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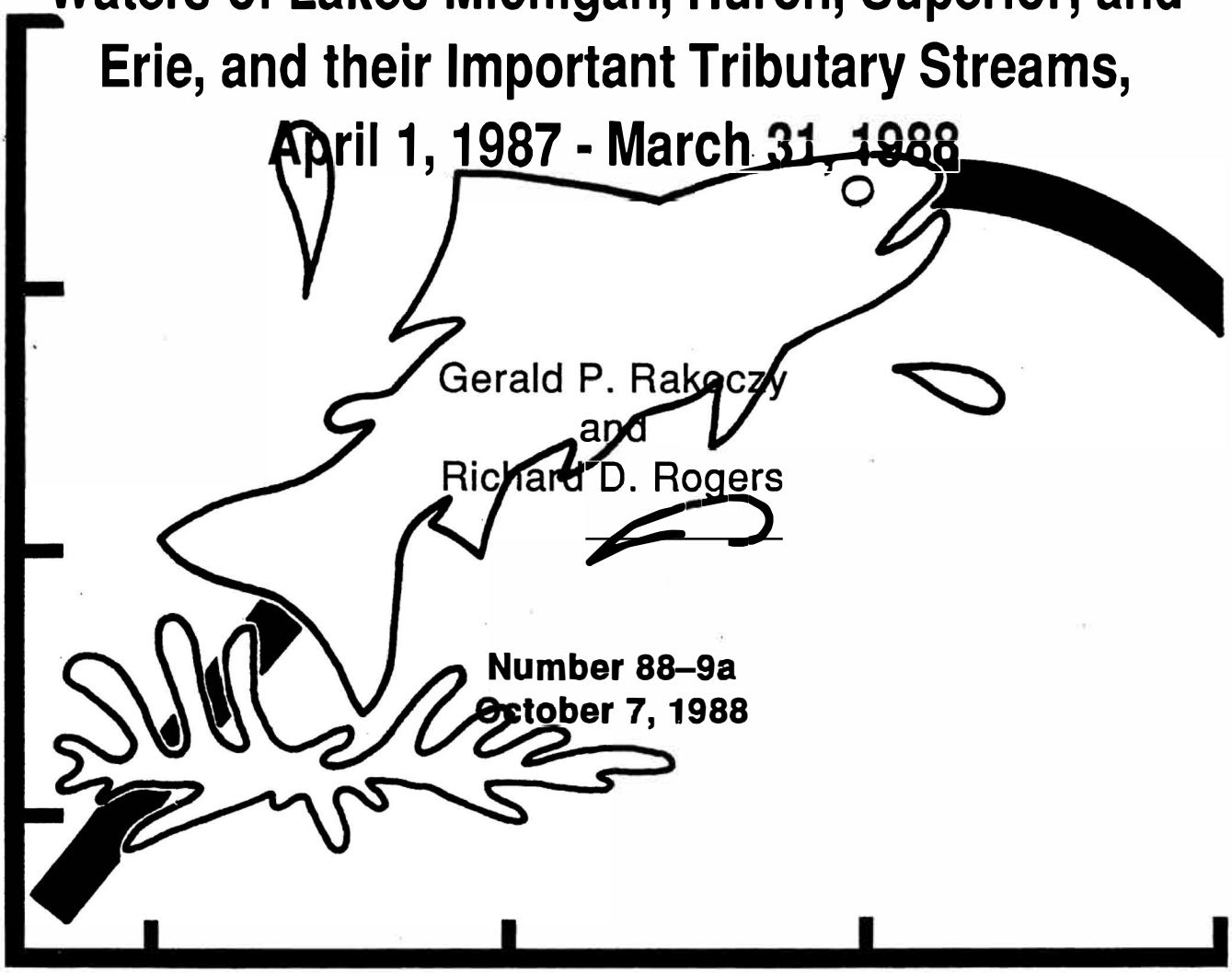
FISHERIES DIVISION

TECHNICAL REPORT

Sportfishing Catch and Effort from the Michigan Waters of Lakes Michigan, Huron, Superior, and Erie, and their Important Tributary Streams, April 1, 1987 - March 31, 1988



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Number 88–9a
October 7, 1988

Michigan Department of
Natural Resources

MICHIGAN DEPARTMENT OF NATURAL RESOURCES
FISHERIES DIVISION

Fisheries Technical Report No. 88-9a

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SPORTFISHING CATCH AND EFFORT FROM THE MICHIGAN WATERS OF LAKES MICHIGAN, HURON, SUPERIOR, AND ERIE, AND THEIR IMPORTANT TRIBUTARY STREAMS, APRIL 1, 1987 – MARCH 31, 1988[1]

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[1]Contribution from Dingell-Johnson Project F-53-R, Michigan

ABSTRACT

Sportfishing catch and effort were sampled on lakes Michigan, Huron, Erie and Superior, and on several important river systems from April 1, 1987 through March 31, 1988. The objective of the creel census program was to obtain a continuous record of sport catch, catch rates, and catch composition for the Great Lakes and important anadromous river fisheries.

Over 88,000 anglers were sampled at the end of their fishing trips. Catch and effort estimates were calculated by month for all areas sampled. It was estimated that anglers spent 14,855,507 (±609,785 two standard errors) angler hours in all areas of Michigan's waters of the Great Lakes that were censused. Total angler effort for the Great Lakes and connecting waters which were sampled by mode of fishing was 84% boat, 6% pier, 6% ice, and 4% shore. Of the total angler hours during the open-water season 45% was spent on Lake Michigan and 32% on Lake Huron.

Total harvest was estimated to be over 10.6 million fish. Yellow perch were the most abundant species in the sport catch in most sample areas, totaling 7,329,815 (±737,446) fish. In addition, sport anglers harvested an estimated 1,133,145 (±156,221) walleye, 523,115 (±65,331) chinook salmon, 200,127 (±31,620) lake trout, 165,905 (±28,206) coho salmon, 95,371 (±14,063) rainbow trout, and 41,266 (±7,246) brown trout.

INTRODUCTION

Michigan's Great Lakes sport fishery has been monitored with a statewide contact creel census program since 1983. The objective of the program is to obtain a continuous record of sport catch, catch rates, and catch composition for the Great Lakes and important anadromous river fisheries.

A fundamental requirement for sound management of the Great Lakes fisheries is knowledge of the response of fish stocks to fishing and the contributions of various fish stocks to the fisheries. The success and the future value of the Great Lakes and anadromous stream fisheries depend on the long-term consequences of current management. It is essential that management decisions be based on a sound empirical knowledge of the history, current status, and dynamics of the fish communities.

Fishing statistics are needed for stock assessment and to facilitate stock identification. Coupled with fish marking studies, these kinds of data can identify Great Lakes and anadromous fish stocks and determine their spatial distribution, movements, and contribution to various sport fisheries. In future years, data collected from this program could be used to develop, test, and improve decision models which will help to discern management strategies for Great Lakes fish communities and fisheries.

During the 1987 open-water fishing season, angler catch and effort were sampled on lakes Michigan, Huron, Erie, and Superior. In addition, the fisheries of several important anadromous rivers tributary to lakes Michigan and Huron were sampled. During the winter months of 1987–88, ice fisheries were sampled at several important locations on lakes Superior, Michigan, Huron, and Erie.

Michigan Department of Natural Resources (MDNR) Fisheries Division personnel interviewed over 88,000 anglers at the end of their fishing trips during the 1987 license year, April 1, 1987 through March 31, 1988. Approximately 81,000 of these anglers were contacted during the April through November open-water season. A total of 7,400 anglers was interviewed during the winter ice fishing season, January through March, 1988.

STUDY AREA AND METHODS

In 1987 creel monitoring operations were conducted at two levels of intensity. In the most intensive creel census, the geographical area sampled per census worker was smaller than in a less intensive census. As a general rule, the most intensive creel census was designed such that the sampling area was no larger than could be covered in one 8-hour workday. The same sample area was then traversed 5 days per week. For the less intensive creel sampling operations, personnel were spread over a much broader area covering several ports or fishing

areas per week. As a result, a particular port or fishing area may have been sampled only six or seven times per month. The same sampling designs and data collection methods were used regardless of sampling frequency.

During the 1987 open-water season, an intensive creel census was conducted at all important ports and sportfishing areas on Lake Huron from Port Huron to St. Ignace and from St. Ignace to Potagannissing Bay (Figure 1). The St. Marys River, a major tributary of Lake Huron, was also sampled from the rapids in Sault Ste. Marie to Detour. The port of Alpena was surveyed under a separate study (Weber 1988). An intensive creel census focused on the boat fishery was also conducted on Lake Erie from Pointe Mouillee to the Michigan-Ohio state line (Figure 2). On Lake Superior, Black River Harbor, Ontonagon, Keweenaw Bay, Huron Bay, and Munising Bay were intensively sampled (Figure 3). Less intensive creel sampling was conducted on important ports and angling areas of Lake Michigan from New Buffalo to Harbor Springs and from Manistique to Menominee (Figure 4). The ports of Portage Lake and White Lake, which were not covered in 1986 were sampled in 1987. Comparisons of lake-wide estimates for 1987 and 1986 do not include these two ports. Sampling at some Lake Michigan ports began as early as March 15, 1987.

The winter fishery was intensively sampled in Saginaw Bay and the Les Cheneaux Islands (Lake Huron), Big and Little Bays de Noc (Lake Michigan), Munuscong Bay (St. Marys River), and Keweenaw Bay, Huron Bay and Munising Bay (Lake Superior). Lake Erie was also censused from Pointe Mouillee to the Michigan-Ohio state line. Plans for sampling the ice fishery on Grand Traverse bays (Lake Michigan) were cancelled due to the lack of ice formation.

The creel census used in Michigan is based on a stratified design using simple random sampling within strata. Strata included port fished by month, by weekday-weekend (holiday), and by mode of fishing. Catch and effort estimates were made for each strata and then combined to give monthly and seasonal figures. Each work schedule was specifically tailored for the area sampled. Both weekend days and three randomly selected weekdays were sampled each week. In some cases, four 10-hour days per work week were used when permanent personnel were required to drive long distances to and from the sampling area. In these cases, two randomly selected weekdays and both weekend days were sampled each week. The entire angling day from dawn to 1 hour past dusk was covered. This was accomplished by breaking each day into two 8-hour work shifts, then randomly selecting the actual shift to be worked. If an individual was responsible for sampling more than one area, the port or fishing areas were also randomly selected for each day.

Two types of data were collected for each area sampled: angler party interviews for catch rates and angler (or boat) counts for pressure. An angler party was defined as one or more anglers who fished together. Angler parties were interviewed at the end of their fishing trips at

various boat launching ramps, marinas, piers, and along the shoreline. Anglers were queried as to their mode of fishing (i.e., boat, shore, pier, open ice, or shanty ice), where they fished, how long they fished, what they fished for, the numbers (by species) of fish they kept, and the number of fishing trips they made or intended to make that day. Additional data were collected on each angler in the party such as age and sex, zip code or county of residence, and the types of angling methods used (casting, still fishing, trolling, etc.). These data were recorded on an angler interview form by census personnel (Figure 5).

Instantaneous and interval counts were used to sample fishing pressure. Instantaneous counts were used when all boats or anglers in a sample area could be observed from a given point at one time. Interval counts were used when the sample area was too large to be observed from one point. In this case, the number of boats or anglers passing the observation point during a 45-minute period was used to determine the number of fishermen in the entire sampling area. All counts of boat trailers, pier anglers, shore anglers, open-ice anglers, and ice shanties were instantaneous. However, both instantaneous and interval boat counts were made depending on the sampling area. The type and number of boating access points within the sample area determined the type of boat count used. Interval counts were used in cases where boat access to the open lake was limited to harbor areas where all boats exited through defined channels.

Most fishing effort counts were done from the ground by census workers at randomly selected times. Instantaneous counts made from airplanes of boats, ice shanties, pier, shore and open-ice anglers were used only when ground counts were not feasible, such as areas with many access points or restricted visibility. These areas were: Saginaw Bay, southern Lake Huron from Tawas to Port Huron, northern Lake Huron from St. Ignace to Potagannissing Bay, St. Marys River, and western Lake Erie from Pointe Mouillee to the state line.

Local flight service companies were contracted to make aerial counts. Five flights were made each week at randomly selected starting times—one each weekend day, and one on each of three randomly selected weekdays.

All pressure counts, whether accomplished from the ground or air, were recorded on count data forms by census clerks or contract pilots (Figure 6).

Seasonal workers were trained on-site by fisheries technicians at the beginning of the field season. Count and interview data forms, completed by both the seasonal and permanent personnel, were reviewed every 2 weeks by a designated individual at each district or research station office. Throughout the field season, completed data forms were sent to the Charlevoix Great Lakes Research Station for computer entry. Data forms were further scrutinized at Charlevoix prior to data entry. The entry software employed range checks on various data for each count and interview record that was keyed. In addition, a module of the creel catch estimate software performed a final check of the data before the catch estimates were made.

Catch and effort estimates were made for each port or fishing area by month and species (Ryckman 1981; Smith and Ryckman, in preparation). Three measures of fishing effort were calculated: angler hours, angler trips, and angler days. An angler trip is one completed fishing excursion. An angler day is composed of one or more fishing excursions during a 24-hour period.

Statistical significance in the analysis comparing lake-wide or port estimates between years is based on two standard error limits.

Scientific and common names of fish species observed during this study are contained in Table 1. Detailed catch estimates by month, species, and sample area are contained in the appendices, Michigan Department of Natural Resources, Fisheries Technical Report Number 88-9b (Rakoczy and Rogers 1988).

RESULTS

Lake Michigan

Anglers spent an estimated 5,681,907 (±414,248) hours fishing the Michigan waters of Lake Michigan during the March 15 through October 1987 open-water season (Table 2). The number of hours fished converts to an estimated 1,252,119 (±83,048) individual angler trips or 1,131,124 (±73,345) angler fishing days. Total angling effort by mode of fishing was 88% boat, 10% pier, and 2% shore. Estimated angler effort decreased in 1987 by 16% compared to 1986.

The waters of Lake Michigan from Ludington to Frankfort had the greatest concentration of fishing effort. Thirty-two percent of the lake-wide total estimated effort (angler hours) occurred in this area. The port of Grand Haven had more angler activity than any other port, with an estimated 759,713 (±139,908) angler hours or 159,115 (±27,675) individual fishing trips (Table 3). Ludington, Frankfort/Elberta, Manistee, and St. Joseph/ Benton Harbor also had substantial levels of sportfishing activity.

The average length of a fishing trip (all modes of fishing) was 4.5 hours. Anglers made approximately 1.1 fishing trips per day. These statistics were virtually unchanged compared to 1986. Boat trips were the longest in duration, averaging 4.9 hours. Pier and shore trips averaged 2.9 hours.

Fishermen caught an estimated 3,384,159 (±478,239) fish comprising 30 species during 1987 (Table 2). The bulk of this catch (79%) came from the boat fishery, while pier and shore anglers harvested 20% and 1% of the total catch, respectively (Tables 4, 5 and 6).

The yellow perch was the most numerous species in the catch, making up 74% of all the fish harvested. An estimated 2,513,981 (±468,048) yellow perch were harvested by all modes of fishing (Table 2). The lake-wide perch harvest in 1987 was not significantly different than

in 1986. During 1987, 17% of all Lake Michigan anglers interviewed said their target species was yellow perch. Fifty-one percent of the lake-wide yellow perch catch came from four southern Lake Michigan ports—St. Joseph/Benton Harbor, South Haven, Grand Haven, and Muskegon (Table 7). St. Joseph/Benton Harbor had the largest perch catch (450,540 ± 297,375 fish). The bulk of this harvest (79%) came from the boat fishery. Substantial catches of yellow perch also occurred at Ludington, East and West Arm of Grand Traverse Bay, and Big and Little Bays de Noc (Table 7).

The seasonal lake-wide catch rate for yellow perch in 1987 was 0.443 (±0.089) fish per angler hour compared to 0.374 (±0.072) in 1986. The 18% increase was not significant. The greatest catch rate for perch was 1.968 (±0.821) fish per angler hour in Big Bay de Noc (Table 7). Catch rates for yellow perch in 1987 increased compared to 1986 at St. Joseph/Benton Harbor, South Haven, Grand Haven, Muskegon, Ludington, and West Arm Grand Traverse Bay. Catch rates decreased in 1987 compared to 1986 at East Arm Grand Traverse Bay and Little Bay de Noc. Only two of these changes—the increases at Grand Haven and Muskegon—are statistically significant.

Although yellow perch are important to the Lake Michigan sport fishery, most anglers (72%) seek the various species of salmonids. The Lake Michigan salmonid catch, exclusive of lake whitefish, in the study area was estimated at 716,732 (±77,242) fish. This represents a significant decrease (23%) in the salmonid harvest compared to 1986.

The salmonid catch was composed of 51% chinook salmon, 20% coho salmon, 18% lake trout, 7% rainbow trout, 4% brown trout, and less than 1% of other salmonids such as pink salmon, Atlantic salmon, brook trout, and splake. The vast majority of the salmonid harvest (94%) came from the boat fishery (Table 4). The species composition of the salmonid catch shifted in 1987 compared to 1986. Coho salmon, lake trout and rainbow trout increased by 5, 3, and 3 percentage points, respectively. Chinook salmon and brown trout decreased by 6 and 4 percentage points, respectively.

Chinook salmon is the most important salmonid in the Lake Michigan sport fishery in terms of numbers and weight of fish harvested. An estimated 364,357 (±63,905) chinooks were harvested by anglers during 1987. Biological data collected from the Lake Michigan sport catch during 1987 indicated that the mean weight of a chinook in the catch was 11.0 (±0.26) pounds. Based on these data, fishermen harvested approximately 4 million pounds of chinook from the Lake Michigan ports which were sampled during 1987. The lake-wide harvest of chinook decreased 32% by number in 1987 compared to 1986.

The largest catch of chinook salmon (83,091 ± 35,281 fish) came from the port of Ludington (Table 8). The chinook harvest at Ludington decreased 36% in 1987 compared to 1986. The chinook harvest also decreased in 1987 compared to 1986 at other ports such as

St. Joseph/Benton Harbor, Grand Haven, Muskegon, Manistee, Frankfort/Elberta, and Charlevoix.

The lake-wide chinook catch rate was 0.064 (±0.012) fish per angler hour in 1987 compared to 0.078 (±0.016) in 1986. Catch rates decreased by 28% in southern Lake Michigan (New Buffalo to White Lake) and by 20% in the central section of the lake (Pentwater to Platte Bay), but increased by 44% in the northern waters. However, the only change which was statistically significant was in the southern section of the lake.

The poor chinook salmon fishery in the southern and central sections of Lake Michigan during the spring and early summer of 1987 was the subject of much discussion by the angling public. Their outcry prompted MDNR to appoint a task force, made up of members of the sportfishing community and MDNR's Fisheries Division personnel, to review its entire Lake Michigan management program. The results of that study indicate that the geographic distribution of chinook salmon in Lake Michigan during 1987 was different than in previous years (Keller et al. 1988). The report indicates that it was possible chinook did not concentrate in the southern end of Lake Michigan during the winter months and were more widespread in their distribution. This may have been caused by the abnormally mild winter and warm spring and early summer weather. The net result was a poor spring and early summer fishery in southern Lake Michigan and an earlier than normal fishery in the northern portion of Lake Michigan.

Another factor which may have contributed to the decrease in harvest and catch rate of chinook salmon was the less than average representation of the 1984 year class. Normally, 3-year-old chinook salmon are the most important age group to the Lake Michigan sport fishery (Keller et al. 1988).

The coho salmon was the second most abundant salmonid in the Lake Michigan sport catch. An estimated 139,529 (±27,896) fish were harvested by the sport fishery (Table 2). The 1987 lake-wide harvest was virtually unchanged compared to 1986. Twenty-nine percent of the coho catch came during April-May in the area from South Haven to Muskegon. During 1986, 47% of the spring coho catch came from New Buffalo and St. Joseph/Benton Harbor (Rakoczy and Rogers 1987). Based on these data, coho salmon may have been distributed further north in Lake Michigan compared to 1986. Anglers in the Frankfort/Elberta area had the largest catch, estimated at 21,704 (±10,611) fish. Good catches of coho (greater than 15,000 fish) were also noted at Grand Haven and Ludington. The lake-wide coho salmon catch rate was 0.025 (±0.005) fish per angler hour, virtually unchanged compared to 1986. The greatest seasonal catch rate for coho was estimated to be 0.041 (±0.041) fish per hour at Pentwater.

The lake trout was the third most numerous salmonid in the sport catch. An estimated 132,117 (±30,594) were harvested from all the ports sampled in 1987. The lake-wide harvest

of lake trout in 1987 was not significantly different from that in 1986. Data collected from the sport fishery during 1987 indicated that creeled lake trout averaged 5.6 (±0.16) pounds, the same as in 1986. Therefore, anglers harvested over 700,000 pounds of lake trout from the ports which were sampled in 1987. Of all the fishing areas sampled, the largest estimated lake trout catch (20,232 ± 10,826 fish) occurred at Grand Haven (Table 9). St. Joseph/Benton Harbor and Ludington anglers had lake trout catches exceeding 10,000 fish.

Lake-wide lake trout catch rates increased 26% to 0.034 (±0.008) fish per angler hour in 1987 compared to 1986. The increase was not statistically significant. The increase in lake-wide catch rates may have been due to anglers targeting for lake trout more during 1987 than 1986 because of the poor spring chinook salmon fishery (Keller et al. 1988). Anglers fishing the West Arm of Grand Traverse Bay had the highest catch rate for lake trout (0.078 ± 0.028 fish per angler hour) of all the areas sampled in 1987 (Table 9). Catch rates for lake trout decreased at Frankfort/Elberta and Charlevoix/Petoskey in 1987 compared to 1986.

Catch rates alone can be misleading indicators of species abundance. In southern and central Lake Michigan, anglers tend to target for chinook salmon, usually with downriggers. Lures are fished a substantial distance above the bottom. Because salmon are a mid-water species, and lake trout are usually associated with the bottom, a large percentage of the lake trout catch in these areas is taken incidental to salmon fishing. In Grand Traverse Bay and the Charlevoix/Petoskey area, anglers spend a good portion of the season (May and June) seeking lake trout with lures fished at or very near the bottom because salmon normally do not enter the area in large numbers until July. This is the main reason why catch rates for lake trout are higher in some of the northern ports than in the south and central portion of the lake.

A total of 29,817 (±6,903) brown trout was estimated to have been caught by Lake Michigan anglers in 1987 (Table 2). The brown trout catch declined significantly (62%) in 1987 compared to 1986. The lake-wide catch rate (0.005 ± 0.001 fish per angler hour) for brown trout also decreased by 53%. The greatest catch (8,673 ± 4,585 fish) and catch rate (0.017 ± 0.009) for brown trout in 1987 occurred at Manistee. In 1986, 71% of the brown trout catch came from the central Lake Michigan ports of Ludington, Manistee, and Frankfort. Most of those brown trout (54%) were caught during April from shallow near-shore waters (Rakoczy and Rogers 1987). The decline in the brown trout harvest in 1987 was possibly due in part to the mild winter and early spring weather. In 1987, brown trout inhabited the near-shore waters during late February and early March before most anglers began fishing and by April most of these fish had dispersed (D. Johnson and L. Frankenberger, MDNR, personal communication). Some February angling for brown trout occurred off Berrien County (southeastern Lake Michigan), but this was missed by the creel sampling program (D. Johnson, MDNR, personal communication).

The estimated harvest of rainbow trout in 1987 was 47,149 (±10,594) fish. The rainbow trout harvest increased 27%, although not significantly, compared to 1986. The increase in the 1987 rainbow catch was mainly due to above average angler success in the pier and shore fisheries during September and October in the area from Pentwater to Frankfort/Elberta. The estimated harvest in September and October of 1987 was 362% greater than in 1986. During these months in 1986 many areas around Michigan experienced record flooding which caused a reduction in fishing pressure (Rakoczy and Rogers 1987; Keller et al. 1988). The greatest harvest (10,498 ± 7,864 fish) and catch rate (0.037 ±0.031 fish per angler hour) for rainbow trout occurred at Pentwater. The lake-wide catch rate for rainbow trout in 1987 was 0.008 (±0.002) fish per angler hour. This was 54% greater than the rate estimated for 1986.

Lake Huron

The 1987 intensive survey of the Michigan waters of Lake Huron revealed that anglers spent an estimated 3,977,552 (±172,880) hours fishing during the open-water season, April through November (Table 10). An estimated 1,017,635 (±44,800) individual angler trips were made during the season or 897,936 (±40,421) angler days. Compared to 1986, total angler effort was virtually unchanged. Angler effort by mode of fishing was 82% boat, 10% shore, and 8% pier.

The waters of Saginaw Bay had the greatest concentration of fishing effort (47%) on Lake Huron. Anglers spent an estimated 1,882,169 (±116,509) hours, 507,528 (±33,503) trips, or 466,748 (±31,369) days fishing the Bay from Port Austin to Tawas (Table 11). Total angler effort on Saginaw Bay in 1987 was not significantly different than in 1986. The area from Saganing Creek to Au Gres had the greatest amount of fishing pressure (418,651 ± 58,005 angler hours) (Table 12). Eagle Bay to Harbor Beach, Sand Point to Port Austin, and Lexington to Port Sanilac areas also had significant amounts of angler activity.

The average length of a Lake Huron fishing trip (all modes of fishing) was 3.9 hours in 1987, compared to 4.3 hours in 1986. During 1987, anglers made approximately 1.1 fishing trips per day. Boat trips were the longest in duration, averaging 4.5 hours. Pier and shore trips averaged 2.7 and 2.2 hours, respectively.

Lake Huron fishermen harvested an estimated 3,769,076 (±370,004) fish comprising 36 species during 1987 (Table 10). Seventy-five percent of the catch (2,829,033 ± 324,160 fish) came from the boat fishery (Table 13). Shore anglers accounted for 19% and pier anglers for 6% of the total harvest, respectively (Tables 14 and 15). During 1987, 32% of all anglers interviewed responded they fished specifically for yellow perch, 10% they fished for walleye, and 47% they sought various species of salmonids.

Yellow perch predominated the catch, making up 80% of all fish harvested. An estimated 3,006,611 (±346,009) yellow perch were caught by all modes of fishing (Table 10).

The 1987 lake-wide yellow perch harvest was 23% greater than in 1986. The increase was not significant. The majority of the yellow perch harvest (82%) came from Saginaw Bay (Port Austin to Tawas) (Table 11). The Drummond Island and Les Cheneaux Island areas of northern Lake Huron were also important yellow perch fishing areas. Over 220,000 yellow perch were estimated caught in the vicinity of Drummond Island and about 138,000 in the Les Cheneaux Islands (Table 16). The perch harvest in the Drummond Island area during 1987 was unchanged compared to 1986. However, the catch at Les Cheneaux Islands in 1987 decreased significantly (75%) compared to 1986.

The lake-wide catch rate for yellow perch increased by 20% during the 1987 open-water season to 0.756 (±0.093) fish per hour compared to 1986. Yellow perch catch rates also increased on Saginaw Bay by 41% to 1.305 (±0.193) fish per angler hour compared to 1986 (Table 11). Neither of these increases was statistically significant. Saginaw Bay anglers in the area from the mouth of the Saginaw River to Essexville had the greatest catch rate for yellow perch (2.445 ± 1.457) of all the Lake Huron sample areas in 1987. Catch rates of over one fish per hour were also noted in the Au Gres to Saganing Creek, Saganing Creek to Bay City, and Sand Point to Sebewaing areas of Saginaw Bay (Table 16).

The walleye is becoming an important species to the Lake Huron sport fishery. An estimated 137,091 (±26,467) walleye were harvested in 1987 compared to 106,448 (±27,126) in 1986 (Table 10). Forty-seven percent of the walleye catch (63,691 ± 12,061 fish) came from Saginaw Bay. Anglers in the area from the mouth of the Quanicassee River to Fish Point had the largest estimated catch (21,484 ± 8,868 fish) of walleye in the Bay. Good catches of walleye (greater than 9,000 fish) also occurred in the Bay City to Saganing Creek and Port Austin to Sand Point areas. In addition to Saginaw Bay, a substantial catch of walleye (62,497 ± 23,327) was estimated for the Port Huron area. The majority of these fish were taken in the upper St. Clair River.

The overall catch rate for walleye on Lake Huron in 1987 was 0.035 (±0.007) fish per hour compared to 0.027 (±0.007) in 1986. The greatest catch rate for walleye (0.379 ± 0.155) was observed in the Port Huron area. The walleye catch rate in Saginaw Bay was 0.034 (±0.008) during 1987, virtually unchanged compared to 1986 (Table 11). This was significantly higher than the rate (0.003 ± 0.002) reported for the 1983 season (Ryckman 1986).

Several species of salmonids are an important part of the Lake Huron sport fishery. An estimated 184,111 (±13,646) salmonids were caught by anglers in 1987, compared to 171,678 (±18,727) in 1986. The salmonid catch was composed of 50% chinook salmon, 23% lake trout, 16% pink salmon, 5% brown trout, 3% coho salmon, and 3% rainbow trout. The percent composition of pink salmon in the salmonid catch increased from less than 1% in 1986 to 16%

in 1987, due to the fact that individuals of this species attain vulnerable size every other year at maturation. Ninety percent of the salmonids harvested came from the boat fishery.

An estimated 92,638 (±8,981) chinook salmon were caught by anglers in 1987 (Table 10). The lake-wide estimated harvest in 1987 was not significantly different than in 1986. However, in 1986, 37% of the catch came from the southern Lake Huron areas of Lexington to Port Sanilac and Eagle Bay to Harbor Beach, whereas in 1987, only 23% of the harvest came from these ports (Table 17). During 1987 southern Lake Huron anglers experienced a poor spring chinook salmon fishery similar to that which occurred on southern Lake Michigan. Anglers fishing in the area from Eagle Bay to Harbor Beach had a higher estimated catch for chinook salmon (15,257 ± 3,674 fish) than anglers in other areas in 1987. Good catches of chinook also occurred at Harrisville, Rogers City, and Oscoda.

The lake-wide chinook catch rate in 1987 was 0.023 (±0.003) fish per angler hour and was virtually unchanged compared to 1986. Anglers in the Rockport (0.158 ± 0.045) and Rogers City (0.142 ± 0.063) areas had the greatest catch rates for chinook. In 1986 anglers in central Lake Huron (Tawas to Harrisville) felt that their chinook fishery was poor (Rakoczy and Rogers 1987). Catch rates for chinook in this area during 1987 increased 43–67% compared to 1986 (Table 17). These figures, however, were not statistically significant.

Lake trout was the second most abundant salmonid in the 1987 Lake Huron sport catch, with an estimated harvest of 42,430 (±7,325) fish compared to 55,911 (±11,644) in 1986. The largest catches of lake trout (60%) occurred in the "Thumb" area, especially from Eagle Bay to Harbor Beach (16,613 ± 5,030 fish) (Table 18). Substantial catches of lake trout were also noted at Oscoda and Harrisville. The seasonal (May through August) catch rate for all areas sampled (excluding inner Saginaw Bay) was 0.024 (±0.004) lake trout per hour in 1987 compared to 0.030 (±0.007) lake trout per hour in 1986. Anglers in the Harrisville area had the highest catch rate (0.086 ± 0.051 fish per hour).

A total of 29,461 (±6,788) pink salmon was harvested by Lake Huron anglers. The largest catches of pink salmon occurred in northern Lake Huron in the vicinity of Detour (7,454 ± 3,977 fish), Les Cheneaux Islands (5,123 ± 1,996 fish), and Drummond Island (4,154 ± 4,084 fish). During 1986 the total estimated lake-wide harvest of pink salmon was less than 150 fish.

The total catch of brown trout for all areas sampled was estimated at 8,353 (±1,415) fish and did not change significantly compared to 1986. Tawas area anglers had the largest estimated catch of any sample area (1,429 ± 661 fish) covered by this study. Alpena's Thunder Bay has probably the best brown trout fishery on Lake Huron, with an estimated catch of over 3,000 fish and catch rates exceeding 0.043 (±0.008) fish per hour (Weber 1988)

An estimated 4,897 (±1,358) coho salmon and 6,275 (±1,403) rainbow trout were also harvested by Lake Huron anglers. The largest estimated coho harvest, 1,874 (±993) fish,

occurred in the Lexington to Port Sanilac area, while the greatest rainbow trout harvest, 1,071 (±943) fish, came from Oscoda.

In addition to perch, walleye, and salmonids, 52,104 (±29,978) lake herring, 42,305 (±11,615) channel catfish, and 13,403 (±6,299) white bass were estimated caught by Lake Huron anglers (Table 10). The lake herring fishery occurred in the Drummond Island area. The channel catfish catch is probably underestimated due to the fact that most fishing for this species occurs throughout the night and data collection was usually terminated about 1 hour after dark.

Lake Erie

Approximately 30 miles of Lake Erie shoreline, from Pointe Mouillee to the Michigan-Ohio state line, were sampled from April 15 through October, 1987. Anglers spent an estimated 2,455,903 (±308,709) hours fishing from boats in the sample area (Table 19). A total of 451,276 (±57,646) angler trips or 448,700 (±57,330) angler days were spent in the area. Total angler effort increased by 18% in 1987 compared to 1986. Angler effort was fairly evenly distributed throughout the study area. Forty-six percent (1,129,195 ± 193,909) of the estimated angler hours occurred in the northern half of the study area, Pointe Mouillee to the mouth of the River Raisin. The southern half, which encompassed the area from the mouth of the River Raisin to the Michigan-Ohio state line, received 54% (1,326,708 ± 240,210) of the angler hours.

The average length of a boat fishing trip on Lake Erie was 5.4 hours. The average angler made 1.0 trips per day.

Boat fishermen harvested an estimated 1,864,011 (±431,872) fish comprising 15 species. Eighty-seven percent of all Lake Erie anglers interviewed responded that they were fishing specifically for walleye and 9% said they were seeking yellow perch. Walleye and perch made up 82% of the total catch; walleye was the most abundant species in the catch. Anglers caught an estimated 902,378 (±151,024) walleye. Sixty-five percent of the catch came from the southern half of the census area. The walleye harvest in 1987 increased significantly (49%) compared to 1986. The majority of the 1987 walleye catch (82%) was taken during June and July, whereas in 1986, the majority of the catch was taken in May and June. The seasonal catch rate for walleye in 1987 was 0.367 (±0.077) fish per hour compared to 0.291 (±0.064) in 1986. Although there was no significant difference in walleye catch rates between the two sample areas in 1986–87, the southern part of the study area had greater mean rates both years.

Lake Erie anglers harvested fewer (27%) yellow perch during 1987 compared to 1986. The decline however, was not significant. Nearly 94% of the estimated 619,112 (±385,740) yellow perch which were harvested were taken during September and October. The perch harvest was fairly evenly divided between the two sample areas. The overall seasonal catch rate

for yellow perch was 0.252 (±0.160) fish per angler hour compared to 0.406 (±0.117) in 1986. There was no significant difference in perch catch rates between the two sample areas.

In addition to yellow perch and walleye, 169,756 (±87,326) white bass and 66,766 (±63,003) channel catfish were estimated to have been harvested by Lake Erie anglers. The white bass harvest in 1987 was 122% greater than the estimate for 1986. As was the case with Lake Huron, the channel catfish catch is probably underestimated due to the fact that most fishing for this species occurs at night.

Lake Superior

Anglers spent an estimated 97,563 (±6,290) hours fishing the sample areas on western and central Lake Superior (Table 20). This amounted to 22,816 (±1,430) individual angler trips, or 22,299 (±1,440) angler days. The average length of a fishing trip (all modes of fishing) was 4.3 hours and anglers made 1.0 fishing trips per day. The port of Marquette was sampled under a separate study (Peck 1988).

Lake Superior anglers harvested an estimated 23,588 (±2,761) fish comprising 16 species. Most anglers (53%) interviewed on Lake Superior said they were fishing for various species of salmonids. Three species of salmonids—lake trout, coho salmon, and chinook salmon—made up 85% of the catch. The species composition of the salmonid catch (excluding lake whitefish) was 76% lake trout, 16% coho salmon, 5% chinook salmon, 2% rainbow trout, and less than 1% each of brown trout, brook trout, Atlantic salmon, splake, and pink salmon. The lake trout catch for all sample areas was estimated at 15,798 (±2,105) fish. Black River Harbor, Ontonagon, and Traverse Bay (northwest shore of Keweenaw Bay) yielded about 4,000 lake trout each. The lake-wide catch rate for lake trout was 0.162 (±0.024) fish per angler hour. The greatest catch rate (0.300 ± 0.102 fish per hour) for lake trout occurred at the Traverse Bay sample area.

Lake Superior anglers also caught an estimated 3,246 (±713) coho salmon and 1,042 (±597) chinook salmon. The largest catch of coho salmon (1,883 ± 531 fish) occurred at Munising Bay. The greatest catch of chinook (724 ± 562 fish) occurred at Black River Harbor. Lake-wide catch rates for coho and chinook were 0.033 (±0.008) and 0.012 (±0.006) fish per hour, respectively. Munising Bay anglers had the greatest catch rate for coho (0.088 ± 0.26), while Black River Harbor fishermen had the best catch rate for chinook salmon (0.022 ± 0.017).

River fisheries

Several Lake Michigan tributary streams were sampled during the spring and fall anadromous fish runs. The St. Joseph and Manistee rivers were sampled throughout the entire

season. Anglers spent an estimated 897,899 (±28,419) hours fishing the St. Joseph, Kalamazoo, Grand, Muskegon, Manistee, Betsie, Platte, and Bear rivers (Table 21). The greatest amount of angler activity occurred on the St. Joseph River: 331,177 (±18,774) angler hours were spent from March 15 through October. The average length of a fishing trip on all the Lake Michigan tributaries sampled was 4.4 hours. Anglers made an average of 1.1 fishing trips per day. Seventy-four percent of the anglers interviewed on Lake Michigan tributary streams indicated that they were fishing for various species of salmon and trout. In general, angler effort during 1987 increased on most of the rivers sampled compared to 1986. Angler effort during the fall of 1986 was unusually low due to above normal precipitation which caused severe flooding in many western Michigan streams (Rakoczy and Rogers 1987).

A total of 88,345 (±13,079) chinook salmon, coho salmon, rainbow trout and brown trout were harvested on these eight rivers. Chinook salmon was the most abundant salmonid in the catch (46,136 ± 9,133). Anglers on the Manistee River had the largest estimated catch of chinook (20,976 ± 7,944).

Rainbow trout was the second most numerous salmonid in the river catches. The total rainbow trout harvest from the eight rivers sampled was estimated to be 34,615 (±9,056) fish, 10,618 (±3,323) of which were caught from the St. Joseph River.

Coho salmon and brown trout were important in some river fisheries. The total coho catch was estimated at 5,026 (±1,551) fish; 72% of these were harvested from the Platte River. A total of 2,568 (±1,801) brown trout was harvested in the river fisheries. Fishermen on the Betsie River had the largest catch, estimated at 1,168 (±1,625) brown trout.

Three Lake Huron tributary streams, the Au Sable, Saginaw, and Tittabawassee rivers were surveyed. In addition, the largest tributary to Lake Huron, the St. Marys River system, was also censused for the first time. Forty-seven percent of all anglers interviewed on Lake Huron tributary streams indicated they were fishing for salmonids; 38% said they were seeking walleye.

Anglers spent an estimated 148,624 (±5,109) hours fishing the Au Sable River from Foote Dam to Oscoda. Angler effort in 1987 decreased significantly (13%) compared to 1986. Channel catfish was the most abundant species in the catch, with an estimated 8,952 (±2,377) harvested. This figure is probably low since sampling occurred only during daylight hours. Anglers also caught an estimated 7,416 (±1,670) chinook salmon and 5,081 (±896) rainbow trout. Compared to 1986 the harvest of chinook salmon and rainbow trout increased significantly by 174% and 155%, respectively.

The lower Saginaw River catch was composed of warmwater species. Anglers spent an estimated 92,877 (±46,391) hours and caught a total of 32,251 (±37,653) fish. Sixty-five percent of the catch was yellow perch. The Tittabawassee River, a tributary of the Saginaw River, supported an estimated 199,228 (±36,382) angler hours during the periods April 15

through May 31 and October 1 through December 31, 1987. The catch primarily consisted of walleye (21,428 ± 4,625) and white bass (20,885 ± 9,248). The greatest catch of walleye (7,527 ± 4,625 fish) occurred in October.

Anglers on the St. Marys River from the rapids in Sault Ste. Marie to Detour spent an estimated 752,238 (±110,125) hours fishing (Table 22). This amounted to an estimated 203,784 (±34,613) individual angler trips, or 154,799 (±27,723) angler days. St. Marys River anglers harvested an estimated 590,741 (±117,201) fish composed of 28 species. Species composition of the catch was 54% yellow perch, 24% lake herring, 4% northern pike, 4% lake whitefish, and 2% salmonids (various species). The yellow perch catch was estimated at 316,436 (±100,781) fish. Also 141,386 (±48,162) lake herring were harvested by anglers fishing the St. Marys River. Sixty-three percent of the lake herring catch came from the Neebish Island to Sweets Point sample area during June and July.

The average length of a fishing trip on the Lake Huron tributaries sampled was 3.8 hours. Anglers made an average of 1.2 fishing trips per day.

Winter fisheries

Catch and pressure were sampled at various areas on lakes Superior, Michigan, Huron, and Erie during the winter months of 1988.

Keweenaw Bay, Huron Bay, and Munising Bay were surveyed on Lake Superior. Keweenaw Bay had the greatest amount of angler activity (75,204 ± 11,044 angler hours). The important species in the Keweenaw Bay fishery were lake trout (8,596 ± 2,306), coho salmon (5,610 ± 2,061), and lake whitefish (4,902 ± 3,544). Lake whitefish was the major species (424 ± 608) caught by ice anglers on Huron Bay. Angler effort on Munising Bay was estimated at 39,817 (±4,448) hours or 9,017 (±1,019) trips. An estimated 6,890 (±2,797) coho salmon and 5,906 (±2,162) lake whitefish were harvested on Munising Bay. Munising Bay had the greatest catch rate for whitefish (0.148 ± 0.057) of all the Lake Superior sample areas.

Areas sampled on Lake Michigan included Big Bay de Noc and Little Bay de Noc. Winter census plans also called for sampling Grand Traverse Bays but safe ice conditions never developed. It can be assumed that catch and effort on Grand Traverse bays were near zero.

Yellow perch was the most abundant species in the catch from Big and Little Bay de Noc. Anglers on Little Bay de Noc had both the greatest estimated catch of yellow perch (65,290 ± 22,140 fish) and fishing effort (133,107 ± 25,403 angler hours). In addition to perch, 11,798 (±6,435) walleye were harvested by anglers on Little Bay de Noc. Most of the walleye (67%) were harvested March 1–15. Prior to 1988 the walleye season closed at the end of February.

Yellow perch catch and effort on Big Bay de Noc were estimated at 60,677 (±23,748) fish and 32,619 (±6,719) angler hours. Catch rates for yellow perch (1.860 ± 0.823 fish per hour) were greater on Big Bay de Noc than on Little Bay de Noc. The average length of an ice fishing trip on these waters of Lake Michigan was 3.5 hours. Anglers made an average of 1.2 ice fishing trips per day.

Ice fisheries at the Les Cheneaux Islands, Munuscong Bay, and Saginaw Bay areas of Lake Huron were also sampled during the winter months of 1988. Anglers caught an estimated 7,775 (±3,528) yellow perch from January through March in the Les Cheneaux Island area. The perch catch rate was 0.814 (±0.414) fish per hour. Total angler effort was estimated to be 9,553 (±2,184) angler hours or 2,464 (±631) trips.

Munuscong Bay fishermen caught an estimated 5,400 (±4,392) walleye and 2,437 (±1,758) yellow perch during the 1988 winter ice fishery. The greatest walleye catch occurred during February. Catch rates for walleye and perch were 0.113 (±0.094) and 0.051 (±0.038) fish per angler hour, respectively. A total of 47,803 (±9,143) angler hours or 13,997 (±3,095) trips were estimated for this sample area.

The Saginaw Bay ice fishery is the largest and most important, in terms of catch and effort, on Michigan's waters of the Great Lakes. In 1988, anglers caught an estimated 675,723 (±133,958) yellow perch from Saginaw Bay (Port Austin to Tawas) during January through March (Table 23). Twelve other species of fish were noted in Saginaw Bay's winter catch. The average duration of a Saginaw Bay ice fishing trip was 3.6 hours and anglers made an average of 1.0 trip per day. Total effort was estimated to be 279,505 (±30,909) angler hours or 78,116 (±8,657) trips. The 1988 yellow perch harvest and angler effort decreased significantly by 79% and 58%, respectively, compared to the winter fishery in 1987. Catch rates for yellow perch were 2.416 (±0.549) fish per hour in 1988 compared to 4.794 (±0.832) for 1987, a decrease of nearly 50%.

Anglers fishing the Sebewaing to Sand Point area of Saginaw Bay accounted for 50% (336,723 ± 112,543 fish) of the Bay's perch catch and had the greatest hourly catch rate for perch (3.693 ± 1.442) of the six areas sampled on the Bay. The perch harvest in this area decreased 72% compared to 1987.

In addition to yellow perch, an estimated 4,658 (±4,617) walleye were caught by Saginaw Bay ice anglers (Table 23). This was an increase, although not statistically significant, of over 600% compared to 1987. Fishermen in the Bay City to Saganing Creek sample area had the largest estimated catch of walleye (4,602 ± 4,616 fish). The overall catch rate for walleye on Saginaw Bay in 1988 was 0.017 (±0.017) fish per hour as compared to 0.001 (±0.001) in 1987.

Winter ice fisheries on the Saginaw and Tittabawassee rivers, tributaries to Saginaw Bay, were also survey during 1988. Total angler effort on these two rivers for January through

March was 107,672 (±36,725) angler hours, or 32,977 (±11,637) individual fishing trips. Anglers caught an estimated 8,226 (±5,100) walleye and 6,012 (±7,160) yellow perch.

Lake Erie anglers during the winter of 1988 spent an estimated 85,422 (±25,992) hours and made 29,668 (±10,770) fishing trips in the area from Pointe Mouillee to the Michigan-Ohio state line. Ninety-seven percent of the fishing effort occurred in the northern half (Pointe Mouillee to the River Raisin) of the study area. Fishermen harvested an estimated 226,222 (±180,925) yellow perch and 35 (±48) walleye.

SUMMARY

During the 1987 license year, anglers spent an estimated 14,855,507 (±609,785) angler hours in the areas of Michigan's waters of the Great Lakes that were censused. This accounted for an estimated 3,411,381 (±117,558) individual fishing trips and 3,119,006 (±107,564) angler days. Total angler effort on the Great Lakes and connecting waters was 84% boat, 6% pier, 6% ice, and 4% shore. Of the total angler hours during the open-water season 45% was spent on Lake Michigan while 32% was spent on Lake Huron. Grand Haven was the busiest port in terms of angler hours on Lake Michigan. The area from Au Gres to Saganing Creek was found to be the heaviest fished sample area on Lake Huron.

Total catch was estimated to be over 10.6 million fish. Yellow perch was the most abundant species in the sport catch in most sample areas. The yellow perch catch for all areas censused was estimated at 7,329,815 (±737,446) fish. Forty-three percent of the total yellow perch harvest came from Saginaw Bay, Lake Huron.

In addition to yellow perch, sport anglers harvested an estimated 1,133,145 (±156,221) walleye, 523,115 (±65,331) chinook salmon, 200,127 (±31,620) lake trout, 165,905 (±28,206) coho salmon, 95,371 (±14,063) rainbow trout, and 41,266 (±7,246) brown trout. Seventy percent of all salmonids harvested by anglers in the areas censused came from Lake Michigan. The salmonid catch in Lake Michigan was composed of 51% chinook salmon, 20% coho salmon, 18% lake trout, 7% rainbow trout, and 4% brown trout.

ACKNOWLEDGMENTS

The authors wish to thank the staffs of the fisheries district and research stations who participated in the census program. These field units did the day-to-day work of angler interviews, fishing pressure counts, and supervision of seasonal workers. Paul Wei of the Management Information Division wrote the interview and count data entry programs. Evelyn Eakes keyed the data. Special thanks to Kelley Smith who wrote the computer programs for the calculation of the catch and effort estimates. James Schneider edited the manuscript.

Figure 1. Lake Huron census area.

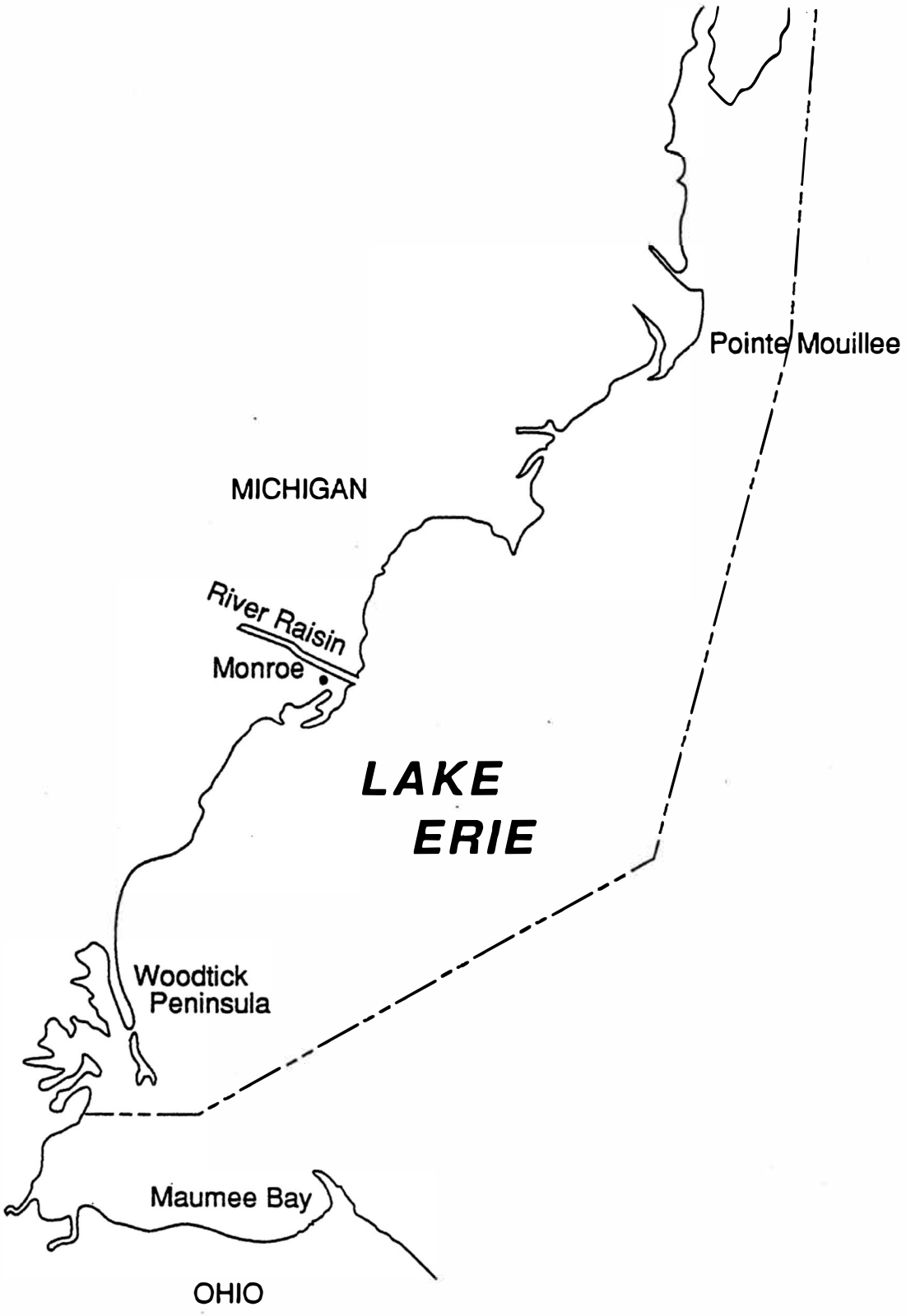

Figure 2. Lake Erie census area.

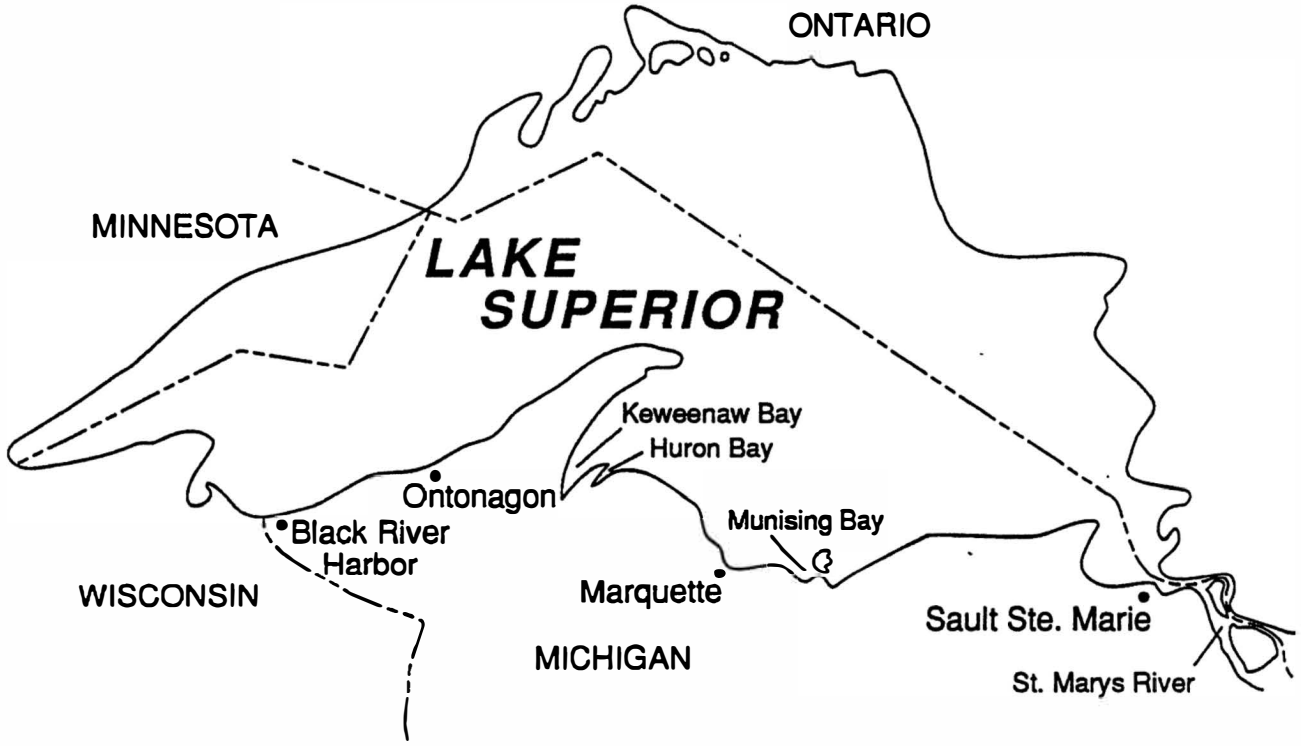

Figure 3. Lake Superior census area.

Figure 4. Lake Michigan census area.

ANGLER PARTY INTERVIEW FORM

Project #:

Unit: Soc. Sec. #: Date: / / Seq. #:

Interview site: Site name:
Fishing site: Site name:

Fishery type
☐Gt Lk ☐Anad
☐In Lk ☐In St

Mode of fishing
☐Boat ☐Shore ☐Open ice
☐Charter ☐Non-f. shore ☐Non-f. open ice
☐Non-f. boat ☐Pier/dock ☐Shanty ice
☐Non-f. pier/dock

Start date: / / Day of week:
1 = Monday 5 = Friday
2 = Tuesday 6 = Saturday
3 = Wednesday 7 = Sunday
4 = Thursday 8 = Holiday

End time:
Start time:
Hrs fished: .
Comp. trip: ☐Y ☐N

Military hr: Morning AM Noon Evening PM
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 0
1 2 3 4 5 6 7 8 9 10 11 12

Angler	# tps	Sex	Age	Zip code	Residence (county/state)	Cnty code	Fishing methods: cast	stil	trol	fly	drif	spea	dip	snag	jig
1							☐	☐	☐	☐	☐	☐	☐	☐	☐
2							☐	☐	☐	☐	☐	☐	☐	☐	☐
3							☐	☐	☐	☐	☐	☐	☐	☐	☐
4							☐	☐	☐	☐	☐	☐	☐	☐	☐
5							☐	☐	☐	☐	☐	☐	☐	☐	☐
6							☐	☐	☐	☐	☐	☐	☐	☐	☐
7							☐	☐	☐	☐	☐	☐	☐	☐	☐
8							☐	☐	☐	☐	☐	☐	☐	☐	☐

Use this side or use this side, not both!

Target sp.: code:
☐Anything ☐Salmon ☐Trout ☐Salmon & Trout ☐Walleye & Perch
☐Bass ☐Panfish ☐Bass & Bluegill ☐Pike & Bass ☐Pike & Perch

Catch data

Code	Species	# kept	Code	Species	# kept	Code	Species	# kept
ATL	Atlantic salmon		MUS	Muskellunge		BUF	Buffalo (spp)	
BKT	Brook trout		TMU	Tiger musky		LNS	Longnose sucker	
BNT	Brown trout		BCR	Black crappie		QIL	Quillback	
CHS	Chinook salmon		BLG	Bluegill		RHS	Redhorse (spp)	
COH	Coho salmon		GSF	Green sunfish		CWS	White sucker	
LHR	Lake herring		LMB	Largemouth bass		BOW	Bowfin	
LAT	Lake trout		LSF	Longear sunfish		BUR	Burbot	
LWF	Lake whitefish		OSF	Orange. sunfish		DRU	Freshwater drum	
PKS	Pink salmon		PSF	Pumpkinseed		GAR	Gar (spp)	
RBT	Rainbow trout		RSF	Redear sunfish		GZS	Gizzard Shad	
RWF	Round whitefish		RKB	Rockbass		MOO	Mooneye	
SPL	Splake		SMB	Smallmouth bass		STR	Sturgeon	
SMT	Rainbow smelt		WAR	Warmouth		OTH	Other	
SAU	Sauger		WCR	White crappie				
WAE	Walleye		BLB	Black bullhead				
YEP	Yellow perch		BRB	Brown bullhead				
WHB	White bass		CCF	Channel catfish				
WHP	White perch		YLB	Yellow bullhead				
NOP	Northern pike		CAR	Carp				

R 8548 3/87

Figure 5. Angler party interview data sheet.

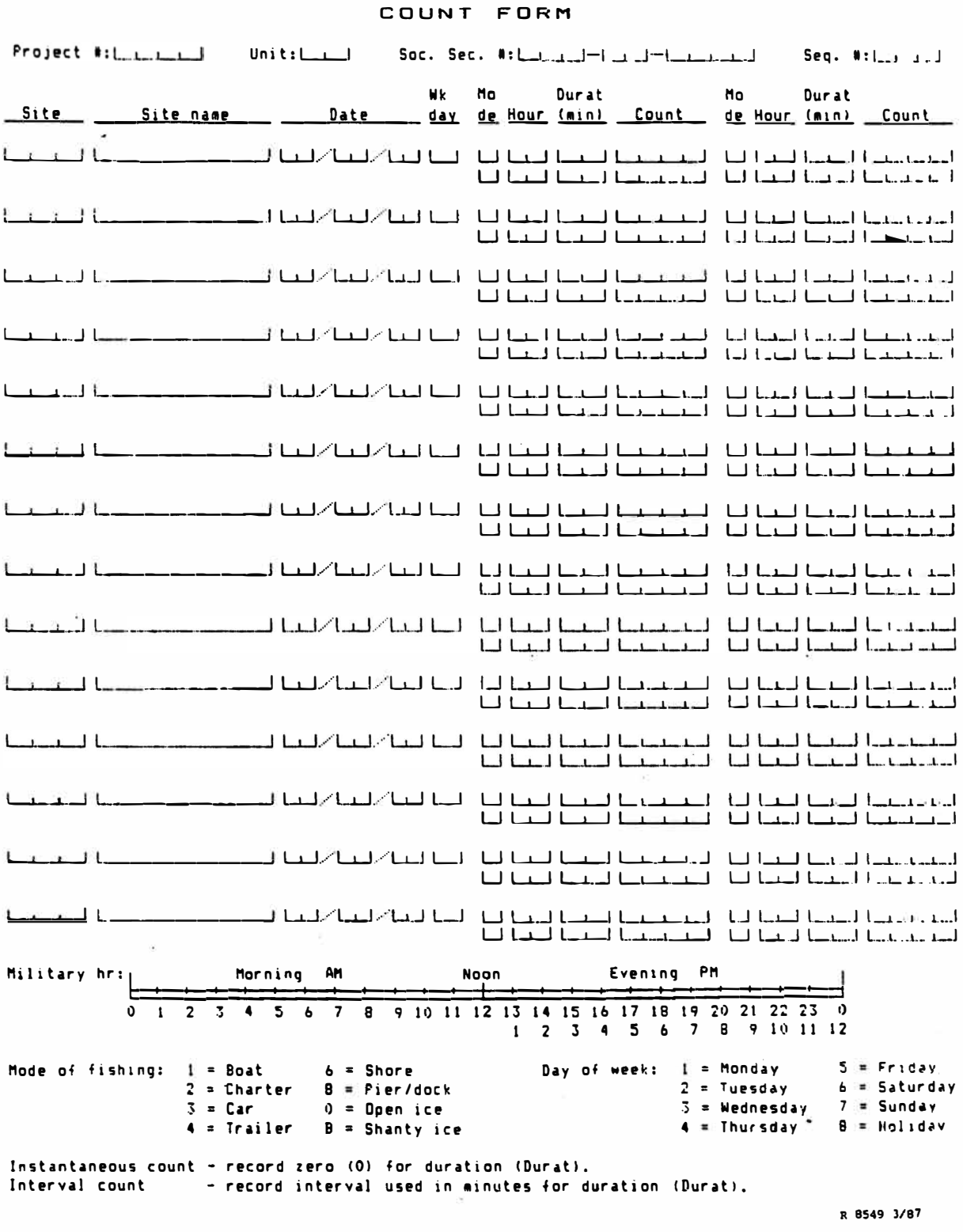

Figure 6. Shore and boat count data sheet.

Table 1. List of scientific and common names of fish observed in study.

Common name	Scientific name
Rainbow smelt	*Osmerus mordax*
Northern pike	*Esox lucius*
Tiger musky	*Esox masquinongy* x *E. lucius*
Black bullhead	*Ictalurus melas*
Yellow bullhead	*Ictalurus natalis*
Brown bullhead	*Ictalurus nebulosus*
Channel catfish	*Ictalurus punctatus*
Burbot	*Lota lota*
White perch	*Morone americana*
White bass	*Morone chrysops*
Lake herring	*Coregonus artedii*
Freshwater drum	*Aplodinotus grunniens*
Lake whitefish	*Coregonus clupeaformis*
Round whitefish	*Prosopium cylindraceum*
Chinook salmon	*Oncorhynchus tshawytscha*
Coho salmon	*Oncorhynchus kisutch*
Pink salmon	*Oncorhynchus gorbuscha*
Rainbow trout	*Oncorhynchus mykiss*[1]
Atlantic salmon	*Salmo salar*
Brown trout	*Salmo trutta*
Brook trout	*Salvelinus fontinalis*
Lake trout	*Salvelinus namaycush*
Splake	*Salvelinus namaycush* x *S. fontinalis*
White sucker	*Catostomus commersoni*
Redhorse spp.	*Moxostoma* spp.
Rock bass	*Ambloplites rupestris*
Green sunfish	*Lepomis cyanellus*
Pumpkinseed	*Lepomis gibbosus*
Bluegill	*Lepomis macrochirus*
Longear sunfish	*Lepomis megalotis*
Redear sunfish	*Lepomis microlophus*
Smallmouth bass	*Micropterus dolomieui*
Largemouth bass	*Micropterus salmoides*
White crappie	*Pomoxis annularis*
Black crappie	*Pomoxis nigromaculatus*
Yellow perch	*Perca flavescens*
Walleye	*Stizostedion vitreum*

[1]Formerly *Salmo gairdneri*.

Table 2. Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for Lake Michigan, by all modes of sportfishing, 1987. Two standard errors in parentheses.

Species	Total catch per hour	Month								Season total
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
Pink salmon	0.0006 (0.0004)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	959 (1,522)	2,365 (1,424)	1 (2)	3,325 (2,084)
Coho salmon	0.0246 (0.0052)	7 (16)	39,950 (17,949)	28,054 (10,658)	6,070 (5,185)	3,408 (2,854)	21,886 (13,499)	38,882 (11,176)	1,272 (536)	139,529 (27,896)
Chinook salmon	0.0641 (0.0122)	0 (0)	11,702 (5,207)	25,100 (9,555)	18,451 (8,039)	90,540 (35,018)	142,930 (48,820)	71,333 (16,980)	4,301 (1,675)	364,357 (63,905)
Rainbow trout	0.0083 (0.0020)	44 (64)	1,570 (938)	1,207 (712)	5,165 (2,664)	5,308 (3,482)	4,176 (2,895)	18,650 (8,617)	11,029 (2,997)	47,149 (10,594)
Atlantic salmon	<0.0001 (<0.0001)	0 (0)	0 (0)	0 (0)	53 (117)	0 (0)	39 (78)	0 (0)	0 (0)	92 (141)
Brown trout	0.0052 (0.0013)	237 (232)	4,784 (1,722)	8,847 (3,571)	5,553 (4,070)	5,854 (3,344)	3,795 (1,968)	596 (495)	151 (125)	29,817 (6,903)
Brook trout	0.0001 (0.0002)	0 (0)	193 (427)	95 (221)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	288 (481)
Lake trout	0.0233 (0.0057)	0 (0)	0 (0)	42,561 (14,267)	40,181 (23,892)	33,188 (10,841)	16,187 (6,638)	0 (0)	0 (0)	132,117 (30,594)
Splake	<0.0001 (<0.0001)	0 (0)	57 (63)	0 (0)	0 (0)	0 (0)	1 (1)	0 (0)	0 (0)	58 (63)
Rainbow smelt	0.0017 (0.0025)	0 (0)	9,643 (14,329)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	17 (37)	9,660 (14,329)
Northern pike	0.0010 (0.0004)	0 (0)	162 (246)	992 (1,133)	166 (154)	1,137 (733)	2,164 (1,594)	631 (439)	420 (501)	5,672 (2,211)
White sucker	<0.0001 (<0.0001)	0 (0)	48 (97)	32 (46)	29 (62)	0 (0)	0 (0)	0 (0)	0 (0)	109 (124)
Black bullhead	<0.0001 (<0.0001)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	106 (219)	43 (86)	0 (0)	149 (235)
Yellow bullhead	0.0001 (0.0001)	0 (0)	0 (0)	0 (0)	0 (0)	659 (867)	0 (0)	0 (0)	0 (0)	659 (867)
Brown bullhead	<0.0001 (<0.0001)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	133 (268)	0 (0)	133 (268)
Channel catfish	0.0018 (0.0016)	0 (0)	5,964 (8,401)	339 (591)	571 (808)	1,620 (1,313)	1,741 (2,604)	114 (252)	0 (0)	10,349 (8,952)

Table 2. Continued:

Species	Total catch per hour	Month								Season total
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
White bass	<0.0001	0	0	12	69	0	0	0	0	81
	(<0.0001)	(0)	(0)	(29)	(83)	(0)	(0)	(0)	(0)	(88)
Rock bass	0.0012	0	37	719	2,009	887	2,285	525	158	6,620
	(0.0005)	(0)	(83)	(1,096)	(1,868)	(862)	(1,614)	(691)	(319)	(2,937)
Pumpkinseed	0.0014	0	0	0	29	430	6,644	493	236	7,832
	(0.0016)	(0)	(0)	(0)	(62)	(427)	(8,845)	(598)	(478)	(8,889)
Bluegill	0.0003	0	0	10	119	687	952	0	0	1,768
	(0.0004)	(0)	(0)	(20)	(196)	(1,069)	(2,003)	(0)	(0)	(2,279)
Smallmouth bass	0.0027	0	0	1,299	4,667	4,885	2,968	1,668	99	15,586
	(0.0011)	(0)	(0)	(958)	(3,181)	(4,456)	(1,989)	(958)	(209)	(5,984)
Largemouth bass	0.0001	0	0	122	2	405	119	0	0	648
	(0.0001)	(0)	(0)	(278)	(4)	(817)	(178)	(0)	(0)	(881)
White crappie	0.0002	0	0	256	945	0	0	0	0	1,201
	(0.0002)	(0)	(0)	(599)	(1,235)	(0)	(0)	(0)	(0)	(1,373)
Black crappie	0.0043	0	2,379	684	271	451	20,603	0	0	24,388
	(0.0094)	(0)	(4,908)	(1,481)	(382)	(481)	(52,905)	(0)	(0)	(53,156)
Yellow perch	0.4425	0	299,058	79,807	765,220	680,025	515,170	118,911	58,574	2,513,981
	(0.0885)	(0)	(82,752)	(35,926)	(180,022)	(300,299)	(292,319)	(48,938)	(22,799)	(468,048)
Walleye	0.0033	0	31	1,543	2,708	3,139	6,285	4,571	729	19,006
	(0.0018)	(0)	(65)	(1,009)	(2,483)	(2,407)	(2,760)	(9,301)	(893)	(10,388)
Freshwater drum	0.0008	0	201	1,072	1,978	171	603	286	0	4,311
	(0.0006)	(0)	(335)	(1,962)	(2,259)	(195)	(1,023)	(617)	(0)	(3,245)
Lake whitefish	0.0035	0	272	1,249	8,969	7,924	1,269	183	145	20,011
	(0.0013)	(0)	(304)	(961)	(5,494)	(4,819)	(894)	(228)	(158)	(7,436)
Round whitefish	0.0039	141	67	1,614	6,285	6,953	29	725	6,121	21,935
	(0.0028)	(165)	(111)	(2,224)	(5,079)	(13,943)	(61)	(1,481)	(3,055)	(15,386)
Burbot	<0.0001	0	0	0	11	18	0	0	0	29
	(<0.0001)	(0)	(0)	(0)	(22)	(37)	(0)	(0)	(0)	(43)
Other	0.0001	0	0	256	17	81	151	10	0	515
	(0.0001)	(0)	(0)	(489)	(35)	(139)	(327)	(20)	(0)	(606)

Table 2. Continued:

Species	Total catch per hour	Month								Season total
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
Total	0.5956 (0.0947)	429 (292)	376,118 (86,611)	195,870 (41,591)	869,538 (182,146)	847,770 (302,992)	751,062 (301,631)	260,119 (54,552)	83,253 (23,295)	3,384,159 (478,239)
Angler hours		5,147 (1,444)	591,107 (72,756)	815,759 (157,193)	808,840 (135,403)	1,058,429 (156,262)	1,186,103 (258,992)	1,083,093 (177,966)	133,429 (9,797)	5,681,907 (414,248)
Angler trips		1,690 (446)	128,036 (15,306)	155,190 (27,394)	175,757 (25,101)	252,389 (33,374)	267,772 (53,183)	232,602 (36,483)	38,683 (2,954)	1,252,119 (83,048)
Anglei days		1,354 (383)	118,087 (15,047)	142,377 (25,861)	166,509 (24,107)	234,050 (31,130)	239,239 (44,215)	196,672 (31,169)	32,836 (2,727)	1,131,124 (73,345)

Table 3. Estimated angler effort in hours, trips, and days at selected Lake Michigan ports, 1987. Two standard errors in parentheses.

Port	Angler		
	Hours	Trips	Days
Grand Haven	759,713 (139,908)	159,115 (27,675)	157,564 (27,657)
Ludington	614,485 (161,652)	119,922 (27,863)	102,412 (24,758)
Frankfort-Elberta	548,231 (193,141)	126,835 (41,386)	92,994 (32,018)
Manistee	509,415 (110,459)	112,930 (23,220)	92,605 (19,208)
St. Joseph-Benton Harbor	369,500 (91,609)	67,836 (15,738)	62,569 (14,426)

Table 4. Estimated catch per hour, number caught, and effort (angler hours, days, and trips) for the Lake Michigan boat fishery, 1987. Two standard errors in parentheses.

Species	Total catch per hour	Month								Season total
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
Pink salmon	0.0002 (0.0003)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	959 (1,522)	85 (135)	0 (0)	1,044 (1,528)
Coho salmon	0.0260 (0.0060)	0 (0)	39,115 (17,943)	24,875 (10,506)	6,050 (5,185)	3,408 (2,854)	20,896 (13,482)	34,958 (11,006)	591 (424)	129,893 (27,757)
Chinook salmon	0.0698 (0.0140)	0 (0)	11,604 (5,205)	24,602 (9,549)	18,412 (8,039)	90,307 (35,017)	137,564 (48,761)	64,746 (16,846)	1,268 (1,322)	348,503 (63,814)
Rainbow trout	0.0073 (0.0022)	14 (26)	434 (415)	969 (689)	4,668 (2,613)	4,956 (3,467)	4,105 (2,893)	17,889 (8,608)	3,336 (2,533)	36,371 (10,411)
Atlantic salmon	<0.0001 (<0.0001)	0 (0)	0 (0)	0 (0)	53 (117)	0 (0)	39 (78)	0 (0)	0 (0)	92 (141)
Brown trout	0.0053 (0.0014)	126 (184)	4,137 (1,665)	7,473 (3,499)	5,238 (4,058)	5,565 (3,333)	3,533 (1,943)	432 (465)	78 (97)	26,582 (6,828)
Brook trout	<0.0001 (<0.0001)	0 (0)	0 (0)	91 (221)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	91 (221)
Lake trout	0.0262 (0.0065)	0 (0)	0 (0)	41,307 (14,133)	40,162 (23,892)	33,188 (10,841)	16,084 (6,635)	0 (0)	0 (0)	130,741 (30,531)
Splake	<0.0001 (<0.0001)	0 (0)	57 (63)	0 (0)	0 (0)	0 (0)	1 (1)	0 (0)	0 (0)	58 (63)
Rainbow smelt	<0.0001 (<0.0001)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	17 (37)	17 (37)
Northern pike	0.0011 (0.0005)	0 (0)	162 (246)	992 (1,133)	166 (154)	1,137 (733)	2,142 (1,594)	631 (439)	178 (376)	5,408 (2,186)
White sucker	<0.0001 (<0.0001)	0 (0)	48 (97)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	48 (97)
Black bullhead	<0.0001 (<0.0001)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	106 (219)	0 (0)	0 (0)	106 (219)
Channel catfish	0.0017 (0.0017)	0 (0)	5,964 (8,401)	337 (591)	332 (641)	1,374 (1,223)	484 (1,001)	114 (252)	0 (0)	8,605 (8,596)
White bass	<0.0001 (<0.0001)	0 (0)	0 (0)	0 (0)	69 (83)	0 (0)	0 (0)	0 (0)	0 (0)	69 (83)

Table 4. Continued:

Species	Total catch per hour	Month								Season total
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
Rock bass	0.0005	0	37	98	1,039	467	766	296	0	2,703
	(0.0004)	(0)	(83)	(179)	(1,398)	(671)	(1,125)	(599)	(0)	(2,017)
Pumpkinseed	0.0012	0	0	0	0	221	5,774	31	0	6,026
	(0.0018)	(0)	(0)	(0)	(0)	(327)	(8,817)	(62)	(0)	(8,823)
Bluegill	0.0002	0	0	0	31	0	952	0	0	983
	(0.0004)	(0)	(0)	(0)	(65)	(0)	(2,003)	(0)	(0)	(2,004)
Smallmouth bass	0.0028	0	0	1,131	4,065	4,413	2,720	1,474	99	13,902
	(0.0012)	(0)	(0)	(941)	(3,126)	(4,444)	(1,975)	(865)	(209)	(5,924)
Largemouth bass	<0.0001	0	0	122	2	0	119	0	0	243
	(<0.0001)	(0)	(0)	(278)	(4)	(0)	(178)	(0)	(0)	(330)
White crappie	0.0001	0	0	256	488	0	0	0	0	744
	(0.0001)	(0)	(0)	(599)	(785)	(0)	(0)	(0)	(0)	(987)
Black crappie	0.0048	0	2,379	684	271	80	20,592	0	0	24,006
	(0.0106)	(0)	(4,908)	(1,481)	(382)	(162)	(52,905)	(0)	(0)	(53,154)
Yellow perch	0.3760	0	248,731	47,344	396,270	604,615	418,185	108,649	53,211	1,876,476
	(0.0962)	(0)	(69,030)	(34,047)	(154,100)	(299,177)	(290,498)	(48,483)	(22,295)	(454,328)
Walleye	0.0036	0	31	836	2,478	3,085	6,285	4,467	604	17,786
	(0.0021)	(0)	(65)	(906)	(2,460)	(2,406)	(2,760)	(9,300)	(867)	(10,369)
Freshwater drum	0.0007	0	126	1,072	1,606	12	603	0	0	3,419
	(0.0006)	(0)	(262)	(1,962)	(2,190)	(35)	(1,023)	(0)	(0)	(3,124)
Lake whitefish	0.0040	0	272	1,249	8,969	7,924	1,269	183	145	20,011
	(0.0015)	(0)	(304)	(961)	(5,494)	(4,819)	(894)	(228)	(158)	(7,436)
Round	0.0032	0	51	1,588	6,285	6,953	29	725	311	15,942
	(0.0030)	(0)	(104)	(2,224)	(5,079)	(13,943)	(61)	(1,481)	(388)	(15,083)
Burbot	<0.0001	0	0	0	0	18	0	0	0	18
	(<0.0001)	(0)	(0)	(0)	(0)	(37)	(0)	(0)	(0)	(37)
Other	0.0001	0	0	237	17	14	151	10	0	429
	(0.0001)	(0)	(0)	(488)	(35)	(31)	(327)	(20)	(0)	(590)

Table 4. Continued:

Species	Total catch per hour	Month								Season total
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
Total	0.5352 (0.1031)	140 (186)	313,148 (72,195)	155,263 (39,865)	496,671 (156,564)	767,737 (301,874)	643,358 (299,843)	234,690 (54,037)	59,838 (22,506)	2,670,845 (464,515)
Angler hours		1,239 (1,267)	509,745 (72,353)	746,399 (157,050)	670,893 (134,347)	977,391 (155,876)	1,082,361 (258,762)	957,582 (177,472)	45,147 (7,931)	4,990,757 (413,237)
Angler trips		322 (303)	100,855 (14,990)	135,626 (27,216)	129,120 (24,365)	217,601 (32,990)	225,840 (52,981)	192,135 (36,208)	12,025 (2,100)	1,013,524 (82,279)
Angler days		242 (230)	96,353 (14,780)	125,683 (25,693)	123,678 (23,422)	203,430 (30,770)	202,547 (44,012)	166,256 (30,971)	10,897 (2,029)	929,086 (72,625)

Table 5. Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the Lake Michigan pier fishery, 1987. Two standard errors in parentheses.

Species	Total catch per hour	Month								Season total
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
Pink salmon	<0.0001 (<0.0001)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	13 (26)	0 (0)	13 (26)
Coho salmon	0.0147 (0.0049)	7 (16)	835 (483)	3,179 (1,793)	20 (41)	0 (0)	990 (667)	3,041 (1,903)	266 (180)	8,338 (2,748)
Chinook salmon	0.0212 (0.0057)	0 (0)	98 (145)	498 (336)	39 (55)	233 (305)	5,366 (2,401)	5,452 (2,013)	368 (265)	12,054 (3,181)
Rainbow trout	0.0140 (0.0031)	30 (58)	0 (0)	27 (55)	497 (520)	352 (320)	71 (119)	453 (319)	6,495 (1,554)	7,925 (1,706)
Brown trout	0.0050 (0.0017)	111 (142)	592 (425)	1,195 (695)	315 (315)	289 (265)	262 (313)	0 (0)	66 (78)	2,830 (978)
Lake trout	0.0024 (0.0034)	0 (0)	0 (0)	1,254 (1,951)	19 (37)	0 (0)	103 (185)	0 (0)	0 (0)	1,376 (1,960)
Rainbow smelt	0.0170 (0.0253)	0 (0)	9,643 (14,329)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	9,643 (14,329)
Northern pike	0.0002 (0.0004)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	113 (249)	113 (249)
Yellow bullhead	0.0012 (0.0016)	0 (0)	0 (0)	0 (0)	0 (0)	659 (867)	0 (0)	0 (0)	0 (0)	659 (867)
Channel catfish	0.0031 (0.0045)	0 (0)	0 (0)	0 (0)	239 (491)	246 (477)	1,257 (2,404)	0 (0)	0 (0)	1,742 (2,500)
Rock bass	0.0030 (0.0027)	0 (0)	0 (0)	0 (0)	859 (1,224)	351 (532)	510 (785)	0 (0)	0 (0)	1,720 (1,548)
Pumpkinseed	<0.0001 (<0.0001)	0 (0)	0 (0)	0 (0)	0 (0)	23 (46)	0 (0)	0 (0)	0 (0)	23 (46)
Bluegill	0.0012 (0.0018)	0 (0)	0 (0)	10 (20)	0 (0)	687 (1,069)	0 (0)	0 (0)	0 (0)	697 (1,069)
Smallmouth bass	0.0015 (0.0012)	0 (0)	0 (0)	0 (0)	281 (459)	281 (255)	106 (181)	194 (411)	0 (0)	862 (691)
Largemouth bass	0.0007 (0.0014)	0 (0)	0 (0)	0 (0)	0 (0)	405 (817)	0 (0)	0 (0)	0 (0)	405 (817)
White crappie	0.0008 (0.0017)	0 (0)	0 (0)	0 (0)	457 (954)	0 (0)	0 (0)	0 (0)	0 (0)	457 (954)

Table 5. Continued:

Species	Total catch per hour	Month								Season total
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
Black crappie	0.0007 (0.0008)	0 (0)	0 (0)	0 (0)	0 (0)	371 (452)	11 (27)	0 (0)	0 (0)	382 (453)
Yellow perch	1.0716 (0.2047)	0 (0)	47,430 (45,482)	22,736 (10,896)	362,680 (93,008)	72,760 (25,842)	95,819 (32,562)	6,372 (5,981)	2,868 (4,557)	608,410 (112,255)
Walleye	0.0016 (0.0010)	0 (0)	0 (0)	648 (435)	140 (287)	0 (0)	0 (0)	104 (151)	0 (0)	892 (543)
Freshwater drum	0.0016 (0.0016)	0 (0)	75 (209)	0 (0)	372 (555)	159 (191)	0 (0)	286 (617)	0 (0)	892 (877)
Round	0.0085 (0.0052)	141 (165)	16 (38)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	4,665 (2,949)	4,822 (2,954)
Burbot	<0.0001 (<0.0001)	0 (0)	0 (0)	0 (0)	11 (22)	0 (0)	0 (0)	0 (0)	0 (0)	11 (22)
Other	<0.0001 (<0.0001)	0 (0)	0 (0)	17 (34)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	17 (34)
Total	1.1739 (0.2082)	289 (226)	58,689 (47,691)	29,564 (11,249)	365,929 (93,027)	76,816 (25,913)	104,495 (32,758)	15,915 (6,642)	14,841 (5,661)	666,538 (113,471)
Angler hours		3,908 (692)	60,389 (7,038)	57,719 (6,411)	122,850 (16,635)	67,657 (10,753)	94,047 (10,721)	99,832 (12,887)	61,374 (5,339)	567,776 (28,160)
Angler trips		1,368 (328)	21,610 (2,943)	15,878 (3,022)	40,456 (5,857)	28,600 (4,834)	36,968 (4,485)	33,127 (4,351)	18,553 (1,926)	196,560 (10,878)
Angler days		1,112 (307)	17,548 (2,702)	13,564 (2,862)	37,164 (5,545)	24,714 (4,495)	31,749 (4,075)	23,846 (3,367)	14,935 (1,667)	164,632 (9,862)

Table 6. Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the Lake Michigan shore fishery, 1987. Two standard errors in parentheses.

Species	Total catch per hour	Month								Season total
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
Pink salmon	0.0184 (0.0115)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2,267 (1,417)	1 (2)	2,268 (1,417)
Coho salmon	0.0105 (0.0038)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	883 (376)	415 (273)	1,298 (465)
Chinook salmon	0.0308 (0.0099)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1,135 (685)	2,665 (993)	3,800 (1,206)
Rainbow trout	0.0231 (0.0080)	0 (0)	1,136 (841)	211 (173)	0 (0)	0 (0)	0 (0)	308 (234)	1,198 (392)	2,853 (972)
Brown trout	0.0033 (0.0022)	0 (0)	55 (122)	179 (164)	0 (0)	0 (0)	0 (0)	164 (170)	7 (11)	405 (266)
Brook trout	0.0016 (0.0035)	0 (0)	193 (427)	4 (8)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	197 (427)
Northern pike	0.0012 (0.0018)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	22 (47)	0 (0)	129 (218)	151 (223)
White sucker	0.0005 (0.0006)	0 (0)	0 (0)	32 (46)	29 (62)	0 (0)	0 (0)	0 (0)	0 (0)	61 (77)
Black bullhead	0.0003 (0.0006)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	43 (86)	0 (0)	43 (86)
Brown bullhead	0.0011 (0.0022)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	133 (268)	0 (0)	133 (268)
Channel catfish	<0.0001 (<0.0001)	0 (0)	0 (0)	2 (6)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (6)
White bass	0.0001 (0.0002)	0 (0)	0 (0)	12 (29)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	12 (29)
Rock bass	0.0178 (0.0119)	0 (0)	0 (0)	621 (1,082)	111 (192)	69 (96)	1,009 (851)	229 (345)	158 (319)	2,197 (1,476)
Pumpkinseed	0.0145 (0.0088)	0 (0)	0 (0)	0 (0)	29 (62)	186 (271)	870 (704)	462 (595)	236 (478)	1,783 (1,075)
Bluegill	0.0007 (0.0015)	0 (0)	0 (0)	0 (0)	88 (185)	0 (0)	0 (0)	0 (0)	0 (0)	88 (185)
Smallmouth bass	0.0067 (0.0040)	0 (0)	0 (0)	168 (184)	321 (374)	191 (190)	142 (152)	0 (0)	0 (0)	822 (483)

Table 6. Continued:

Species	Total catch per hour	Month								Season total
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
Yellow perch	0.2358 (0.0603)	0 (0)	2,897 (3,751)	9,727 (3,566)	6,270 (3,252)	2,650 (2,042)	1,166 (899)	3,890 (2,938)	2,495 (1,409)	29,095 (7,277)
Walleye	0.0027 (0.0025)	0 (0)	0 (0)	59 (92)	90 (182)	54 (70)	0 (0)	0 (0)	125 (216)	328 (305)
Round	0.0095 (0.0057)	0 (0)	0 (0)	26 (50)	0 (0)	0 (0)	0 (0)	0 (0)	1,145 (698)	1,171 (700)
Other	0.0006 (0.0012)	0 (0)	0 (0)	2 (5)	0 (0)	67 (136)	0 (0)	0 (0)	0 (0)	69 (136)
Total	0.3791 (0.0671)	0 (0)	4,281 (3,870)	11,043 (3,741)	6,938 (3,290)	3,217 (2,077)	3,209 (1,433)	9,514 (3,448)	8,574 (2,028)	46,776 (7,884)
Angler hours		0 (0)	20,973 (3,007)	11,641 (1,990)	15,097 (2,856)	13,381 (2,191)	9,695 (2,085)	25,679 (3,090)	26,908 (2,138)	123,374 (6,665)
Angler trips		0 (0)	5,571 (953)	3,686 (768)	6,181 (1,447)	6,188 (1,473)	4,964 (1,144)	7,340 (1,012)	8,105 (778)	42,035 (2,950)
Angler days		0 (0)	4,186 (817)	3,130 (709)	5,667 (1,354)	5,906 (1,432)	4,943 (1,144)	6,570 (955)	7,004 (733)	37,406 (2,795)

Table 7. Estimated catch and catch rate (fish per angler hour) of yellow perch at selected Lake Michigan ports and fishing areas, 1986–87. Two standard errors in parentheses.

Port or area	Number of yellow perch		Yellow perch per hour	
	1986	1987	1986	1987
St. Joseph-Benton Harbor	590,044 (307,649)	450,540 (297,375)	0.972 (0.547)	1.219 (0.860)
South Haven	307,847 (150,200)	316,997 (162,911)	0.787 (0.409)	0.967 (0.531)
Grand Haven	79,972 (29,962)	213,199 (76,917)	0.114 (0.050)	0.281 (0.114)
Muskegon	53,516 (51,027)	307,326 (141,768)	0.167 (0.162)	0.904 (0.460)
Ludington	64,712 (46,674)	229,841 (79,397)	0.078 (0.061)	0.374 (0.162)
West Arm Grand Traverse Bay	76,971 (43,181)	102,182 (51,052)	0.439 (0.251)	0.654 (0.335)
East Arm Grand Traverse Bay	139,804 (51,654)	64,375 (20,872)	1.205 (0.472)	0.835 (0.281)
Big Bay de Noc[1]	136,968 (65,315)	116,847 (41,242)	3.708 (1.989)	1.968 (0.821)
Little Bay de Noc	139,828 (50,923)	70,807 (18,980)	0.699 (0.265)	0.548 (0.161)

[1]Estimates are for April and May 1986 only.

Table 8. Estimated catch and catch rate (fish per angler hour) of chinook salmon at selected Lake Michigan ports and fishing areas, 1986–87. Two standard errors in parentheses.

Port or area	Number of chinook		Chinook per hour	
	1986	1987	1986	1987
St. Joseph-Benton Harbor	29,015 (9,526)	9,246 (5,169)	0.049 (0.019)	0.025 (0.015)
Grand Haven	68,698 (29,759)	38,389 (16,924)	0.098 (0.048)	0.051 (0.024)
Muskegon	28,417 (9,654)	27,774 (28,258)	0.089 (0.034)	0.082 (0.085)
Ludington	129,388 (76,019)	83,091 (35,281)	0.155 (0.103)	0.135 (0.068)
Manistee	69,662 (22,074)	42,239 (12,219)	0.102 (0.039)	0.083 (0.030)
Frankfort-Elberta	65,080 (36,322)	42,857 (28,799)	0.109 (0.070)	0.078 (0.059)
Charlevoix	10,027 (3,679)	9,338 (2,282)	0.100 (0.044)	0.103 (0.028)

Table 9. Estimated catch and catch rate (fish per angler hour) of lake trout at selected Lake Michigan ports and fishing areas, May through August, 1986–87. Two standard errors in parentheses.

Port or area	Number of lake trout		Lake trout per hour	
	1986	1987	1986	1987
St. Joseph-Benton Harbor	18,217 (11,018)	10,176 (8,272)	0.038 (0.025)	0.039 (0.034)
Saugatuck	8,847 (4,701)	8,983 (5,101)	0.026 (0.018)	0.040 (0.026)
Grand Haven	14,731 (7,598)	20,232 (10,826)	0.026 (0.015)	0.040 (0.024)
Ludington	15,163 (8,973)	10,899 (4,810)	0.021 (0.014)	0.027 (0.016)
Frankfort-Elberta	33,654 (40,334)	10,503 (4,810)	0.068 (0.085)	0.032 (0.022)
West Arm Grand Traverse Bay	8,365 (3,537)	8,722 (2,820)	0.073 (0.032)	0.078 (0.028)
Charlevoix-Petoskey	9,337 (3,645)	4,331 (1,554)	0.082 (0.036)	0.045 (0.017)

Table 10. Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for Lake Huron, by all modes of sportfishing, 1987. Two standard errors in parentheses.

Species	Total catch per hour	Month								Season total
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
Pink salmon	0.0074 (0.0017)	4 (9)	2,618 (981)	4,800 (1,674)	1,725 (714)	8,533 (4,272)	11,711 (4,852)	70 (112)	0 (0)	29,461 (6,788)
Coho salmon	0.0012 (0.0003)	1,127 (926)	509 (259)	601 (356)	1,017 (462)	840 (619)	685 (396)	118 (197)	0 (0)	4,897 (1,358)
Chinook salmon	0.0233 (0.0025)	2,114 (1,086)	5,968 (1,614)	2,885 (962)	22,317 (4,317)	29,180 (5,776)	25,182 (4,430)	4,992 (2,081)	0 (0)	92,638 (8,981)
Rainbow trout	0.0016 (0.0004)	762 (654)	396 (223)	373 (215)	2,018 (1,000)	1,317 (415)	212 (243)	1,062 (451)	135 (95)	6,275 (1,403)
Atlantic salmon	<0.0001 (<0.0001)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	9 (19)	0 (0)	0 (0)	9 (19)
Brown trout	0.0021 (0.0004)	1,970 (884)	199 (139)	814 (295)	2,305 (590)	867 (372)	1,054 (643)	1,076 (459)	68 (52)	8,353 (1,415)
Brook trout	<0.0001 (<0.0001)	0 (0)	0 (0)	0 (0)	12 (25)	15 (36)	17 (34)	0 (0)	0 (0)	44 (55)
Lake trout	0.0107 (0.0019)	0 (0)	5,917 (1,786)	17,541 (5,358)	15,565 (4,481)	3,407 (1,295)	0 (0)	0 (0)	0 (0)	42,430 (7,325)
Splake	<0.0001 (<0.0001)	0 (0)	4 (8)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	4 (8)
Rainbow smelt	0.0465 (0.0305)	185,144 (121,328)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	185,144 (121,328)
Northern pike	0.0058 (0.0014)	348 (609)	3,395 (1,842)	3,095 (1,518)	5,197 (3,046)	6,864 (3,068)	3,449 (1,660)	641 (607)	0 (0)	22,989 (5,280)
Tiger musky	<0.0001 (<0.0001)	0 (0)	0 (0)	0 (0)	0 (0)	6 (11)	2 (4)	0 (0)	0 (0)	8 (12)
White sucker	0.0017 (0.0018)	6,717 (7,225)	10 (21)	229 (469)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	6,956 (7,240)
Redhorse (spp)	0.0001 (0.0001)	67 (139)	321 (455)	0 (0)	0 (0)	0 (0)	185 (370)	0 (0)	0 (0)	573 (603)
Black bullhead	0.0013 (0.0006)	0 (0)	203 (426)	0 (0)	748 (665)	3,484 (2,163)	785 (450)	19 (21)	0 (0)	5,239 (2,346)
Yellow bullhead	0.0012 (0.0011)	594 (714)	1,992 (3,834)	1,802 (1,617)	133 (178)	0 (0)	124 (256)	0 (0)	0 (0)	4,645 (4,233)

Table 10. Continued:

Species	Total catch per hour	Month								Season total
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
Brown bullhead	0.0032 (0.0016)	5,852 (5,833)	1,816 (888)	2,840 (1,585)	455 (643)	527 (684)	1,056 (911)	318 (346)	0 (0)	12,864 (6,257)
Channel catfish	0.0106 (0.0029)	1,470 (2,143)	5,476 (2,639)	14,961 (6,960)	13,556 (7,793)	2,897 (1,354)	3,942 (3,512)	3 (6)	0 (0)	42,305 (11,615)
White perch	0.0004 (0.0003)	170 (352)	784 (1,204)	274 (342)	531 (828)	5 (11)	0 (0)	0 (0)	0 (0)	1,764 (1,541)
White bass	0.0034 (0.0016)	2,943 (3,696)	5,364 (3,938)	2,361 (1,742)	1,651 (2,420)	1,017 (1,263)	65 (132)	2 (4)	0 (0)	13,403 (6,299)
Rock bass	0.0084 (0.0020)	0 (0)	2,393 (2,377)	4,728 (3,886)	3,740 (2,784)	9,178 (4,228)	12,213 (4,044)	1,042 (560)	0 (0)	33,294 (7,940)
Green sunfish	0.0001 (0.0001)	0 (0)	402 (395)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	402 (395)
Pumpkinseed	0.0017 (0.0007)	190 (386)	65 (89)	912 (1,315)	296 (348)	2,099 (1,463)	3,090 (1,863)	15 (27)	0 (0)	6,667 (2,760)
Bluegill	0.0004 (0.0003)	0 (0)	0 (0)	404 (538)	448 (888)	53 (106)	392 (713)	172 (139)	0 (0)	1,469 (1,272)
Longear sunfish	0.0005 (0.0006)	0 (0)	57 (83)	0 (0)	1,942 (2,561)	0 (0)	0 (0)	0 (0)	0 (0)	1,999 (2,562)
Redear sunfish	0.0017 (0.0016)	1,006 (1,108)	887 (1,034)	3,053 (5,689)	1,276 (2,702)	527 (767)	20 (41)	50 (105)	0 (0)	6,819 (6,524)
Smallmouth bass	0.0013 (0.0004)	0 (0)	747 (461)	857 (813)	317 (313)	1,817 (1,155)	1,166 (658)	141 (185)	0 (0)	5,045 (1,665)
Largemouth bass	0.0009 (0.0006)	0 (0)	1,325 (1,574)	770 (835)	1,310 (1,271)	115 (186)	29 (33)	0 (0)	0 (0)	3,549 (2,197)
White crappie	0.0015 (0.0011)	1,147 (2,032)	381 (424)	165 (359)	374 (590)	47 (114)	296 (411)	3,465 (3,757)	0 (0)	5,875 (4,368)
Black crappie	<0.0001 (<0.0001)	0 (0)	70 (119)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	70 (119)
Yellow perch	0.7559 (0.0930)	1,086,729 (271,883)	153,716 (69,201)	354,218 (92,284)	281,148 (55,308)	256,407 (52,341)	723,490 (159,165)	150,903 (36,946)	0 (0)	3,006,611 (346,009)
Walleye	0.0345 (0.0068)	605 (600)	5,364 (2,468)	15,821 (5,975)	83,458 (24,672)	20,010 (4,320)	11,378 (5,557)	455 (325)	0 (0)	137,091 (26,467)

Table 10. Continued:

Species	Total catch per hour	Month								Season total
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
Freshwater drum	0.0015 (0.0009)	0 (0)	766 (690)	1,698 (1,253)	2,914 (3,541)	466 (526)	304 (397)	0 (0)	0 (0)	6,148 (3,875)
Lake whitefish	0.0011 (0.0021)	0 (0)	5 (10)	4,013 (8,211)	94 (199)	41 (91)	0 (0)	62 (124)	0 (0)	4,215 (8,215)
Round whitefish	0.0008 (0.0004)	0 (0)	0 (0)	0 (0)	1,592 (1,391)	0 (0)	45 (77)	1,490 (1,022)	0 (0)	3,127 (1,728)
Lake herring	0.0138 (0.0095)	0 (0)	116 (182)	22,622 (20,446)	29,150 (21,920)	126 (255)	0 (0)	90 (189)	0 (0)	52,104 (29,978)
Other	0.0039 (0.0002)	1,436 (1,409)	5,009 (9,609)	3,339 (1,973)	4,724 (4,718)	69 (92)	13 (25)	0 (0)	0 (0)	14,590 (10,975)
Total	0.9476 (0.1017)	1,300,395 (297,922)	206,275 (70,339)	465,176 (95,843)	480,013 (65,786)	349,914 (53,409)	800,914 (159,517)	166,186 (37,229)	203 (108)	3,769,076 (370,004)
Angler hours		603,028 (93,631)	471,201 (55,652)	613,280 (60,626)	905,350 (83,076)	592,146 (57,654)	674,639 (63,045)	117,261 (12,149)	647 (213)	3,977,552 (172,880)
Angler trips		172,530 (24,353)	119,309 (13,042)	157,185 (20,256)	221,645 (20,871)	143,855 (12,921)	162,597 (14,539)	40,205 (4,426)	309 (110)	1,017,635 (44,800)
Angler days		155,883 (21,992)	106,561 (11,280)	140,849 (19,432)	198,929 (18,494)	125,828 (11,145)	135,317 (12,847)	34,260 (3,756)	309 (110)	897,936 (40,421)

Table 11. Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for Saginaw Bay (Port Austin to Tawas), by all modes of sportfishing, 1987. Two standard errors in parentheses.

Species	Total catch per hour	Month							Season total
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Pink salmon	0.0009 (0.0005)	0 (0)	446 (368)	934 (745)	35 (53)	68 (111)	128 (175)	0 (0)	1,611 (858)
Coho salmon	0.0002 (0.0001)	34 (39)	83 (97)	0 (0)	0 (0)	37 (60)	208 (192)	13 (18)	375 (227)
Chinook salmon	0.0061 (0.0013)	195 (191)	1,488 (538)	431 (256)	2,606 (1,315)	2,198 (898)	3,162 (1,376)	1,459 (982)	11,539 (2,405)
Rainbow trout	0.0008 (0.0003)	216 (336)	50 (51)	98 (81)	435 (313)	224 (169)	60 (71)	402 (192)	1,485 (539)
Brown trout	0.0010 (0.0005)	670 (548)	16 (22)	0 (0)	192 (209)	329 (230)	317 (495)	378 (291)	1,902 (853)
Lake trout	0.0056 (0.0015)	0 (0)	2,253 (888)	3,048 (1,682)	3,844 (1,937)	1,372 (737)	0 (0)	0 (0)	10,517 (2,813)
Splake	<0.0001 (<0.0001)	0 (0)	4 (8)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	4 (8)
Rainbow smelt	0.0737 (0.0598)	138,773 (112,255)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	138,773 (112,255)
Northern pike	0.0008 (0.0007)	0 (0)	937 (1,303)	26 (55)	142 (124)	170 (132)	145 (116)	0 (0)	1,420 (1,322)
White sucker	0.0036 (0.0039)	6,713 (7,225)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	6,713 (7,225)
Black bullhead	0.0001 (0.0002)	0 (0)	203 (426)	0 (0)	32 (71)	0 (0)	0 (0)	2 (4)	237 (432)
Yellow bullhead	0.0014 (0.0021)	594 (714)	1,928 (3,832)	0 (0)	0 (0)	0 (0)	124 (256)	0 (0)	2,646 (3,906)
Brown bullhead	0.0038 (0.0014)	1,751 (1,721)	1,798 (887)	2,201 (1,445)	439 (642)	175 (333)	782 (816)	65 (96)	7,211 (2,652)
Channel catfish	0.0203 (0.0060)	1,470 (2,143)	5,368 (2,631)	14,083 (6,931)	11,371 (6,970)	2,226 (1,153)	3,673 (3,502)	0 (0)	38,191 (11,033)
White perch	0.0007 (0.0007)	170 (352)	784 (1,204)	0 (0)	451 (819)	0 (0)	0 (0)	0 (0)	1,405 (1,498)

Table 11. Continued:

Species	Total catch per hour	Month							Season total
		Apr	May	Jun	Jul	Aug	Sep	Oct	
White bass	0.0071 (0.0034)	2,940 (3,696)	5,357 (3,937)	2,361 (1,742)	1,588 (2,417)	1,012 (1,263)	65 (132)	2 (4)	13,325 (6,297)
Rock bass	0.0005 (0.0003)	0 (0)	486 (405)	13 (25)	13 (28)	328 (432)	20 (40)	0 (0)	860 (595)
Green sunfish	0.0002 (0.0002)	0 (0)	402 (395)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	402 (395)
Pumpkinseed	0.0023 (0.0013)	0 (0)	65 (89)	912 (1,315)	296 (348)	997 (1,101)	1,972 (1,673)	15 (27)	4,257 (2,423)
Bluegill	0.0004 (0.0005)	0 (0)	0 (0)	340 (522)	435 (888)	0 (0)	0 (0)	54 (108)	829 (1,036)
Longear sunfish	<0.0001 (<0.0001)	0 (0)	57 (83)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	57 (83)
Redear sunfish	0.0010 (0.0008)	1,006 (1,108)	807 (1,020)	6 (13)	0 (0)	0 (0)	0 (0)	0 (0)	1,819 (1,506)
Smallmouth bass	0.0001 (0.0001)	0 (0)	18 (37)	0 (0)	63 (75)	32 (65)	11 (22)	0 (0)	124 (108)
Largemouth bass	0.0018 (0.0012)	0 (0)	1,256 (1,567)	765 (835)	1,310 (1,271)	105 (185)	11 (22)	0 (0)	3,447 (2,192)
White crappie	0.0031 (0.0023)	1,122 (2,031)	381 (424)	165 (359)	374 (590)	47 (114)	291 (411)	3,465 (3,757)	5,845 (4,368)
Black crappie	<0.0001 (<0.0001)	0 (0)	70 (119)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	70 (119)
Yellow perch	1.3045 (0.1927)	1,021,108 (268,266)	54,682 (19,972)	295,597 (89,286)	203,496 (47,439)	197,986 (48,561)	556,152 (149,253)	126,218 (34,605)	2,455,239 (329,272)
Walleye	0.0338 (0.0067)	495 (577)	3,374 (1,903)	8,761 (5,248)	39,999 (10,112)	9,576 (3,288)	1,256 (918)	230 (236)	63,691 (12,061)
Freshwater drum	0.0019 (0.0009)	0 (0)	713 (684)	1,593 (1,246)	913 (724)	323 (477)	96 (137)	0 (0)	3,638 (1,671)
Other	0.0034 (0.0052)	1,035 (1,059)	5,009 (9,610)	253 (315)	0 (0)	30 (46)	0 (0)	0 (0)	6,327 (9,673)

Table 11. Continued:

Species	Total catch per hour	Month							Season total
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Total	1.4791 (0.2066)	1,178,292 (290,945)	88,035 (23,277)	331,587 (89,781)	268,034 (49,166)	217,235 (48,736)	568,473 (149,317)	132,303 (34,825)	2,783,959 (348,643)
Angler hours		388,908 (67,274)	244,709 (35,727)	312,383 (46,029)	431,593 (56,230)	217,161 (30,059)	230,770 (39,087)	56,645 (7,770)	1,882,169 (116,509)
Angler trips		124,863 (20,853)	65,371 (8,602)	85,098 (17,972)	101,144 (12,790)	55,964 (7,082)	53,003 (8,201)	22,085 (3,099)	507,528 (33,503)
Angler days		110,397 (18,325)	61,402 (8,438)	79,749 (17,642)	96,532 (12,585)	51,916 (6,695)	47,095 (7,367)	19,657 (2,884)	466,748 (31,369)

Table 12. Estimated angler effort in hours, trips, and days at selected Lake Huron ports, 1987. Two standard errors in parentheses.

Port or area	Angler		
	Hours	Trips	Days
Lexington to Port Sanilac	313,076 (52,403)	74,837 (11,288)	69,233 (10,624)
Eagle Bay to Harbor Beach	374,267 (55,473)	83,773 (11,436)	75,017 (10,600)
Sand Point to Port Austin	367,158 (52,214)	87,405 (12,577)	80,610 (11,743)
Saganing Creek to Au Gres	418,651 (58,005)	110,501 (14,698)	109,364 (14,518)
Tawas	280,523 (36,564)	73,185 (9,175)	64,638 (8,558)
Oscoda	231,882 (51,100)	64,284 (11,559)	52,956 (10,577)
Drummond Island	334,009 (51,260)	97,379 (15,809)	59,051 (9,689)

Table 13. Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the Lake Huron boat fishery, 1987. Two standard errors in parentheses.

Species	Total catch per hour	Month							Season total
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Pink salmon	0.0083 (0.0020)	4 (9)	2,618 (981)	4,618 (1,632)	1,725 (714)	8,533 (4,272)	9,549 (4,123)	29 (62)	27,076 (6,276)
Coho salmon	0.0013 (0.0003)	606 (392)	392 (199)	601 (356)	1,017 (462)	840 (619)	637 (383)	0 (0)	4,093 (1,031)
Chinook salmon	0.0252 (0.0029)	2,113 (1,086)	5,968 (1,614)	2,625 (810)	22,317 (4,317)	27,614 (5,531)	20,133 (3,916)	1,626 (1,385)	82,396 (8,422)
Rainbow trout	0.0013 (0.0004)	173 (126)	352 (211)	267 (153)	1,982 (997)	1,317 (415)	74 (73)	196 (289)	4,361 (1,157)
Atlantic salmon	<0.0001 (<0.0001)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	9 (19)	0 (0)	9 (19)
Brown trout	0.0019 (0.0003)	849 (335)	198 (139)	814 (295)	2,305 (590)	848 (370)	925 (632)	267 (173)	6,206 (1,064)
Brook trout	<0.0001 (<0.0001)	0 (0)	0 (0)	0 (0)	12 (25)	15 (36)	17 (34)	0 (0)	44 (55)
Lake trout	0.0129 (0.0023)	0 (0)	5,917 (1,786)	17,269 (5,329)	15,565 (4,481)	3,407 (1,295)	0 (0)	0 (0)	42,158 (7,304)
Splake	<0.0001 (<0.0001)	0 (0)	4 (8)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	4 (8)
Northern pike	0.0066 (0.0016)	0 (0)	2,452 (1,300)	3,069 (1,517)	5,111 (3,044)	6,840 (3,068)	3,396 (1,658)	641 (607)	21,509 (5,078)
Tiger musky	<0.0001 (<0.0001)	0 (0)	0 (0)	0 (0)	0 (0)	6 (11)	2 (4)	0 (0)	8 (12)
White sucker	0.0001 (0.0002)	0 (0)	10 (21)	229 (469)	0 (0)	0 (0)	0 (0)	0 (0)	239 (469)
Black bullhead	0.0016 (0.0007)	0 (0)	203 (426)	0 (0)	716 (661)	3,484 (2,163)	785 (450)	19 (21)	5,207 (2,345)
Yellow bullhead	0.0013 (0.0013)	149 (323)	1,891 (3,833)	1,802 (1,617)	133 (178)	0 (0)	124 (256)	0 (0)	4,099 (4,184)
Brown bullhead	0.0021 (0.0018)	4,063 (5,573)	387 (505)	1,253 (1,285)	56 (90)	352 (597)	540 (650)	253 (332)	6,904 (5,819)
Channel catfish	0.0101 (0.0034)	1,313 (2,116)	2,571 (2,026)	13,110 (6,904)	11,000 (6,976)	1,409 (987)	3,742 (3,506)	3 (6)	33,148 (10,871)

Table 13. Continued:

Species	Total catch per hour	Month							Season total
		Apr	May	Jun	Jul	Aug	Sep	Oct	
White perch	0.0004 (0.0004)	0 (0)	784 (1,204)	118 (243)	484 (822)	0 (0)	0 (0)	0 (0)	1,386 (1,478)
White bass	0.0039 (0.0019)	2,875 (3,694)	5,309 (3,937)	1,769 (1,600)	1,608 (2,419)	1,012 (1,263)	65 (132)	2 (4)	12,640 (6,259)
Rock bass	0.0096 (0.0024)	0 (0)	964 (1,062)	4,715 (3,886)	3,684 (2,781)	8,850 (4,205)	12,213 (4,044)	1,042 (560)	31,468 (7,636)
Pumpkinseed	0.0012 (0.0006)	190 (386)	4 (8)	564 (1,164)	187 (309)	1,591 (1,188)	1,288 (859)	2 (4)	3,826 (1,936)
Bluegill	0.0003 (0.0003)	0 (0)	0 (0)	290 (484)	13 (26)	53 (106)	392 (713)	118 (88)	866 (873)
Longear sunfish	0.0006 (0.0008)	0 (0)	0 (0)	0 (0)	1,942 (2,561)	0 (0)	0 (0)	0 (0)	1,942 (2,561)
Redear sunfish	0.0016 (0.0019)	0 (0)	351 (592)	3,047 (5,689)	1,276 (2,702)	527 (767)	20 (41)	50 (105)	5,271 (6,373)
Smallmouth bass	0.0013 (0.0005)	0 (0)	21 (44)	796 (803)	317 (313)	1,785 (1,154)	1,166 (658)	141 (185)	4,226 (1,595)
Largemouth bass	0.0010 (0.0007)	0 (0)	1,216 (1,559)	597 (758)	1,310 (1,271)	115 (186)	29 (33)	0 (0)	3,267 (2,158)
White crappie	0.0010 (0.0013)	1,111 (2,031)	155 (320)	0 (0)	268 (551)	0 (0)	5 (11)	1,645 (3,530)	3,184 (4,122)
Black crappie	<0.0001 (<0.0001)	0 (0)	55 (115)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	55 (115)
Yellow perch	0.7072 (0.1043)	547,884 (239,588)	127,882 (68,890)	326,310 (91,549)	270,268 (54,944)	244,057 (51,909)	699,520 (158,967)	98,211 (35,130)	2,314,132 (320,542)
Walleye	0.0413 (0.0084)	376 (471)	5,091 (2,428)	15,284 (5,958)	83,375 (24,671)	19,932 (4,319)	10,685 (5,433)	273 (283)	135,016 (26,430)
Freshwater drum	0.0009 (0.0005)	0 (0)	588 (661)	1,094 (1,190)	882 (727)	330 (481)	119 (145)	0 (0)	3,013 (1,623)
Lake whitefish	0.0013 (0.0026)	0 (0)	5 (10)	4,013 (8,211)	94 (199)	41 (91)	0 (0)	0 (0)	4,153 (8,214)
Round whitefish	0.0005 (0.0004)	0 (0)	0 (0)	0 (0)	1,592 (1,391)	0 (0)	7 (15)	28 (65)	1,627 (1,393)

Table 13. Continued:

Species	Total catch per hour	Month							Season total
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Lake herring	0.0159 (0.0095)	0 (0)	116 (182)	22,622 (20,446)	29,150 (21,920)	126 (255)	0 (0)	90 (189)	52,104 (29,978)
Other	0.0041 (0.0005)	434 (932)	4,829 (9,605)	3,327 (1,973)	4,724 (4,718)	69 (92)	13 (25)	0 (0)	13,396 (10,922)
Total	0.8645 (0.1083)	562,140 (239,705)	170,333 (69,952)	430,203 (95,115)	463,113 (65,285)	333,153 (52,941)	765,455 (159,269)	104,636 (35,349)	2,829,033 (324,160)
Angler hours		336,778 (83,020)	398,628 (55,207)	531,827 (59,257)	858,814 (82,750)	540,494 (57,209)	543,752 (61,667)	62,160 (10,860)	3,272,453 (165,809)
Angler trips		69,329 (16,914)	85,428 (12,401)	117,872 (13,186)	197,873 (20,512)	123,318 (12,464)	112,984 (12,858)	18,838 (3,630)	725,642 (36,991)
Angler days		65,566 (16,047)	77,082 (10,600)	105,061 (12,028)	178,913 (18,111)	108,259 (10,741)	95,506 (11,128)	15,659 (2,974)	646,046 (33,024)

Table 14. Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the Lake Huron shore fishery, 1987. Two standard errors in parentheses.

Species	Total catch per hour	Month								Season total
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
Pink salmon	0.0006 (0.0010)	0 (0)	0 (0)	182 (371)	0 (0)	0 (0)	65 (135)	0 (0)	0 (0)	247 (395)
Coho salmon	0.0004 (0.0004)	2 (5)	117 (166)	0 (0)	0 (0)	0 (0)	48 (101)	13 (18)	0 (0)	180 (195)
Chinook salmon	0.0148 (0.0059)	1 (2)	0 (0)	8 (16)	0 (0)	0 (0)	3,261 (1,737)	2,687 (1,523)	0 (0)	5,957 (2,310)
Rainbow trout	0.0022 (0.0011)	229 (339)	0 (0)	95 (150)	0 (0)	0 (0)	16 (34)	421 (255)	135 (95)	896 (461)
Brown trout	0.0026 (0.0015)	499 (512)	0 (0)	0 (0)	0 (0)	0 (0)	69 (83)	409 (306)	68 (52)	1,045 (604)
Lake trout	0.0007 (0.0014)	0 (0)	0 (0)	272 (557)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	272 (557)
Rainbow smelt	0.4409 (0.3030)	177,361 (120,925)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	177,361 (120,925)
Northern pike	0.0031 (0.0036)	348 (609)	883 (1,301)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1,231 (1,436)
White sucker	0.0167 (0.0180)	6,717 (7,225)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	6,717 (7,225)
Redhorse (spp)	0.0014 (0.0015)	67 (139)	321 (455)	0 (0)	0 (0)	0 (0)	185 (370)	0 (0)	0 (0)	573 (603)
Black bullhead	0.0001 (0.0002)	0 (0)	0 (0)	0 (0)	32 (71)	0 (0)	0 (0)	0 (0)	0 (0)	32 (71)
Yellow bullhead	0.0014 (0.0017)	445 (637)	101 (107)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	546 (646)
Brown bullhead	0.0135 (0.0056)	1,789 (1,723)	1,411 (729)	1,059 (698)	399 (636)	175 (333)	516 (638)	65 (96)	0 (0)	5,414 (2,218)
Channel catfish	0.0193 (0.0101)	157 (338)	2,898 (1,691)	1,424 (760)	2,408 (3,468)	857 (569)	7 (14)	0 (0)	0 (0)	7,751 (3,988)
White bass	0.0019 (0.0018)	68 (116)	48 (81)	592 (688)	43 (89)	0 (0)	0 (0)	0 (0)	0 (0)	751 (708)

Table 14. Continued:

Species	Total catch per hour	Month								Season total
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
Rock bass	0.0014 (0.0010)	0 (0)	449 (402)	13 (25)	0 (0)	91 (48)	0 (0)	0 (0)	0 (0)	553 (406)
Green sunfish	0.0010 (0.0010)	0 (0)	402 (395)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	402 (395)
Pumpkinseed	0.0071 (0.0050)	0 (0)	61 (89)	348 (612)	109 (161)	508 (853)	1,802 (1,653)	13 (27)	0 (0)	2,841 (1,957)
Bluegill	0.0015 (0.0023)	0 (0)	0 (0)	114 (235)	435 (888)	0 (0)	0 (0)	54 (108)	0 (0)	603 (925)
Longear sunfish	0.0001 (0.0001)	0 (0)	57 (83)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	57 (83)
Redear sunfish	0.0038 (0.0034)	1,006 (1,108)	536 (847)	6 (13)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1,548 (1,395)
Smallmouth bass	0.0018 (0.0011)	0 (0)	673 (446)	61 (124)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	734 (463)
Largemouth bass	0.0007 (0.0010)	0 (0)	109 (221)	173 (350)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	282 (414)
White crappie	0.0067 (0.0036)	36 (77)	226 (278)	165 (359)	106 (211)	47 (114)	291 (411)	1,820 (1,285)	0 (0)	2,691 (1,446)
Black crappie	<0.0001 (<0.0001)	0 (0)	15 (31)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	15 (31)
Yellow perch	1.2235 (0.2938)	403,724 (109,155)	5,163 (3,295)	10,452 (7,674)	3,885 (4,298)	4,219 (5,250)	19,601 (7,244)	45,123 (11,140)	0 (0)	492,167 (110,486)
Walleye	0.0042 (0.0034)	70 (133)	270 (440)	537 (452)	83 (169)	0 (0)	627 (1,157)	92 (102)	0 (0)	1,679 (1,339)
Freshwater drum	0.0067 (0.0087)	0 (0)	178 (200)	485 (365)	1,809 (3,431)	30 (16)	185 (370)	0 (0)	0 (0)	2,687 (3,476)
Other	0.0030 (0.0028)	1,002 (1,057)	180 (292)	12 (18)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1,194 (1,097)

Table 14. Continued:

Species	Total catch per hour	Month								Season total
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
Total	1.7810 (0.4354)	593,521 (163,084)	14,098 (4,229)	15,998 (7,870)	9,309 (6,601)	5,927 (5,361)	26,673 (7,775)	50,697 (11,325)	203 (108)	716,426 (164,126)
Angler hours		169,376 (31,438)	43,312 (4,962)	50,073 (9,430)	18,892 (2,873)	18,472 (4,241)	70,443 (6,409)	31,040 (2,996)	647 (213)	402,255 (34,325)
Angler trips		71,320 (14,764)	22,298 (3,331)	26,030 (14,814)	10,320 (1,841)	10,759 (2,702)	26,650 (4,582)	13,319 (2,081)	309 (110)	181,005 (22,013)
Angler days		60,339 (11,980)	18,631 (3,190)	24,095 (14,764)	8,790 (1,835)	8,483 (2,238)	20,032 (4,508)	11,706 (1,901)	309 (110)	152,385 (20,100)

Table 15. Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the Lake Huron pier fishery, 1987. Two standard errors in parentheses.

Species	Total catch per hour	Month							Season total
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Pink salmon	0.0071 (0.0085)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2,097 (2,554)	41 (93)	2,138 (2,556)
Coho salmon	0.0021 (0.0029)	519 (839)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	105 (196)	624 (862)
Chinook salmon	0.0141 (0.0071)	0 (0)	0 (0)	252 (520)	0 (0)	1,566 (1,664)	1,788 (1,128)	679 (305)	4,285 (2,099)
Rainbow trout	0.0034 (0.0022)	360 (545)	44 (73)	11 (23)	36 (73)	0 (0)	122 (230)	445 (234)	1,018 (645)
Brown trout	0.0036 (0.0024)	622 (639)	1 (2)	0 (0)	0 (0)	19 (38)	60 (85)	400 (295)	1,102 (710)
Rainbow smelt	0.0257 (0.0327)	7,783 (9,877)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	7,783 (9,877)
Northern pike	0.0008 (0.0006)	0 (0)	60 (104)	26 (55)	86 (103)	24 (53)	53 (85)	0 (0)	249 (186)
Brown bullhead	0.0018 (0.0020)	0 (0)	18 (36)	528 (610)	0 (0)	0 (0)	0 (0)	0 (0)	546 (611)
Channel catfish	0.0046 (0.0030)	0 (0)	7 (14)	427 (456)	148 (195)	631 (731)	193 (205)	0 (0)	1,406 (907)
White perch	0.0012 (0.0014)	170 (352)	0 (0)	156 (240)	47 (104)	5 (11)	0 (0)	0 (0)	378 (439)
White bass	<0.0001 (<0.0001)	0 (0)	7 (15)	0 (0)	0 (0)	5 (11)	0 (0)	0 (0)	12 (19)
Rock bass	0.0042 (0.0071)	0 (0)	980 (2,088)	0 (0)	56 (126)	237 (430)	0 (0)	0 (0)	1,273 (2,136)
Smallmouth bass	0.0003 (0.0004)	0 (0)	53 (108)	0 (0)	0 (0)	32 (65)	0 (0)	0 (0)	85 (126)
Yellow perch	0.6614 (0.2404)	135,121 (67,846)	20,671 (5,664)	17,456 (8,730)	6,995 (4,657)	8,131 (4,173)	4,369 (3,208)	7,569 (2,608)	200,312 (69,048)
Walleye	0.0013 (0.0013)	159 (346)	3 (5)	0 (0)	0 (0)	78 (89)	66 (144)	90 (125)	396 (405)
Freshwater drum	0.0015 (0.0018)	0 (0)	0 (0)	119 (146)	223 (482)	106 (214)	0 (0)	0 (0)	448 (547)

Table 15. Continued:

Species	Total catch per hour	Month							Season total
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Lake whitefish	0.0002 (0.0004)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	62 (124)	62 (124)
Round whitefish	0.0050 (0.0035)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	38 (76)	1,462 (1,020)	1,500 (1,023)
Total	0.7384 (0.2460)	144,734 (68,573)	21,844 (6,039)	18,975 (8,783)	7,591 (4,690)	10,834 (4,579)	8,786 (4,269)	10,853 (2,856)	223,617 (69,894)
Angler hours		96,874 (29,768)	29,261 (4,969)	31,380 (8,672)	27,644 (6,767)	33,180 (5,756)	60,444 (11,435)	24,061 (4,549)	302,844 (34,877)
Angler trips		31,881 (9,433)	11,583 (2,285)	13,283 (4,118)	13,452 (3,390)	9,778 (2,073)	22,963 (5,007)	8,048 (1,445)	110,988 (12,414)
Angler days		29,978 (9,090)	10,848 (2,170)	11,693 (3,864)	11,226 (3,261)	9,086 (1,959)	19,779 (4,570)	6,895 (1,283)	99,505 (11,801)

Table 16. Estimated catch and catch rate (fish per angler hour) of yellow perch at selected Lake Huron fishing areas, 1986–87. Two standard errors in parentheses.

Port or area	Number of yellow perch		Yellow perch per hour	
	1986	1987	1986	1987
Drummond Island	226,506 (79,034)	220,139 (85,062)	0.574 (0.224)	0.659 (0.274)
Les Cheneaux Islands[1]	556,986 (83,359)	138,769 (45,558)	1.231 (0.228)	0.760 (0.311)
Au Gres to Saganing Creek	385,765 (83,284)	696,664 (130,777)	1.090 (0.289)	1.664 (0.388)
Saganing Creek to Bay City	282,407 (80,113)	432,449 (106,249)	1.274 (0.454)	1.805 (0.513)
Saginaw River to Essexville	374,036 (203,342)	466,632 (248,632)	1.453 (0.839)	2.445 (1.457)
Sebewaing to Essexville	185,985 (89,205)	122,629 (37,754)	1.529 (0.774)	0.717 (0.264)
Sand Point to Sebewaing	151,464 (72,382)	233,396 (91,452)	0.773 (0.389)	1.089 (0.461)
Port Austin to Sand Point	337,804 (110,150)	272,988 (82,341)	0.757 (0.289)	0.744 (0.248)

[1]April through August 1986 from Diana et al. (1987).

Table 17. Estimated catch and catch rate (fish per angler hour) of chinook at selected Lake Huron ports and fishing areas, 1986–87. Two standard errors in parentheses.

Port or area	Number of chinook		Chinook per hour	
	1986	1987	1986	1987
Lexington to Port Sanilac	16,745 (6,027)	6,951 (1,616)	0.080 (0.020)	0.022 (0.064)
Eagle Bay to Harbor Beach	17,286 (5,742)	15,257 (3,674)	0.043 (0.017)	0.041 (0.012)
Port Austin to Sand Point	6,709 (4,115)	6,720 (2,151)	0.015 (0.010)	0.018 (0.006)
Oscoda	6,136 (2,629)	9,203 (4,089)	0.028 (0.014)	0.040 (0.020)
Harrisville	6,077 (2,291)	14,458 (3,564)	0.045 (0.021)	0.075 (0.026)
Rockport	7,580 (2,607)	7,662 (1,886)	0.136 (0.052)	0.158 (0.045)
Rogers City	7,272 (1,485)	11,739 (3,934)	0.117 (0.027)	0.142 (0.063)

Table 18. Estimated catch and catch rate (fish per angler hour) of lake trout at selected Lake Huron ports and fishing areas, May through August, 1986–87. Two standard errors in parentheses.

Port or area	Number of lake trout		Lake trout per hour	
	1986	1987	1986	1987
Eagle Bay to Harbor Beach	13,127 (6,829)	16,613 (5,030)	0.046 (0.026)	0.062 (0.021)
Port Austin to Sand Point	14,139 (5,946)	8,968 (2,748)	0.041 (0.020)	0.040 (0.013)
Oscoda	8,744 (4,837)	5,834 (2,547)	0.053 (0.034)	0.037 (0.020)
Harrisville	9,544 (4,740)	7,291 (3,670)	0.126 (0.078)	0.086 (0.051)

Table 19. Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the Lake Erie boat fishery, 1987. Two standard errors in parentheses.

Species	Total catch per hour	Month							Season total
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Rainbow trout	0.0000	0	40	50	0	0	0	0	90
	(0)	(0)	(82)	(103)	(0)	(0)	(0)	(0)	(132)
Black bullhead	0.0001	0	144	0	0	0	0	0	144
	(0.0002)	(0)	(243)	(0)	(0)	(0)	(0)	(0)	(243)
Yellow bullhead	0.0004	1,021	0	0	0	0	0	0	1,021
	(0.0005)	(1,367)	(0)	(0)	(0)	(0)	(0)	(0)	(1,367)
Brown bullhead	0.0037	44	148	78	2,071	0	6,785	0	9,126
	(0.0061)	(97)	(321)	(160)	(3,268)	(0)	(14,617)	(0)	(14,982)
Channel catfish	0.0272	1,129	5,950	5,130	5,149	1,075	40,668	7,665	66,766
	(0.0259)	(1,270)	(5,648)	(5,826)	(4,022)	(2,203)	(60,999)	(12,649)	(63,003)
White perch	0.0250	0	223	330	2,293	18,518	32,364	7,678	61,406
	(0.0214)	(0)	(463)	(482)	(3,215)	(20,461)	(44,749)	(16,739)	(52,078)
White bass	0.0691	3,129	19,196	19,613	19,120	34,017	58,239	16,442	169,756
	(0.0366)	(3,028)	(14,520)	(20,361)	(15,845)	(42,638)	(60,874)	(34,879)	(87,326)
Rock bass	0.0001	38	0	51	79	0	0	0	168
	(0.0001)	(83)	(0)	(103)	(169)	(0)	(0)	(0)	(215)
Bluegill	0.0020	95	75	0	0	4,106	0	548	4,824
	(0.0036)	(208)	(155)	(0)	(0)	(8,690)	(0)	(1,157)	(8,771)
Largemouth bass	0.0001	0	0	207	0	0	0	0	207
	(0.0002)	(0)	(0)	(419)	(0)	(0)	(0)	(0)	(419)
White crappie	0.0000	7	0	0	0	0	0	0	7
	(0)	(16)	(0)	(0)	(0)	(0)	(0)	(0)	(16)
Black crappie	0.0012	4	0	621	2,057	0	0	329	3,011
	(0.0018)	(8)	(0)	(1,257)	(4,385)	(0)	(0)	(694)	(4,614)
Yellow perch	0.2521	0	13,216	7,938	8,433	9,695	271,060	308,770	619,112
	(0.1602)	(0)	(13,487)	(5,702)	(8,233)	(12,599)	(144,995)	(356,834)	(385,740)
Walleye	0.3674	1,176	122,795	373,220	370,525	15,145	19,517	0	902,378
	(0.0769)	(1,173)	(45,747)	(92,149)	(105,778)	(10,331)	(30,447)	(0)	(151,024)
Freshwater drum	0.0103	1,942	6,891	1,891	5,767	2,962	5,883	0	25,336
	(0.0069)	(2,242)	(6,330)	(2,893)	(6,677)	(5,396)	(12,290)	(0)	(16,680)
Other	0.0003	153	506	0	0	0	0	0	659
	(0.0003)	(336)	(610)	(0)	(0)	(0)	(0)	(0)	(696)

Table 19. Continued:

Species	Total catch per hour	Month							Season total
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Total	0.7590 (0.2001)	8,738 (4,385)	169,184 (50,579)	409,129 (94,778)	415,494 (107,744)	85,518 (51,104)	434,516 (178,169)	341,432 (359,150)	1,864,011 (431,872)
Angler hours		13,318 (7,540)	318,290 (97,863)	858,504 (190,596)	798,609 (199,817)	203,854 (63,481)	178,358 (60,059)	84,970 (42,153)	2,455,903 (308,709)
Angler trips		2,886 (1,658)	58,214 (17,807)	143,918 (32,081)	142,177 (37,302)	46,967 (17,325)	35,406 (12,421)	21,708 (11,320)	451,276 (57,646)
Angler trips		2,886 (1,658)	57,630 (17,652)	142,560 (31,769)	141,543 (37,155)	46,967 (17,325)	35,406 (12,421)	21,708 (11,320)	448,700 (57,330)

Table 20. Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for all western and central Lake Superior sample areas, by all modes of sportfishing, 1987. Two standard errors in parentheses.

Species	Total catch per hour	Month								Season total
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
Pink salmon	<0.0001 (<0.0001)	0 (0)	0 (0)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)	1 (2)
Coho salmon	0.0333 (0.0076)	1,213 (483)	369 (157)	493 (235)	421 (301)	240 (258)	306 (159)	203 (114)	1 (2)	3,246 (713)
Chinook salmon	0.0107 (0.0062)	17 (29)	162 (108)	84 (59)	65 (92)	65 (102)	649 (567)	0 (0)	0 (0)	1,042 (597)
Rainbow trout	0.0044 (0.0022)	165 (96)	50 (31)	18 (20)	113 (174)	7 (10)	36 (64)	35 (40)	9 (15)	433 (217)
Atlantic salmon	0.0001 (0.0001)	0 (0)	0 (0)	4 (8)	0 (0)	0 (0)	4 (7)	0 (0)	0 (0)	8 (11)
Brown trout	0.0007 (0.0005)	11 (14)	56 (49)	6 (11)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	73 (52)
Brook trout	0.0001 (0.0002)	0 (0)	0 (0)	8 (17)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	8 (17)
Lake trout	0.1619 (0.0240)	114 (108)	1,144 (464)	5,241 (1,142)	3,538 (1,086)	3,229 (1,032)	1,933 (734)	599 (341)	0 (0)	15,798 (2,105)
Splake	0.0008 (0.0006)	3 (5)	34 (44)	10 (19)	0 (0)	7 (14)	0 (0)	10 (14)	11 (22)	75 (57)
Northern pike	0.0006 (0.0005)	0 (0)	0 (0)	5 (7)	9 (19)	23 (36)	13 (22)	6 (11)	0 (0)	56 (48)
Rock bass	0.0006 (0.0005)	0 (0)	0 (0)	16 (32)	0 (0)	41 (30)	0 (0)	0 (0)	0 (0)	57 (44)
Smallmouth bass	0.0001 (0.0002)	0 (0)	0 (0)	0 (0)	0 (0)	13 (28)	0 (0)	0 (0)	0 (0)	13 (28)
Yellow perch	0.0187 (0.0145)	780 (1,155)	428 (536)	394 (580)	133 (148)	39 (60)	55 (111)	0 (0)	0 (0)	1,829 (1,413)
Walleye	0.0045 (0.0040)	0 (0)	116 (99)	308 (380)	0 (0)	16 (25)	0 (0)	0 (0)	0 (0)	440 (393)
Lake whitefish	0.0044 (0.0034)	239 (291)	48 (76)	140 (130)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	427 (328)
Round whitefish	0.0008 (0.0011)	17 (34)	8 (12)	50 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	75 (106)

Table 20. Continued:

Species	Total catch per hour	Month								Season total
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
Other	0.0001 (0.0002)	0 (0)	4 (9)	3 (7)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	7 (11)
Total	0.2418 (0.0323)	2,559 (1,294)	2,419 (748)	6,780 (1,369)	4,279 (1,154)	3,681 (1,072)	2,996 (950)	853 (362)	21 (27)	23,588 (2,761)
Angler hours		6,313 (1,146)	8,084 (1,218)	25,808 (3,465)	17,553 (3,315)	15,088 (2,615)	21,236 (2,570)	3,278 (570)	203 (66)	97,563 (6,290)
Angler trips		1,890 (357)	1,860 (302)	5,083 (671)	3,789 (740)	3,159 (508)	5,638 (720)	1,262 (225)	135 (49)	22,816 (1,430)
Angler days		1,848 (353)	1,786 (290)	4,969 (661)	3,709 (734)	3,362 (578)	5,241 (708)	1,249 (225)	135 (49)	22,299 (1,440)

Table 21. Estimated sportfishing catch and effort (angler hours) for salmonids taken at various Lake Michigan tributaries, 1987. Two standard errors in parentheses.

River	Species				Angler hours
	Chinook salmon	Coho salmon	Rainbow trout	Brown trout	
St. Joseph	15,230 (3,113)	4 (9)	10,618 (3,323)	754 (467)	331,177 (18,774)
Kalamazoo	1,952 (1,059)	0 (0)	4,240 (7,340)	18 (36)	58,667 (4,277)
Grand	2,100 (1,172)	1,019 (1,071)	5,335 (1,816)	171 (342)	81,038 (6,723)
Muskegon	2,867 (2,510)	0 (0)	480 (492)	0 (0)	72,510 (6,813)
Manistee	20,976 (7,944)	145 (304)	8,013 (2,788)	392 (501)	261,917 (17,815)
Betsie	1,585 (1,191)	218 (213)	2,118 (1,306)	1,168 (1,625)	39,853 (3,244)
Platte	350 (168)	3,640 (1,059)	2,545 (1,812)	7 (15)	33,193 (3,239)
Bear	1,076 (612)	0 (0)	1,266 (891)	58 (118)	19,544 (2,624)
Total	46,136 (9,133)	5,026 (1,551)	34,615 (9,056)	2,568 (1,801)	897,899 (28,419)

Table 22. Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the St. Marys River from the rapids in Sault Ste. Marie to Detour, by all modes of sportfishing, 1987. Two standard errors in parentheses.

Species	Total catch per hour	Month							Season total
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Pink salmon	0.0076 (0.0057)	0 (0)	0 (0)	12 (24)	0 (0)	1,553 (3,062)	4,134 (2,915)	0 (0)	5,699 (4,228)
Coho salmon	0.0002 (0.0002)	0 (0)	36 (55)	11 (15)	0 (0)	89 (133)	0 (0)	0 (0)	136 (145)
Chinook salmon	0.0062 (0.0026)	0 (0)	0 (0)	0 (0)	499 (604)	1,953 (1,302)	2,052 (1,162)	158 (168)	4,662 (1,854)
Rainbow trout	0.0026 (0.0015)	0 (0)	891 (966)	297 (206)	637 (413)	141 (223)	0 (0)	24 (51)	1,990 (1,095)
Atlantic salmon	<0.0001 (<0.0001)	0 (0)	0 (0)	6 (12)	0 (0)	0 (0)	0 (0)	0 (0)	6 (12)
Brown trout	0.0007 (0.0007)	0 (0)	23 (48)	85 (79)	200 (297)	230 (477)	0 (0)	0 (0)	538 (569)
Lake trout	0.0003 (0.0006)	0 (0)	0 (0)	0 (0)	203 (411)	0 (0)	0 (0)	0 (0)	203 (411)
Rainbow smelt	0.0001 (0.0002)	0 (0)	0 (0)	66 (111)	0 (0)	0 (0)	0 (0)	0 (0)	66 (111)
Northern pike	0.0279 (0.0111)	348 (609)	6,451 (6,072)	2,237 (1,507)	4,620 (3,123)	4,651 (2,886)	1,548 (1,344)	1,110 (1,095)	20,965 (7,785)
White sucker	0.0006 (0.0007)	0 (0)	0 (0)	290 (480)	0 (0)	0 (0)	0 (0)	193 (295)	483 (563)
Redhorse (spp)	0.0015 (0.0030)	67 (139)	976 (2,201)	61 (93)	0 (0)	0 (0)	0 (0)	0 (0)	1,104 (2,207)
Black bullhead	0.0115 (0.0214)	0 (0)	1,085 (2,445)	7,306 (15,816)	0 (0)	239 (498)	0 (0)	0 (0)	8,630 (16,012)
Brown bullhead	0.0081 (0.0077)	4,101 (5,574)	477 (757)	712 (733)	0 (0)	267 (571)	267 (404)	253 (332)	6,077 (5,725)
Channel catfish	0.0033 (0.0022)	0 (0)	257 (398)	597 (636)	0 (0)	425 (444)	1,205 (1,390)	5 (10)	2,489 (1,641)
White bass	<0.0001 (<0.0001)	0 (0)	22 (46)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	22 (46)
Rock bass	0.0182 (0.0085)	0 (0)	960 (1,062)	4,701 (3,885)	2,155 (2,450)	3,062 (3,163)	2,524 (2,178)	306 (430)	13,708 (6,096)

Table 22. Continued:

Species	Total catch per hour	Month							Season total
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Green sunfish	0.0001 (0.0002)	0 (0)	0 (0)	0 (0)	0 (0)	53 (111)	0 (0)	0 (0)	53 (111)
Pumpkinseed	0.0031 (0.0050)	190 (386)	2,169 (3,779)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2,359 (3,799)
Bluegill	0.0029 (0.0030)	0 (0)	8 (16)	85 (136)	138 (212)	1,623 (2,089)	345 (710)	7 (14)	2,206 (2,221)
Longear sunfish	0.0026 (0.0034)	0 (0)	0 (0)	0 (0)	1,942 (2,561)	0 (0)	0 (0)	0 (0)	1,942 (2,561)
Redear sunfish	0.0066 (0.0085)	0 (0)	80 (168)	3,047 (5,689)	1,276 (2,702)	527 (767)	0 (0)	50 (105)	4,980 (6,348)
Smallmouth bass	0.0036 (0.0024)	0 (0)	0 (0)	549 (777)	0 (0)	1,637 (1,446)	457 (556)	86 (179)	2,729 (1,742)
Largemouth bass	0.0006 (0.0011)	0 (0)	69 (146)	0 (0)	411 (838)	0 (0)	0 (0)	0 (0)	480 (851)
Yellow perch	0.4207 (0.1475)	2,496 (1,775)	99,879 (74,449)	20,024 (25,455)	20,214 (15,382)	46,015 (30,288)	105,921 (51,413)	21,887 (12,879)	316,436 (100,781)
Walleye	0.0340 (0.0346)	0 (0)	15,951 (25,576)	1,260 (911)	2,667 (2,164)	4,512 (2,283)	568 (516)	644 (935)	25,602 (25,807)
Lake	0.0335 (0.0145)	0 (0)	5,059 (3,854)	13,574 (9,152)	5,773 (2,551)	391 (427)	163 (341)	227 (194)	25,187 (10,269)
Round whitefish	0.0008 (0.0007)	0 (0)	104 (226)	397 (390)	102 (214)	0 (0)	0 (0)	0 (0)	603 (499)
Lake herring	0.1880 (0.0697)	0 (0)	116 (182)	26,350 (21,923)	114,364 (42,876)	126 (255)	0 (0)	430 (743)	141,386 (48,162)
Total	0.7853 (0.1936)	7,202 (5,896)	134,613 (79,225)	81,667 (38,924)	155,201 (46,015)	67,494 (30,989)	119,184 (51,604)	25,380 (13,000)	590,741 (117,201)
Angler hours		23,486 (4,698)	215,915 (93,268)	126,769 (28,541)	149,781 (34,499)	119,923 (27,913)	93,433 (23,714)	22,931 (7,765)	752,238 (110,125)
Angler trips		4,522 (940)	64,834 (30,517)	30,953 (6,884)	44,246 (11,665)	29,477 (6,469)	22,163 (5,762)	7,589 (2,712)	203,784 (34,613)
Angler days		4,522 (940)	48,897 (24,950)	24,572 (5,915)	32,841 (7,745)	22,976 (5,275)	15,491 (4,326)	5,500 (1,911)	154,799 (27,723)

Table 23. Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the Saginaw Bay ice fishery, 1988. Two standard errors in parentheses.

Species	Total catch per hour	Month			Season total
		Jan	Feb	Mar	
Rainbow trout	<0.0001 (<0.0001)	0 (0)	0 (0)	3 (8)	3 (8)
Northern pike	0.0043 (0.0050)	1,194 (1,370)	0 (0)	0 (0)	1,194 (1,370)
White sucker	0.0039 (0.0038)	0 (0)	0 (0)	1,078 (1,051)	1,078 (1,051)
White perch	0.0010 (0.0020)	0 (0)	266 (536)	0 (0)	266 (536)
Rock bass	0.0001 (0.0002)	40 (81)	0 (0)	0 (0)	40 (81)
Pumpkinseed	<0.0001 (<0.0001)	0 (0)	2 (3)	0 (0)	2 (3)
Bluegill	0.0001 (0.0002)	20 (41)	0 (0)	0 (0)	20 (41)
White crappie	0.0012 (0.0015)	181 (340)	16 (26)	149 (261)	346 (429)
Black crappie	0.0109 (0.0218)	2,954 (6,058)	0 (0)	85 (210)	3,039 (6,062)
Yellow perch	2.4176 (0.5488)	299,864 (76,174)	203,883 (46,411)	171,976 (99,941)	675,723 (133,958)
Walleye	0.0167 (0.0167)	645 (606)	3,398 (4,528)	615 (666)	4,658 (4,617)
Lake whitefish	0.0001 (0.0002)	22 (46)	0 (0)	0 (0)	22 (46)
Other	<0.0001 (<0.0001)	0 (0)	1 (2)	0 (0)	1 (2)
Total	2.4557 (0.5516)	304,920 (76,430)	207,566 (46,634)	173,906 (99,949)	686,392 (134,187)
Angler hours		133,803 (24,805)	99,727 (12,598)	45,975 (13,467)	279,505 (30,909)
Angler trips		39,098 (6,937)	25,631 (3,331)	13,387 (3,965)	78,116 (8,657)
Angler days		37,614 (6,736)	24,920 (3,261)	12,093 (3,670)	74,627 (8,335)

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Report approved by W. C. Latta