in the bay little else besides pickerel and saugers are taken. No herring or whitefish are caught except when the water is extremely clear.

The best grounds for general fishing are said to be those of Cedar Point, and for whitefish in the vicinity of Stony Point.

Investigation showed that the number of men employed in the regular pound-net fisheries in this locality in 1879 was about one hundred and fifteen, while in the hook and fyke-net fisheries and other minor branches about two hundred were employed.

During the height of the season the proprietors of the fisheries employ a large number of men in dressing and packing the fish. One firm alone, in 1879, employed as many as one hundred men

in this part of the business. In the manufacture of caviare and in smoking sturgeon about eleven men are employed.

The majority of the fishermen, as well as the owners, are Americans, but there are also quite a number of Germans among them. The greater part of the fishermen are hired by the day or month, and their profits vary, of course, according to the length of time they are employed.

The boats in use at the present time are smaller than those formerly employed. Many years ago boats of over 15 and 20 tons burden were used, but it was found that they were quite too comfortable, and that the fishermen, having taken out provisions, would stay out a much longer time than was necessary, coming back whenever they felt disposed to do so. At the present time the ordinary Lake Erie pound-boat is in general use.

In all, there were about one hundred and sixty-seven pound-nets in use in 1879, but many of them, especially those set in the bay, were small and of simple construction. They do not differ materially from those in use on many parts of Lake Erie. They are usually set in water from 8 to 12 feet deep, the leaders being of different lengths, the average being, perhaps, 75 rods. Many of them are constructed of pine that has been used in the lake nets and has become partially rotten. Their value will not exceed $120 each.

The lake pounds, that is, those set between Cedar Point and Locust Point, are generally placed in water from 12 to 30 feet deep, and are, therefore, more valuable than the bay nets. They are estimated to be worth about $300 apiece. The pounds in use in this locality are set at an earlier date than those at any other point in the lake. The fishermen make it a practice to set them as soon as the ice leaves the bay. They are usually taken up again about the 1st of May, and, having been repaired, are set again late in September.

A few fyke-nets are in use in the bay and river for catching "panfish," but their products are of no considerable importance.

The extent of the hook fishing is estimated very differently by different persons. Mr. D. Y. Howell, however, who is well acquainted with the fisheries of the locality, estimated that fully two hundred men are engaged in this branch. Each man employs about five hundred hooks, and the set-lines vary in length from 1 to 6 miles. The season for hook fishing begins usually in March and lasts until August or September.

The catch consists of a great variety of fish—whitefish, herring, and saugers being among the most important. The more valuable kinds are taken in the pounds, the hook fishermen catching little except bass, catfish, and other species of minor value.

The total yield in 1879 amounted to about 12,000,000 pounds. Of this amount 7,000,000 pounds were salted, 4,500,000 pounds sold fresh, and the remainder either frozen or smoked. Probably more fish are frozen in Toledo than at any other point on the lakes. In 1879 the amount thus treated was not less than 300,000 pounds. A considerable amount of caviare, isinglass, and fish-oil are also manufactured at Toledo. In 1879 the amount of caviare was about 38,000 pounds; of isinglass, 500 pounds; and of oil, 650 gallons.

One of the fishery firms at Toledo has established a private hatchery in their warehouse, in which they hatch numbers of whitefish. The capacity of the establishment is calculated to be sufficient for 6,000,000 eggs. It is estimated that they had 15,000,000 eggs in the boxes at one time, but they lost all but about 4,000,000 eggs.

As an experiment, they have also bought or leased for a number of years several small, deep lakes in Michigan, where they have planted large numbers of young fish. The second year after the planting whitefish of considerable size were caught, and the proprietors are very hopeful of the success of the enterprise.

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LOCUST POINT TO OTTAWA CITY.—The principal fisheries on this section of coast are at Locust Point, Toussaint, Port Clinton, and Ottawa. As far as could be ascertained, during 1879, along the whole shore, about fifty-six men were employed in pound and seine fishing, ten in gill-net fishing, and thirty-six in fyke net and hook fishing. All the firms which ship fish are also engaged in fishing, to a greater or less extent. Some of them are only owners of nets, and do not carry on fishing themselves. During the height of the season a large number of men are often temporarily employed, one firm often adding to its force as many as fifty or sixty men. All the nets used are owned by six firms, who carry on the fisheries by means of hired assistants.

At Port Clinton the boats are large and well made, the average length being about 32 feet. Smaller and less valuable boats, however, are used during calm weather and also in the hook fishery. The pound-nets in use at these points are set in deeper water and are more valuable than those used at Toussaint and Locust Point. In 1879 about eighty-nine pound-nets were in use along the whole shore, besides about five hundred gill-nets, thirty-five or thirty-six fyke-nets, three seines, and fifteen or twenty hook-rigs. The value of these nets, together with that of the boats, fish-houses, freezers, &c., according to the estimates of the fishermen, is about $37,500.

A large variety of fish are taken in the pounds as well as in the fyke-nets. In spring the principal kinds taken in the pounds are saugers and pike, but in fall whitefish and herring predominate. In the fyke-nets few other kinds except catfish, river bass, and other small varieties are taken. The catch of the seines consists of black bass, pike, perch, and bull-heads. The hook fishermen catch catfish almost exclusively. The total yield in 1879 was not less than 2,790,000 pounds. Of this amount about 1,700,000 pounds were sold fresh, being distributed to inland towns and sent to other distributing towns eastward. At least 60,000 pounds were frozen and sent to New York, Philadelphia, and other cities on the coast. Nearly all the herring caught are salted.

Information could be obtained of but one disaster by drowning since the commencement of the fisheries in this locality. In 1870 one fisherman was lost at Toussaint. As a rule, longer leaders are used for the pounds, and, in general, larger boats are employed than formerly. The mesh of the gill-nets has gradually been made to conform to the size of the fish to be taken, in many cases being one-half the size it was at the beginning of the decade. The fishermen and dealers generally claim that there has been a decrease in the abundance of the fish, particularly in the case of the whitefish. Some, however, among whom may be mentioned Mr. Matthews, of Port Clinton, argue that there are as many whitefish now as formerly, and that as many are caught, but that, being distributed among a larger number of fishermen, the profit accruing to each individual is less.

FISHERIES OF SANDUSKY.—The principal fishing stations in the vicinity of Sandusky are at Cedar Point, Marblehead, Spit Island, East and West Harbors, Mouse Island, Sugar Bluff, Moore's Point, Kelly's Island, and Put-in Bay. The fishing grounds of Sandusky may be divided into four great districts, each partaking of some peculiarity not shared by the others. The fisheries are generally spoken of as the Cedar Point fisheries, bay fisheries, island fisheries, and the main-shore fisheries. The Cedar Point fisheries, which are among the oldest and most important, occupy the shore from Cedar Point eastward toward Huron, a distance of about six miles. The bay fisheries are those which are carried on in the lower and upper Sandusky bays. Pounds, fykes, and seines are scattered along both shores and are owned and managed by a great many different parties. The main-shore fisheries occupy the shore west of the entrance to Sandusky Bay, the nets being distributed quite equally. The island fisheries are located at Bass and Kelly's Islands, which lie out in the lake a number of miles distant from Sandusky. The number of fishermen engaged in

the fisheries of these different localities is as follows: Kelly's Island, 22; South Bass Island, 23; Middle Bass Island, 15; North Bass Island, 6; the main shore, 63; the upper and lower bays, 94; Cedar Point, 56. In addition to these there are about thirteen men who fish but for a short time, and are engaged for the greater part of the year in other occupations. There are also twelve dealers and about nineteen clerks. Altogether, then, there are not less than three hundred and twenty-three men connected with the fisheries, the majority of whom are married and have families. Probably not less than thirteen hundred people are dependent upon the fisheries carried on from Sandusky. It should be borne in mind, however, that in this estimate the men employed in the manufacture of fishery apparatus are not included. As one might expect, the nationalities represented among the fishermen are very numerous. The Germans, however, predominate.

As already intimated, the principal branch carried on is the pound fishery. Seines, fykes, and hook-rigs are employed, but these fisheries are of minor importance. In 1879 about three hundred and forty-eight pounds were in use, together with about ten seines, fifty fyke-nets, and five hook-rigs. The boats employed are of various kinds, some quite large and worth not less than $100; others smaller and of considerably less value. Besides the boats there are two steamers which are employed in carrying the fishery products from place to place, and also two steam-tugs used in connection with the pound fisheries. The total value of the nets and boats employed in 1879, together with the value of warehouses, ice-houses, fish-shanties, docks, freezers, and other accessories, amounted to about $230,000.

The varieties of fish taken in the fisheries of Sandusky and vicinity are very numerous. In the Cedar Point fisheries the catch consists principally of herring, whitefish, &c.; in fact, these grounds are among the most famous for the abundance of the herring. In the pounds set in the bay principally soft fish are taken; herring and whitefish are never caught in them. The catch of the main-shore fisheries consists principally of herring and catfish, chiefly the former being taken in the pounds, the latter by the hook fishermen. About the islands few varieties except whitefish, herring, black bass, and sturgeon are taken. The value of the yield of 1879 was about $186,500.

A large proportion of the fish are sent to a great number of inland cities and towns. Among the most important of these may be mentioned Cincinnati, Pittsburgh, and Wheeling. Nearly all the firms located here freeze a large quantity of fish every year. A great many methods are employed and an account of them will be found in Section VI. Probably a larger amount of caviare, isinglass, and fish-oil are prepared at Sandusky than at any other point on the lakes. A large proportion of the sturgeon taken in the fisheries of many other points is sent to Sandusky to the firms who are engaged in making caviare and in smoking fish. The business of smoking sturgeon is said to be rapidly increasing and a large amount is prepared every year. The entire amount of caviare is exported principally to Hamburg; isinglass is sold wholesale to the druggists of New York City.

A considerable quantity of fish-oil is also manufactured at Sandusky and is sold chiefly to the tanneries at Buffalo.

The changes in the methods of fishing in this locality, as in others on Lake Erie, have been very few since the introduction of pound-nets in 1850. Prior to that time seines and gill-nets were extensively used, but both have gradually given place to the pound-nets, which, since their introduction, have increased in this locality at a rate of about sixteen a year. Seines are now used only in the bay fisheries, and gill-nets only about the reefs near the off-shore islands. A great diversity of opinion exists among the fishermen regarding the increase or decrease of fish. The majority of the men assert that herring and blue pike, and, in some localities, catfish are increasing, while

whitefish, sturgeon, and black bass are decreasing very rapidly. Some few, however, affirm that during 1878 and 1879 the schools of whitefish which visited the shore were larger than those during the three or four years preceding, and are of the opinion that this condition of affairs is due to the effect of artificial propagation. Others, again, have no faith whatever in "planted fish," as they call them. It seems quite evident, however, that the present supply of whitefish is not one-third what it was twenty years ago.

HURON.—At Huron, fishing is the most important occupation in which the people are engaged, and a large number of persons, besides those professionally engaged, are indirectly dependent upon the results of the industry. The number of professional fishermen in 1879 was about seventy-five, in addition to which about forty-six were engaged for a short period. The fisheries are controlled by twelve firms, who hire the necessary assistance. About two-thirds of the fishermen are married and have families. Almost every nationality is represented among them, but the Americans largely predominate. The Huron fishermen are considered a better class of men than the Lake Erie fishermen generally. As a rule, fishing is not hereditary with them, most of them having begun the business late in life. They are not so reckless and improvident as at many other places, and are said to be more energetic, hard-working, and temperate than those at Sandusky and some of the other large fishing towns. No fishing is now carried on upon Sunday, although the reverse was formerly the universal custom. The fishing at Huron is prosecuted almost entirely by means of pound-nets, no gill-nets or seines being used. There are about twenty fyke-nets set in the river, owned and operated by six or seven fishermen.

The only kind of boat used is the regular pound-boat, which is about 30 feet in length. There are no steam fishing-vessels in use at Huron, although steam-tugs are occasionally used for towing the scows to and fro.

In 1879 there were seventy-four pound-nets in use in these fisheries. They were set at different points along the shore for a distance of five miles east and about the same distance west from the mouth of the river. The nets are usually set in lines, six or seven together, the largest number in one line being ten. All the nets in any one line seldom belong to a single firm. The value of boats, nets, and other apparatus employed is not less than $58,000.

The Huron fishing grounds are considered the most profitable for herring fishing on Lake Erie. There has never yet been a total failure since fishing began. Whitefish and other migratory species are only taken in transit. The catch in 1879 amounted to about 2,392,000 pounds, making an average of about 32,000 for each pound-net. Of this amount about 840,000 pounds were sold fresh; 1,462,000 pounds salted; and 90,000 pounds frozen.

The greater part of the fresh fish was sold in various inland towns and also sent to the cities on the coast, New York receiving a large share of it. The salt fish were largely sent to Buffalo, New York, and to Philadelphia. Frozen fish found their principal market in Pittsburgh, Cincinnati, and New York. Most of the sturgeon were sent to Sandusky to be smoked. A small amount in 1879, however, was sent fresh to Pittsburgh. There is one establishment at Huron at which caviare and isinglass are prepared. The amount of caviare prepared in 1879 was about 8,100 pounds, and of isinglass 154 pounds.

There have been some changes in the fishing-boats used in this locality since the origin of the business. Twenty-five years ago the only boats employed were small row-boats; after that sloops were introduced, and they, finally, have been replaced by the pound-boats. The latter have increased considerably in size and quality of material used since they were first introduced. In fact, the pound-boats in use at Huron are among the best and largest built on the lakes. When pound-boats were first introduced no tunnel was used, and the pot had an opening 2 feet wide, the hearts

leading directly into it. On account of the defects in this form of pound-net great numbers of fish escaped, and, in fact, it was necessary to lift the nets two or three times each day in order to secure good hauls.

There have been no disasters among the fishermen at Huron since the establishment of the business.

VERMILLION.—The fisheries at this place are of less importance than those at Huron. The pound-net fisheries are owned by a single firm who hire a sufficient number of assistants to carry on the industry. Usually about ten men are employed for three months in spring, and thirty for the same length of time in autumn. Besides, there are about twelve men who follow hook fishing for catfish during five or six months of the year. About two-thirds of all the fishermen have families. A great variety of nationalities is represented among them.

The fishing grounds of Vermillion occupy a very small extent of shore, all the nets being set at one place and comparatively near together. In 1879 the number of nets in use was about 12, each of which was valued at about $400. A few gill-nets are owned at Vermillion, but they are used in fisheries at other places.

Catfishing with hook and line is quite an extensive industry at Vermillion. The total value of apparatus employed in both pound and hook fisheries, including the boats, fish-houses, ice-houses, and other accessories, is not less than $15,000. The boats used in the hook fishery are remarkably small, considering that the men often go at least 5 miles from shore, or even more. The majority of these boats are only about 18 feet long and are sloop rigged.

As occurs at other places, a large variety of fish is taken in the pounds; the principal kinds are herring, whitefish, blue pike, and yellow pike. A number of sturgeon are usually taken every season.

The catch for 1879 may be divided somewhat as follows: Fresh fish, 120,000 pounds; frozen fish, 74,000 pounds; salt fish, 146,000 pounds; total, 340,000 pounds. The value of this amount of fish is about $10,500, of which $7,000 worth is the product of the pound-nets, and the remainder the product of the hook and fyke-net fisheries. The larger part of the salt fish was sent to Buffalo, Huron, and Sandusky. The frozen fish were sent to Port Clinton, Pittsburgh, and New York, while the fresh fish were chiefly shipped to Cincinnati and Pittsburgh, as well as a large number of small inland towns in Ohio. The fishermen state that less sturgeon were taken in 1879 than ever before.

No other important changes have taken place in the methods of the fisheries; somewhat larger and better boats are now used than formerly, and also larger and deeper nets. The nets are also set much farther from the shore than in former years. The change, however, has been so gradual that no exact dates can be given.

Mr. McGraw, of the firm of Lavoo & McGraw, who is well acquainted with the fisheries, is of the opinion that blue pike and herring are increasing in abundance, while whitefish have decreased very much. He also considers that the throwing overboard of offal has had a tendency to drive the whitefish away. Twenty years ago a small seine dragged within a stone's throw of the shore would have brought enough whitefish to fill a boat. At that time small shoal-pounds with very light and thin stakes were in use, and with this simple apparatus more fish were then taken than can now be procured by the costly and elaborate forms of apparatus employed.

No disasters have taken place among the fishermen of Vermillion since fishing was first commenced at this point.

AMHERST, BROWNHELM BAY, AND LORAINE.—The fisheries of this section of shore yield large returns considering the amount of apparatus employed and the number of men engaged.

The fisheries, unlike those of Vermillion, are controlled by a large number of firms, each of which owns a few nets. In 1879 there were ten firms engaged in the fishing business, employing together about thirty-two men. Besides the professional fishermen, most of the firms living near the shore own a few gill-nets and take what fish they need for their own use, carrying on the fishery for only a few days in the best part of the season. The majority of the professional fishermen, as well as of the owners of the nets, are Germans. As a rule, the assistants are not employed for more than six months in each year.

The only form of apparatus in use is the pound-net; about thirty-nine of these were in use in 1879, being set at different points along the shore. There are three gill-netters from Erie who fish in this vicinity at certain seasons, but, besides the farmers already mentioned, there are no persons who make a regular business of gill-netting. The nets and boats employed in 1879, together with the accessories, were valued by the owners at about $22,700.

The grounds of this section are chiefly noted for the abundance of blue pike. In 1879 about 1,300 half-barrels of them were prepared for market; herring are also very abundant, the catch in 1879 being sufficient to fill about 2,600 half-barrels, when salted. The amount of other varieties taken in 1879, exclusive of sturgeon, was not less than 185,000 pounds. All of that amount was sold in the vicinity of the fisheries. The salt fish was sent to Huron and Cleveland. In addition to the amounts already mentioned, about 3,000 sturgeon, weighing not less than 50,000 pounds, were taken and sent to Sandusky to be smoked.

No disasters have occurred in this vicinity since the origin of the fisheries.

The general impression among the fishermen seems to be that there has been a great decrease among whitefish during the last decade. Ten years ago not half as many nets were in use as are now employed, but a much larger quantity of fish was taken. The decrease of other species is said to be imperceptible, some even claiming that the blue pike and the herring have increased. About eight or nine years ago the prices of all kinds of fish, except whitefish, were nearly double the present prices.

DOVER BAY.—These fisheries are not very extensive. The nets are scattered along six or seven miles of shore. During 1879 about twenty men were employed by the five firms who owned and managed the fisheries. The hired men are usually engaged for not more than six months in each year. Most of the assistants and owners are Germans. All of the net owners are also farmers, who carry on the double occupation of fishing and farming. The fishing business is said to have been quite profitable, and many of those engaged are in good circumstances.

Pound-nets are the only form of apparatus employed. In 1879 there were about twelve of these nets in use, varying in depth from 20 to 40 feet. No gill-nets are now in use at Dover Bay. They were experimented with some few years ago, but proved unprofitable.

The grade of fish taken at Dover Bay is poor; most of them are classed as "soft fish." The yield in 1879 was a little more than 300,000 pounds, the greater proportion of which was sent to Cleveland, although the wholesale dealers there care very little about handling it.

Pounds have been in use in this locality since the year 1862, but it has been only within the last eight or nine years that the fishery has met with much success. There has always been more or less difficulty experienced in keeping the nets in place on account of the exposed nature of the shore. By better management, within later years, however, this evil seems to have been eradicated. The boats now employed are larger and of better model than those formerly in use, and are usually propelled by sails instead of by oars.

CLEVELAND.—The fishery trade of Cleveland, in proportion to the population of the city, is

much smaller than that of many other lake towns. One reason for this condition of affairs is that there are no very extensive or important fisheries in the vicinity. The railway facilities also are such that the city is not especially important as a distributing center. The nearest fisheries are those of Dover Bay, about 14 miles distant, and there, as has already been stated, the fish taken are of a low grade, and not abundant. As a distributing point for salt fish, however, Cleveland is of considerable importance. Supplies are received from nearly all the larger fisheries of Lakes Michigan, Huron and Superior. A large percentage of the fish received is sold to wholesale city grocers and jobbers, who sell them in small lots, usually repacked in kits, to their customers in the surrounding country. It appears that in 1853 ten times more fish were shipped from Green Bay to Cleveland than to Chicago, while at the present time the reverse is the case.

The local consumption of fresh fish is large, and the city sustains several flourishing retail establishments. There are two retailers who supply the wealthy class. They sell only the very best varieties, and receive proportionately high prices. The other dealers sell cheaper grades, and receive the patronage of less opulent citizens.

ASHTABULA AND CONNEAUT.—The fisheries of Ashtabula and Conneaut are somewhat different in character from those of the places immediately to the westward. The nature of the coast is such that pound-nets cannot be employed, and fishing is therefore carried on almost exclusively by means of gill-nets. In 1879 there were about thirty-four men engaged in fishing, twenty-four of whom were married men with families, and the remainder single young men. Besides these there are also eight fishermen who occupy themselves in fishing for but a small portion of the year. About one-half of the fishermen are Germans and the remainder Americans. Three tugs are employed in connection with the gill-net fishery, the value of which, according to the owners, is not less than $3,000. The nets and small boats employed, together with the accessories, are worth about $6,500; making a total investment of $10,000.

It was found quite impossible to obtain exact information as to the yield of the fisheries of Ashtabula and Conneaut for the year 1879. Every man ships the fish which he catches, and only a few dealers keep any record. Mr. David Jones, of Conneaut, however, a man well informed regarding the fisheries, estimated the amount of the catch, and doubtless his figures are very nearly correct. According to Mr. Jones, the yield was about 400,000 pounds, which, at an average shipping price of 5 cents a pound for all kinds, would be worth about $20,000. Probably about seven-eighths of the whole were whitefish. The greater part of the catch was sent to Cincinnati and Cleveland, although considerable quantities were sold at Akron, Columbus, and other inland towns in Ohio. When the boats and tugs fish off Erie a large share of the fish is shipped from that point; at times some are sold to the dealers. Some of the fish-offal is used in making oil; in 1879 about $200 worth of oil was extracted from this material.

There has been a noticeable change in the manner of prosecuting the fisheries in this vicinity within the last twenty years. The boats have increased in size at least one-half within the last decade and their model has been very much improved. Twenty-five years ago fishing-nets were knit from very coarse twine, which made them heavy, and it was necessary to employ one man for every four nets. In contrast it may be stated that now two men can safely set and lift at least twenty-five nets. With these heavy nets and small, imperfectly made boats, the fishermen did not venture out more than half as far as they do at the present day. Nevertheless, at that time, they caught a great many more fish than now. It is probable that if the same kinds of nets were used now as were employed twenty years ago not enough fish would be caught to supply the wants of the fishermen themselves.

There had been no disaster at Conneaut for over twenty years, but in the fall of 1879 a boat carrying two men was lost in a gale.

WILLOUGHBY AND PAINESVILLE.—The fisheries at these two points are operated by four firms. During the fishing season they hire about forty fishermen, three-fourths of whom are married men. In addition to this number, about twenty others are temporarily employed, usually from March to July, and from September to December. In 1879, however, on account of the unusual mildness of the winter, they were employed nearly the whole year. The fishermen receive very good wages, and most of them are in comfortable circumstances. All, except two, are Americans, the two excepted being of German descent. The fishermen who receive monthly wages seem to live better than those who fish on their own account; they know exactly how much they can rely upon and usually live within their incomes, while those who are fishing for themselves always have in anticipation the capture of fabulous amounts of fish which will help them out of present difficulties.

The fisheries are prosecuted almost exclusively by means of pound-nets. In 1879 there were about seventeen of these nets located here, which, with the boats used in their management and the accessories, were valued at about $18,500. It would seem from these figures that the owners had placed rather too high a valuation upon their property.

A large variety of fish is taken in the pounds; they are all classified in three grades, known as, "rough," "hard," and "soft." Of the three grades, about 340,000 pounds were caught in 1879. In addition, not less than 4,200 sturgeon, weighing about 90,000 pounds, were caught. About one-third of the entire catch was frozen and sent eastward. Of the remainder enough were salted to fill 255 half barrels, and these were sent to Cleveland. The fresh fish are sold in various parts of Pennsylvania, Pittsburgh being the principal market. A large share of the sturgeon are usually sent to Sandusky; in 1879, however, about 8,000 pounds were smoked and sold in the vicinity.

There is a general belief current among the fishermen that there has been a considerable decrease among "hard fish," but none of importance among the "soft fish," during the past decade. Sturgeon are, perhaps, somewhat less abundant. In 1870 it was reported that 20,000 were caught at Painesville, and that some of them were sold at about $2 for a wagon-load. At Swanville more than seventy have been caught in one day by two men using grapnel-hooks.

There have been no important changes in the manner of fishing. The size of the meshes, however, in the pots of the pounds have been somewhat increased. The same kind of boats are used now that were employed when the fishery began.

MILES GROVE, OHIO; ERIE, PA.; AND BARCELONA AND DUNKIRK, N. Y.—The professional fishermen employed at the four villages mentioned are distributed about as follows: Miles Grove 14, Erie 100, Dunkirk 4, and Barcelona 6; making a total of 124. About eighty of these men are married. At Erie the boats and outfits are owned by the fishermen, in very many cases two men being in partnership. The capitalists are the dealers who buy the fish from the fishermen and ship them; they also sell twine for nets. At Erie the nationality of the fishermen is German. The manner of carrying on the fisheries at these four villages is different from that of most of the stations west of Lake Erie. The gill-net is the only form of apparatus in use. In 1879 forty-two boats, each carrying about one hundred and twenty-five gill-nets, were employed, and these together were valued at about $25,000. The only other item of the investment here is that for fish-houses, ice-houses, &c., the amount of which is not more than $3,000.

The quantity of fish taken at the four villages in 1879 was about 1,350,000 pounds. The amount may be divided somewhat as follows: Erie, 1,050,000 pounds; Dunkirk, 40,000 pounds; Barcelona, 60,000 pounds; Miles Grove, 200,000 pounds. The fish caught at Erie are sent chiefly

to eastern and interior cities. From the other villages the fish are sent to various places in New York and Pennsylvania. Miles Grove fishermen, however, send largely to Kentucky and to Pittsburgh. Quite a large amount also is shipped in cars from Miles Grove to Columbus, Ohio. No fish are smoked at Erie, and the amount salted is very small. In 1879 only 10,000 pounds of whitefish were prepared in this way.

At Erie the fishermen engage in extracting oil from fish offal. During 1879 about 800 gallons were made. It is not very carefully made, and only a small price is realized. It is sold mainly to the tanneries in Buffalo.

Considering the number of men and boats employed in this locality, the disasters have been remarkably few. In the fall of 1877 three men were lost; this was the only accident, as far as could be ascertained, for many years.

The fishermen of this region, like their class generally, are poor, owing, however, more to their shiftlessness than to lack of income. Some are in quite good circumstances and four or five have made considerable fortunes. Very little attention appears to have been given to fishing at Erie, and there are no records from which information can be gathered regarding the history of the fisheries of the place. Nearly all the fishermen here have but recently engaged in the business, few having been employed for more than ten years. The number of the boats is said to have increased very much during the last half of the past decade. The year 1878 was the most successful that has occurred since 1860, and the yield for 1879 was quite as good as that for the year 1875. There have been no very important changes in the methods of fishing, except that finer twine is used in the nets than formerly, and the boats are larger and better built.

BUFFALO.—At Buffalo fishing is rather an unimportant occupation. There are a great many men who fish in winter with hooks through the ice, and during the warmer part of the year with small seines, in the river. These catch a considerable amount of fish. Mr. Johnson, one of the oldest dealers of Buffalo, stated that, in his opinion, in ordinary winters, when the ice was thick on the lake, as many as three hundred persons, a large percentage of whom were sailors, were engaged in fishing, and that ordinarily a winter's catch would not fall far short of 300,000 pounds. Very little of this amount, however, falls into the hands of the city dealers. Pike and sturgeon are the principal kinds taken. The winter of 1879 was exceptionally mild, no ice being formed in the lake, and therefore no fishing was prosecuted.

Considerable numbers of sturgeon are caught by means of three-pronged grappling-hooks, which are dragged along the bottom. Pounds or trap-nets are not allowed in the waters of Lake Erie bordering on New York, so that the supply of sturgeon is much less than it would otherwise be. Some fishermen of Ohio attempted to use these nets near Buffalo, but were obliged to desist. Many fish caught in Canadian waters are shipped to Buffalo.

According to the best estimates that could be obtained the amount of fresh fish received into Buffalo during 1879 was approximately as follows: Whitefish, 1,083,000 pounds; trout, 628,500 pounds; mixed fish, 420,000 pounds. Of this whole amount, about 675,000 pounds were received from fisheries lying to the westward, of which account has already been taken. About 600,000 pounds were consumed in the city. Considering the population of Buffalo, this amount is quite small in comparison with the consumption of some other cities. The whole amount of fish received, fresh, salt, and smoked, was about 4,000,000 pounds. Considering the remarkable increase in the receipts of Chicago, it seems hardly possible that the trade of Buffalo could have fallen off since 1872 as much as 2,000,000 pounds. Nevertheless, the statistics for that year, as published by the late Mr. Milner, in the U. S. Fish Commissioner's Report, show that such must be the condition of affairs.

According to the statement of Buffalo dealers, the year 1879 was an exceptionably poor one. The complaint was made that Chicago, by paying higher prices than Buffalo could afford, received a large portion of the products of the fisheries of the latter place.

F.—LAKE ONTARIO AND ITS FISHERIES.

239. STATISTICAL SUMMATION.

Summary statement of persons employed.

Persons employed.	Number.
Fishermen	612

Detailed statement of capital invested and apparatus employed.

Apparatus specified.	Number.	Value.
Vessels and boats	167	$13, 100
Pounds	34	14, 000
Gill-nets	6, 000	20, 000
Seines	9	1, 950
Shore property		5, 000
Total		54, 050

Detailed statement of the quantities and values of the products.

Products specified.	Pounds.	Value.
Fresh fish	3, 490, 000	$132, 550
Frozen fish	150, 000	5, 500
Total		138, 050

240. THE FISHERIES OF THE AMERICAN SHORE.

THE FISHERY INTERESTS OF THE LAKE.—There is very little fishing carried on at the western end of this lake and the few fish caught are taken by the fishermen for their own consumption. The only fisheries which are of commercial importance are situated at the east end of the lake, near the head of the Saint Lawrence River.

There are no records to show the number of fishermen in the different villages, but the following summary, prepared from results of investigation, is probably very nearly correct:

Place.	Number.	Place.	Number.
Oswego	8	Wilson	10
Port Ontario	23	Fair Haven	6
Little Sandy	12	Chaumont	12
Big Sandy	6	Sackett's Harbor	250
Stevens' Point	2	Other points*	10
Armstrong	4		
Cape Vincent	47	Total	400
Chippewa Bay	10		

* From Fox Island to Sandy Creek.

Although French Canadians are quite numerous, Mr. Clark, of Sackett's Harbor, stated that at the east end of Lake Ontario, in the vicinity of Chaumont and Sackett's Harbor, the fishermen originally came from Connecticut, bringing with them the methods they had employed in that region.

Various branches of the fisheries are carried on at the eastern end of Lake Ontario. At Oswego, Wilson, Fair Haven, and Chaumont, gill-net fishing is the principal branch engaged in, while at Cape Vincent and Sackett's Harbor pound-nets are also used, and at these two places and also at Port Ontario a number of seines and fyke-nets are in use.

The value of the apparatus used at Oswego in 1879, including two hundred gill-nets and four boats, was estimated at $800. At Port Ontario were twenty-three boats, eighteen gangs of gill-nets, seventy-five fyke-nets, and about six or seven seines. The investment was not less than $7,500. At Cape Vincent, which, with the exception of Sackett's Harbor, is the most important station in this region, the capital invested in the fisheries is about $16,500. In this amount is included the value of about 2,250 gill-nets, five pounds, one hundred and fifty trap and fyke-nets, the necessary boats for the management of these nets, and the ordinary acccessories, such as fish-houses and ice-houses. At Sackett's Harbor the number of pound-nets is much larger. In 1879 not less than thirty-one were used here. These, together with about three thousand gill-nets, one hundred traps, thirty fykes, and about three seines, were valued at about $25,500. In operating these nets, one hundred gill-net and other boats were employed, besides a steam-tug; the total value of this apparatus was $7,400. The value of accessories was estimated at $6,000.

Several disasters have occurred at the different fishing villages in this region. Twelve years ago four boats carrying three men each were lost off Port Ontario. At Cape Vincent only one man has been drowned in ten years, while in Chaumont there have been but three men lost in fifty years, although as many as three hundred have been engaged from the latter place at one time. At Hudson's Bay, in 1879, seven men were lost at one time.

Notwithstanding the prevailing cry of decrease of fish, the fishermen seem to be making very good profits, especially those who are industrious and attend carefully to their business. These remarks, however, do not apply to some of the older grounds on the south shore; for example, at Charlotte, Wilson, Fair Haven, and Poultneyville, where it is a fact that fishing is no longer profitable.

Poultneyville, N. Y., has been a resort for Canadian fishermen for a number of years. They came for the first time about 1865. At the present time, however, they have ceased coming. Mr. Harrington, of Port Ontario, who is well acquainted with the history of the fisheries at that place, says that there has been no change in the manner of fishing for a great many years, except that the salmon fisheries once carried on in the river at that place are no longer in existence. In his opinion there is a considerable decrease in the abundance of some kinds of fish, especially among whitefish.

At Cape Vincent there was no fishing of importance until 1859. Prior to that date the fish, only caught in small quantities, were consumed by the fishermen. Before the building of the railroad, which now connects this village with other places, a large portion of the catch was salted.

Messrs. Clark & Robbins, of Sackett's Harbor, stated that in 1877 they salted not less than 2,447 half-barrels of ciscoes, while in 1879 they obtained only 100 half-barrels. In their opinion, such fish as pike, black bass, and trout have increased since alewives made their appearance, while whitefish and ciscoes have decreased.