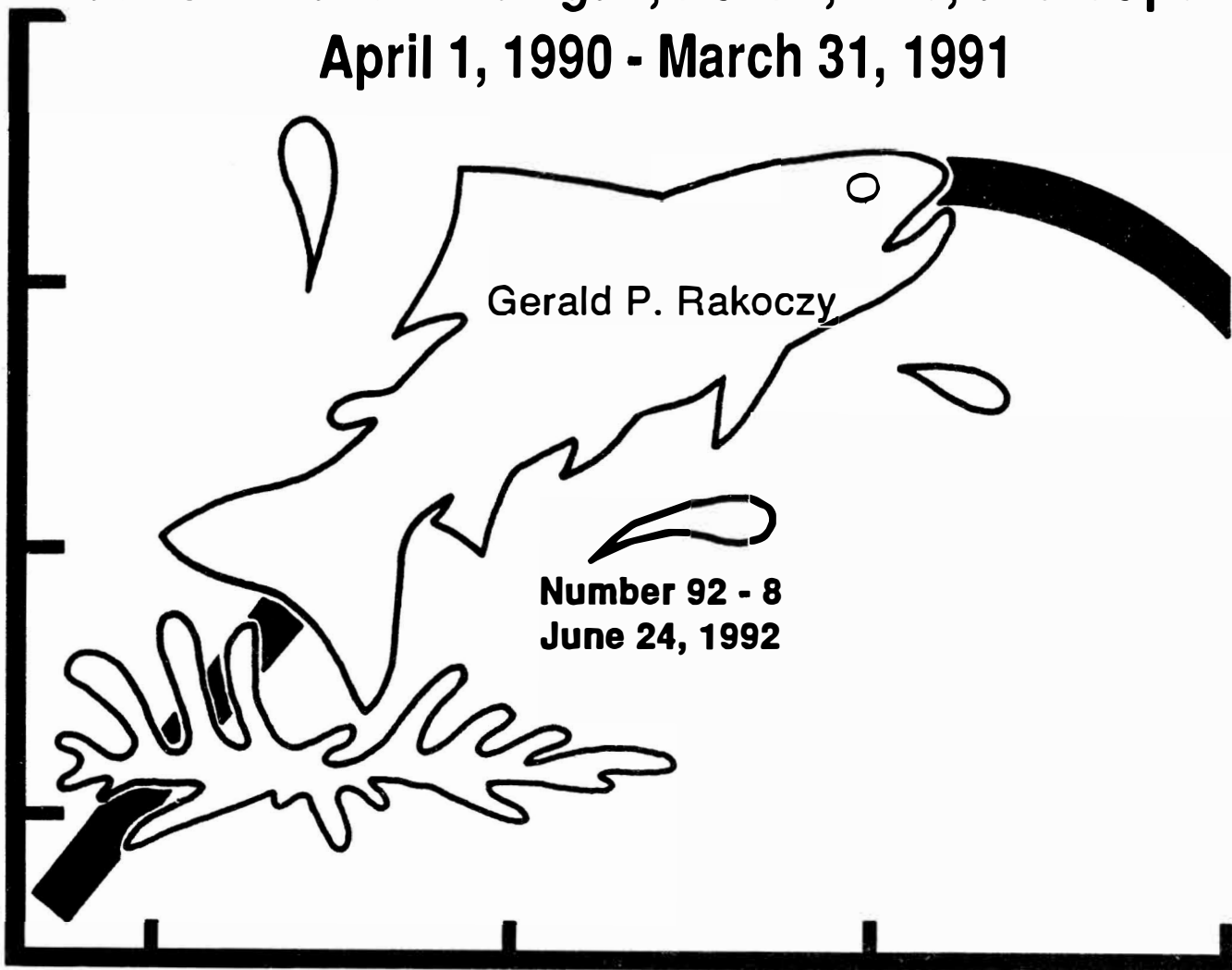


FISHERIES DIVISION

TECHNICAL REPORT

Sportfishing Catch and Effort from the Michigan Waters of Lakes Michigan, Huron, Erie, and Superior, April 1, 1990 - March 31, 1991




Michigan Department of
Natural Resources

**MICHIGAN DEPARTMENT OF NATURAL RESOURCES
FISHERIES DIVISION**

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**SPORTFISHING CATCH AND EFFORT FROM THE MICHIGAN WATERS
OF LAKES MICHIGAN, HURON, ERIE, AND SUPERIOR,
APRIL 1, 1990 - MARCH 31, 1991¹**

Gerald P. Rakoczy

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**Sportfishing Catch and Effort from the Michigan Waters
of Lakes Michigan, Huron, Erie, and Superior,
and their Important Tributary Streams,
April 1, 1990 - March 31, 1991**

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Abstract.—Sportfishing catch and effort were sampled on lakes Michigan, Huron, Erie, and Superior from April 1, 1990 through March 31, 1991. The objective of the creel monitoring program is to obtain a continuous record of sport catch, catch rates, and catch composition for the Great Lakes and important anadromous river fisheries. Over 39,000 anglers were interviewed at the completion of their fishing trips. Catch and effort estimates were calculated by month for all areas sampled. It was estimated that anglers spent 5.7 million angler hours in all areas of the Michigan waters of the Great Lakes that were surveyed. Total harvest was estimated to be over 4.2 million fish. Yellow perch were the most abundant species in the sport catch in most sample areas, totaling 3.0 million fish. In addition to yellow perch, sport anglers harvested an estimated 796,000 walleye, 70,000 chinook salmon, 67,000 lake trout, 34,000 coho salmon, 27,000 rainbow trout, and 14,000 brown trout.

Michigan's Great Lakes sport fishery has been monitored with a statewide contact creel survey 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 future value of the Great Lakes and anadromous stream fisheries depends 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. Data collected from this program have been used to develop, test, and improve decision models which help discern management strategies for Great Lakes fish communities and fisheries.

Study Area and Methods

Michigan Department of Natural Resources (MDNR) Fisheries Division personnel interviewed over 39,000 anglers at the end of

their fishing trips during the 1990 license year, April 1, 1990 through March 31, 1991. Approximately 28,500 of these anglers were contacted during the April through November open-water season. A total of 11,000 anglers were interviewed during the winter ice fishing season, January through March, 1991.

During the 1990 open-water season, creel surveys were conducted at important ports and angling areas on Lake Michigan from New Buffalo to Charlevoix and on Big and Little Bays de Noc (Figure 1). Lake Huron creel surveys were conducted at Rogers City, Harrisville, and Oscoda (Figure 2). A creel survey, focused on the boat fishery, was conducted on Lake Erie from Point Mouillee to the Michigan-Ohio state line (Figure 3). Seven areas were sampled on western and central Lake Superior during the 1990 open-water season, from Black River Harbor to Munising Bay (Figure 4).

Winter ice fisheries were sampled on lakes Michigan, Huron, and Superior. On Lake Michigan, Little Bay de Noc was surveyed (Figure 1). On Lake Huron, Saginaw Bay was surveyed after a 1 year hiatus (Figure 2). On Lake Superior, Keweenaw, Huron, Munising Bays, and Marquette were sampled. The total number of fishing areas sampled during the 1990 license year was greatly reduced compared to prior years (1986-88) due to budget constraints.

The creel survey 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 being 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. In the case where 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 effort. An angler party was defined as one or more anglers who fished together. Angler parties were interviewed at the completion 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 effort. 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 30-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 creel clerks at randomly selected times. Counts made from airplanes (instantaneous) of boats, pier, and shore anglers were used only when ground counts were not feasible, such as areas with many access points or restricted visibility. Air flights were used to make fishing effort counts on Saginaw Bay (ice fishery) and Lake Erie. Local flight service companies were contracted to make aerial counts. Four flights were made each week at randomly selected starting times—one each weekend day, and one on each of two randomly selected week days. All effort counts, whether accomplished from the ground or air, were recorded on count data forms by census clerks or contract pilots (Figure 6).

Seasonal creel clerks were trained on-site by permanent 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 Fisheries Station for computer entry. Data forms were further scrutinized at Charlevoix prior to data entry. The software used for data entry employed range checks on various data fields for each count or 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. Standard mathematical formulas for creel census (Ryckman 1981) were used to calculate all estimates. 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. Error bounds for all catch and effort estimates in this report are defined as two standard errors of the mean (2 times the square root of the variance of an estimate) and approximate true 70-95% confidence limits, depending on sample size. Error

bounds for all mean length and weight data are 95% confidence limits.

Statistical significance in the analysis comparing lakewide or port estimates between years is based on two standard error limits. Information from the previous year is contained in Rakoczy and Rogers (1991a,b). Also, prior to August 1, 1989, the charter boat mode of fishing was included as part of this study. As a result of legislation in Michigan during 1989, charter boat operators are required to report their clients catch and angling effort monthly to MDNR. Therefore, after that date charter boats were no longer covered by this study. However, in order to make valid year to year comparisons, catch and effort reported by charter fishermen were added to the catch and effort estimates generated by this study. All charter boat data use in this report for year-to-year comparisons are from Rakoczy and Rogers (1991b,c).

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.

Results

Lake Michigan

Anglers spent an estimated 2,007,432 ($\pm 142,432$) hours fishing the Michigan waters of Lake Michigan at the 13 areas surveyed during the March 15 through November 15, 1990 open-water season (Table 2). The number of hours fished converts to an estimated 490,856 ($\pm 29,712$) individual angler trips or 442,862 ($\pm 28,025$) angler days. Total angling effort by mode of fishing was 85% boat, 12% pier, and 3% shore.

Total angler effort in 1990 at 10 major sample areas combined decreased by 20% compared to the same period in 1989 (Table 3). Total angler effort has decreased each year since 1986 at these sites. Angler effort decreased at seven of the ten ports in 1990 compared to 1989. Little Bay de Noc had the greatest amount of angler activity in 1990 of all the survey sites, with an estimated 316,145 ($\pm 36,008$) angler hours.

The average length of a fishing trip (all modes of fishing) was 4.1 hours. Anglers made approximately 1.1 fishing trips per day.

Boat trips were the longest in duration, averaging 4.6 hours. Pier and shore trips averaged 2.6 and 2.4 hours, respectively.

Fishermen caught an estimated 1,443,442 ($\pm 172,357$) fish comprising 28 species during 1990 (Table 2). The bulk of this catch (89%) came from the boat fishery, while pier and shore anglers harvested 9% and 2% of the total catch, respectively (Tables 4, 5, and 6).

The yellow perch was the most numerous species in the catch, making up 83% of all the fish harvested. An estimated 1,204,635 ($\pm 171,201$) yellow perch were harvested by all modes of fishing (Table 2). The mean total length of yellow perch kept by Lake Michigan anglers in 1990 was 8.96 (± 0.06) inches. During 1990, 21% of all Lake Michigan angler parties interviewed said their target species was yellow perch. This was up 6 percentage points compared to 1988 and 1989 (Rakoczy and Rogers 1990, 1991a). The largest perch catch (348,313 \pm 128,800 fish) of all areas sampled in 1990 occurred at St. Joseph (Table 7.)

Yellow perch catch rates at seven Lake Michigan sample areas combined have not changed significantly since 1986 (Table 7). The greatest catch rate for yellow perch during 1990 was 1.460 (± 0.578) fish per angler hour at Muskegon. The greatest changes in catch rates for yellow perch in 1990 compared to 1989 occurred in the West Arm of Grand Traverse Bay (+96%) and at St. Joseph (+93%) (Table 7).

Although yellow perch are important to the Lake Michigan sport fishery, many anglers (43%) seek the various species of salmonids. The Lake Michigan salmonid catch, exclusive of lake whitefish, in the study area was estimated at 143,512 ($\pm 12,522$) fish. The vast majority of the salmonid harvest (91%) came from the boat fishery (Table 4). The salmonid catch was composed of 31% chinook salmon, 25% lake trout, 18% rainbow trout, 17% coho salmon, and 9% brown trout. Lake trout and rainbow trout are becoming a larger component of the salmonid catch. Lake trout made up 15-16% of the salmonid catch in 1985-86, and now (1989-90) make up 27-29%

of the total harvest (Rakoczy and Rogers 1987, 1988, 1991a). During the same period, rainbow trout ranged from 4-5% of the salmonid harvest to 10-12% during the past two seasons.

The total salmonid harvest at nine important Lake Michigan fishing areas (index ports) combined decreased 32% in 1990 compared to 1989. Catch rates for all salmonids combined in 1990 was 0.118 (± 0.009) fish per hour compared to 0.129 (± 0.017) in 1989. The decrease in the salmonid catch at these ports in 1990 was mainly due to a 27% decrease in angler effort at these ports compared to 1989 (Table 8).

Chinook salmon have been one of the most important salmonids in the Lake Michigan sport fishery in terms of numbers and weight of fish harvested (Rakoczy and Rogers 1991a). An estimated 44,152 ($\pm 7,378$) chinook salmon were creel by anglers during 1990 at all sample areas combined (Table 2). Biological data collected from the Lake Michigan sport catch during 1990 indicated that their mean size was 26.27 (± 0.51) inches or 8.73 (± 0.48) pounds. The harvest of chinook in 1990 at the nine index ports decreased by 28% in numbers of fish compared to 1989 (Table 8). The harvest of chinook salmon has decreased each year since 1986. Catch rates for chinook at these nine areas combined were virtually unchanged in 1990 compared to 1989, but were significantly lower (68%) than the peak rate noted for 1986 (Table 9).

The lake trout was the second most abundant salmonid in the sport catch in 1990. An estimated 36,438 ($\pm 6,329$) were harvested from all the ports sampled. Data collected from the sport fishery during 1990 indicated that creel lake trout averaged 25.51 (± 0.21) inches in length and weighed 6.09 (± 0.19) pounds. The harvest of lake trout at nine index ports decreased 36% in 1990 compared to 1989 (Table 8). The catch rate for lake trout (0.039 \pm 0.006 fish per hour) at the nine ports combined did not change significantly in 1990 when compared to 1989 and was virtually unchanged compared to the previous 5-year (1985-89) average (Table 9).

An estimated 33,229 ($\pm 5,218$) coho salmon were harvested in all survey areas

combined in 1990 (Table 2). The average size of coho harvested by the sport fishery was 23.62 (± 0.36) inches and 5.43 (± 0.27) pounds. The catch at the nine index ports combined decreased (56%) significantly in 1990 compared to 1989 (Table 8). Catch rates at these areas combined decreased by 41% during the same period. Historically (1985-89), catch rates for coho salmon have varied greatly from year to year. The catch rate noted for 1990 (0.019 \pm 0.003 fish per hour) was 18% below the previous 5-year average (Table 9). The difference was not significant.

An estimated 26,196 ($\pm 4,984$) rainbow trout were harvested from all Lake Michigan ports sampled during 1990 (Table 2). Over 50% of the harvest was taken during June, July, and August in the offshore boat fishery. This was consistent with data collected during the past 2 years. However, in 1987, 68% of the harvest came during September and October from the pier and shore fishery (Rakoczy and Rogers 1988). The mean size of rainbow trout in the Lake Michigan sport catch during 1990 was 26.46 (± 0.19) inches or 7.07 (± 0.28) pounds. The catch, and catch rate for rainbow have increased each year since 1986 at the nine index ports (Table 8).

A total of 12,780 ($\pm 3,130$) brown trout with an average size of 19.49 (± 0.35) inches or 4.33 (± 0.25) pounds were estimated to have been caught by Lake Michigan anglers in 1990 (Table 2). The brown trout catch or catch rate has not significantly changed since 1987 (Table 8). The catch rate for brown trout (0.008 \pm 0.002 fish per hour) in 1990 at the nine index ports was unchanged compared to the previous 5-year average.

Lake Huron

Only three ports were surveyed on Lake Huron during the 1990 open-water season, Rogers City, Harrisville, and Oscoda. Angler effort at these three ports combined in 1990 did not change significantly compared to the 1986-88 average (Table 10).

The sport harvest at these ports consists mainly of chinook salmon and lake trout. During 1990, an estimated 26,313 ($\pm 19,463$)

chinook salmon and 12,786 ($\pm 2,639$) lake trout were harvest by anglers at these ports. Catch rates for both chinook salmon and lake trout during 1990 were at the low end of the ranged noted for previous surveys (1986-88).

Lake Erie

Approximately 30 miles of Lake Erie shoreline, from Point Mouillee to the Michigan-Ohio state line, were surveyed in 1990. Anglers spent an estimated 2,437,431 ($\pm 298,193$) hours fishing from boats in the survey area (Table 11). A total of 416,780 ($\pm 50,617$) angler trips or 416,517 ($\pm 50,591$) angler days were spent in the area. Total angler effort decreased (34%) significantly in 1990 compared to 1989 (Table 12). The average length of a boat fishing trip on Lake Erie was 5.8 hours. The average angler made 1.0 trips per day.

Boat anglers harvested an estimated 1,621,296 ($\pm 398,237$) fish comprising 11 species (Table 11). Eighty-one percent of all Lake Erie anglers interviewed responded that they were target fishing for walleye. Walleye made up 47% of the total catch with an estimated harvest of 747,129 ($\pm 145,900$) fish. The mean size of walleye in the catch was 19.60 (± 0.59) inches or 3.21 (± 0.28) pounds. The walleye harvest in 1990 decreased by 29% compared to 1989 (Table 12). The harvest has decreased in each of the last two seasons. The majority of the 1990 walleye catch (82%) was taken during June and July. This was consistent with the previous 2 years (1988-89). The catch rate for walleye in 1990 was 0.328 (± 0.069) fish per hour compared to 0.305 (± 0.059) in 1989 (Table 12).

Lake Erie anglers harvested an estimated 757,330 ($\pm 368,162$) yellow perch during 1990. The mean total length of yellow perch kept by Lake Erie anglers in 1990 was 9.01 (± 0.31) inches. The yellow perch harvest during the period April through September 1990 decreased (49%) compared to the same period in 1989 (Table 12). This was due to both a decrease in angler effort (34%) and in catch rates (23%) compared to 1989.

The catch and effort estimates for yellow perch and walleye are an important com-

ponent of interagency harvest quota calculations for Lake Erie. These data are used jointly with creel estimates from Ontario, Canada, New York, and Ohio on an annual basis in an effort to prevent overharvest of these two important species.

In addition to yellow perch and walleye, an estimated 68,029 ($\pm 33,635$) white bass, 21,933 ($\pm 20,715$) channel catfish, and 20,634 ($\pm 13,573$) white perch were harvested by Lake Erie anglers. The channel catfish harvest is most probably underestimated due to the fact that most fishing for this species occurs throughout the night. No creel sampling took place during period 1 hour after dusk to 6:00 AM.

Lake Superior

Anglers spent an estimated 115,610 ($\pm 6,010$) hours fishing the seven survey areas on western and central Lake Superior (Table 13). This translates to 26,272 ($\pm 1,455$) individual angler trips, or 25,640 ($\pm 1,440$) angler days. Angler effort declined significantly by 36% compared to the same period in 1988, the last year these areas were surveyed (Rakoczy and Rogers 1990). Marquette had the greatest amount of angler activity of all the Lake Superior sample areas, accounting for 50% of the total effort. The average length of a fishing trip (all modes of fishing) was 4.4 hours and anglers made 1.0 fishing trips per day.

Lake Superior anglers harvested an estimated 25,424 ($\pm 2,642$) fish comprising 14 species (Table 13). Most anglers (59%) interviewed on Lake Superior said they were fishing for the various species of salmonids. Lake trout made up 85% of the salmonid catch (excluding lake whitefish). The remainder of the salmonid catch was made up mainly of chinook and coho salmon (11%), with small numbers of rainbow trout, splake, and brown trout. A few brook trout and pink salmon were also noted in the catch.

The lake trout harvest for all survey areas combined was estimated at 16,523 ($\pm 1,990$) fish (Table 13). Lake trout averaged 21.86 (± 0.28) inches and 3.58 (± 0.17) pounds. The catch rate for lake trout at all survey areas

combined in 1990 was 0.143 (± 0.019) fish per hour compared to 0.125 (± 0.015) for these same areas in 1988 (Rakoczy and Rogers 1990).

Lake Superior anglers also caught an estimated 1,085 (± 297) chinook salmon and 1,003 (± 313) coho salmon in 1990. The 1990 harvest of chinook was virtually unchanged compared to 1988, however, the coho harvest declined (91%) significantly compared to 1988.

Winter Ice Fisheries

Catch and sportfishing effort were surveyed on various areas of Lakes Superior, Huron and Michigan during the winter months of 1991. The Saginaw Bay ice fishery is the largest and most important ice fishery, in terms of catch and effort, on Michigan's waters of the Great Lakes (Rakoczy and Rogers 1988b). The 1991 survey was the first complete survey of the Saginaw Bay (Port Austin to Tawas) ice fishery since 1988. During 1991, anglers spent an estimated 294,976 ($\pm 30,401$) hours fishing the Bay's waters (Table 14). This amounted to an estimated 83,612 ($\pm 8,991$) angler trips, or 75,524 ($\pm 8,149$) angler days. The average length of an ice fishing trip on Saginaw Bay was 3.5 hours and anglers made an average of 1.1 trips per day.

Angler effort on Saginaw Bay during the 1991 winter ice fishery did not change significantly compared to 1988 (Table 15). Mild winter conditions limited angler access to the ice during 1988 and 1991. In 1984 and 1987, angler effort was twice the levels noted for 1988 and 1991. During those winters, solid ice conditions existed during the entire survey period (January-March).

Saginaw Bay ice anglers caught an estimated 821,662 ($\pm 128,006$) fish representing 18 species (Table 14). Most (88%) anglers interviewed on Saginaw Bay during the 1991 ice fishery responded that they were fishing for yellow perch. Yellow perch made up 99% of all fish harvested. The total harvest and catch rate for yellow perch in 1991 was not significantly different than the 1988 estimates (Table 15). The area from

Sebewaing to Sand Point had the greatest estimated catch ($353,129 \pm 90,104$) and catch rate (3.903 ± 1.310) for yellow perch of all the Saginaw Bay survey sites. The same was true during the 1987-88 ice surveys (Rakoczy and Rogers 1987, 1988).

Little Bay de Noc is the largest winter ice fishery on Lake Michigan. Angler effort for the 1991 winter ice fishery was estimated at $221,355 (\pm 22,579)$ hours and did not change significantly compared to 1990 (Table 16). During 1991, anglers harvested an estimated $215,532 (\pm 39,029)$ yellow perch from Little Bay de Noc. In general, the harvest and catch rate for yellow perch have been trending upward since 1988. The 1991 harvest and catch rate for yellow perch were 230% and 98% greater than the 1988 estimates, respectively.

Walleye also play an important role in the Little Bay de Noc winter fishery. The walleye harvest was estimated at $5,183 (\pm 2,090)$ fish. The 1991 walleye harvest and catch rate were the smallest estimates during the past three ice seasons (1988-90) (Table 16).

Three areas were surveyed on Lake Superior during the winter of 1991, Keweenaw Bay, Munising Bay, and Marquette. On Keweenaw Bay anglers spent an estimated $92,480 (\pm 18,268)$ hours fishing through the ice (Table 17). Angler effort in 1991 was similar to that noted for 1989. Poor ice conditions, caused by mild winter weather, resulted in a much abbreviated season during 1990 (Rakoczy and Rogers 1991a).

The most abundant species in the catch during 1991 on Keweenaw Bay were lake trout. This marked the first year that lake trout were identified to the sub-species level. Siscowet lake trout, also known as fat trout, made up 69% of the total lake trout catch (fat and lean trout) on Keweenaw Bay in 1991 (Table 17). An estimated $9,776 (\pm 2,570)$ siscowet lake trout were harvested compared to $4,414 (\pm 1,521)$ lean lake trout. Siscowets probably made up a substantial percentage of the lake trout catch on Keweenaw Bay during the 1988-89 winter ice fisheries (R. Schorfhaar, MDNR, personal communication).

In addition to lake trout, Keweenaw Bay anglers harvested an estimated $5,774 (\pm 1,998)$

coho salmon during 1991. The 1991 coho catch was similar to that noted for the 1988 season, but was 18 times greater than the estimate for the 1989 season (Table 17).

The winter ice fisheries at Marquette and Munising Bay were much smaller in size, in terms of angler effort, compared to Keweenaw Bay. At Marquette, ice fishing effort was estimated at $5,479 (\pm 811)$ angler hours and the catch consisted mainly of coho salmon ($1,702 \pm 627$). Munising Bay ice anglers spent an estimated $20,457 (\pm 1,978)$ hours while harvesting $2,624 (\pm 1,372)$ lake whitefish and $1,441 (\pm 610)$ coho salmon.

Summary

During the 1990 license year anglers spent an estimated 5.7 million angler hours in the Michigan waters of the Great Lakes that were surveyed. This accounted for an estimated 1.2 million individual fishing trips and 1.1 million angler days. Total catch was estimated to be over 4.2 million fish. Yellow perch were the most abundant species in the sport catch in most sample areas. The yellow perch catch for all areas surveyed was estimated at 3.0 million fish. In addition to yellow perch, sport anglers harvested an estimated 796,000 walleye, 70,000 chinook salmon, 67,000 lake trout, 34,000 coho salmon, 27,000 rainbow trout, and 14,000 brown trout.

The Lake Michigan salmonid catch was composed of 31% chinook salmon, 25% lake trout, 18% rainbow trout, 17% coho salmon, and 9% brown trout. Lake trout and rainbow trout are becoming a larger component of the salmonid catch. Lake trout made up 15-16% of the salmonid catch in 1985-86, and now (1989-90) make up 27-29% of the total harvest. The total salmonid harvest at nine important Lake Michigan fishing areas (index ports) combined decreased 32% in 1990 compared to 1989. The decrease in the salmonid catch at these ports in 1990 was mainly due to a 27% decrease in angler effort compared to 1989.

The walleye and yellow perch harvest on Lake Erie decreased in 1990 compared to 1989 by 29% and 49%, respectively. Angler

effort on Lake Erie also decreased (34%) compared to 1989.

Acknowledgments

This report could not have been prepared with out the help of Richard Rogers, who was a Fisheries Technician at the Charlevoix Fisheries Station. The success of the Great Lakes Creel Monitoring Program and the timely reporting of results each year were largely due to his diligence.

The author wishes to thank the staffs of the fisheries districts 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 Davis keyed the data. Special thanks to Kelley Smith who wrote the computer programs for the calculation of the catch and effort estimates.



Figure 1.—Lake Michigan survey area.



Figure 2.—Lake Huron survey area.

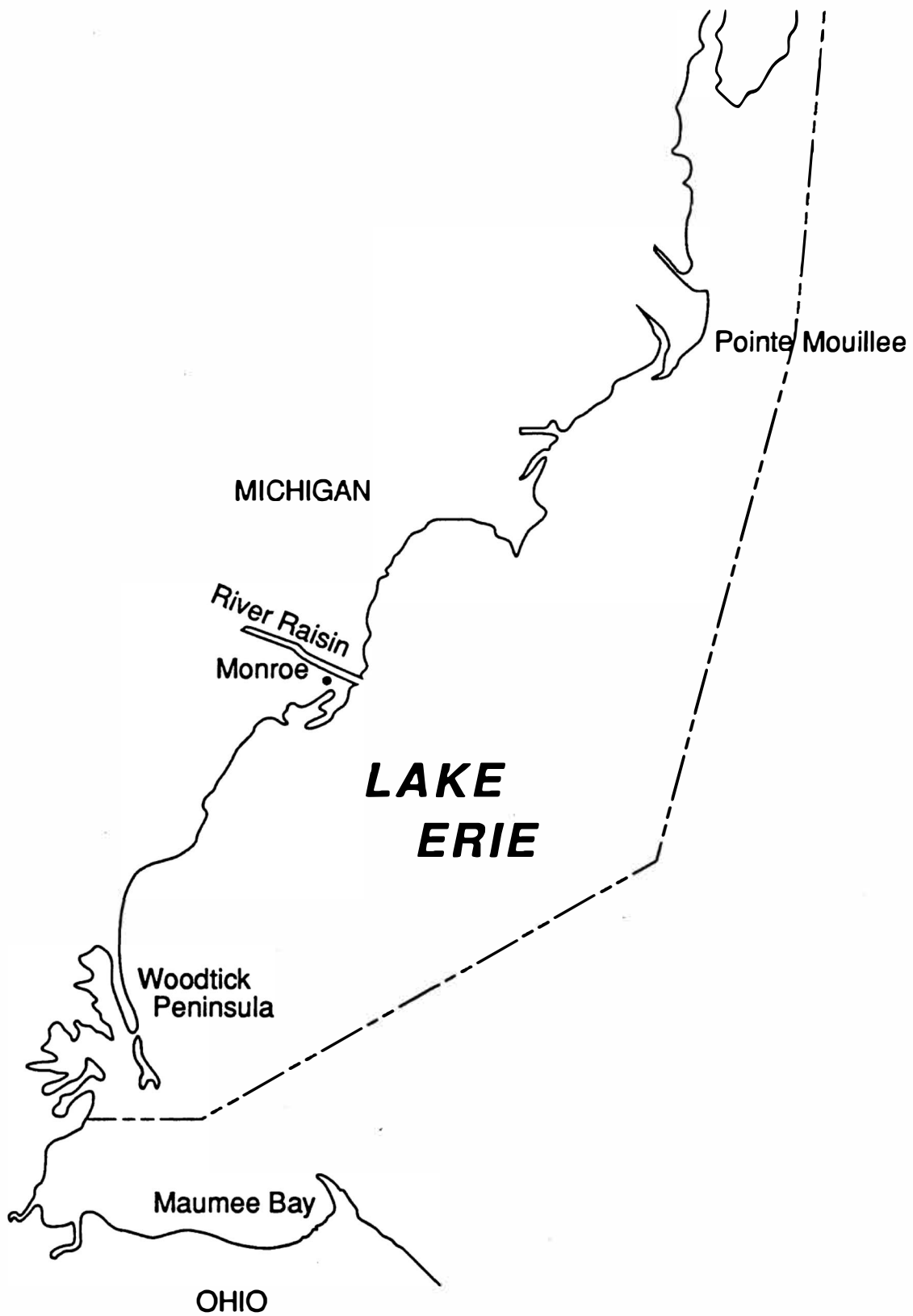


Figure 3.—Lake Erie survey area.



Figure 4.—Lake Superior survey area.

ANGLER PARTY INTERVIEW FORM

Project #: _____

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

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

Fishery type
 St 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: _____ End time: _____
 1 = Monday 5 = Friday Start time: _____
 2 = Tuesday 6 = Saturday Hrs fished: _____
 3 = Wednesday 7 = Sunday
 4 = Thursday 8 = Holiday Coop. 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

Ang #	ler	tps	Sex	Age	Zip code	Residence (countv/state)	Cnty code	Fishing methods								
								cast	stil	trot	fly	dr:f	snea	dio	snag	...
1								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Use this side or use this side, not both!
 Target sp.: _____ Anything Salmon Trout Salmon & Trout Walleye & Perch
 code: _____ 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	Cono salmon	_____	GSF	Green sunfish	_____	CWS	White sucker	_____
LHR	Lake herring	_____	LMB	Largemouth bass	_____	BQW	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	_____			_____

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Figure 5.—Angler party interview sheet.

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

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

Table 2.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for Lake Michigan, by all modes of sportfishing, 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month									Season	
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov		
Pink salmon	0.0000 (0.0000)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	9 (18)	0 (0)	0 (0)	9 (18)
Coho salmon	0.0119 (0.0028)	511 (561)	3,796 (1,577)	5,025 (3,386)	576 (528)	836 (443)	9,162 (3,229)	3,431 (1,521)	482 (359)	0 (0)	0 (0)	23,819 (5,255)
Chinook salmon	0.0220 (0.0040)	6 (8)	514 (268)	4,988 (2,146)	3,072 (1,320)	6,812 (3,052)	22,404 (5,953)	6,044 (1,793)	312 (220)	0 (0)	0 (0)	44,152 (7,378)
Rainbow trout	0.0130 (0.0026)	5 (8)	374 (261)	537 (323)	758 (500)	8,133 (2,721)	6,249 (2,652)	2,341 (1,143)	7,232 (2,932)	567 (275)	0 (0)	26,196 (4,984)
Brown trout	0.0064 (0.0016)	80 (68)	5,348 (2,207)	2,608 (1,221)	212 (242)	1,406 (769)	2,409 (1,480)	586 (754)	131 (137)	0 (0)	0 (0)	12,780 (3,130)
Brook trout	0.0001 (0.0002)	0 (0)	0 (0)	118 (245)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	118 (245)
Lake trout	0.0182 (0.0034)	0 (0)	0 (0)	3,384 (1,208)	9,398 (3,391)	14,230 (4,441)	8,766 (2,689)	660 (387)	0 (0)	0 (0)	0 (0)	36,438 (6,329)
Rainbow smelt	0.0001 (0.0002)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	133 (204)	0 (0)	0 (0)	133 (204)
Northern pike	0.0009 (0.0003)	0 (0)	0 (0)	366 (377)	418 (350)	172 (148)	341 (290)	451 (260)	99 (116)	0 (0)	0 (0)	1,847 (672)
White sucker	0.0001 (0.0002)	0 (0)	231 (467)	0 (0)	27 (54)	0 (0)	0 (0)	27 (53)	0 (0)	0 (0)	0 (0)	285 (473)
Redhorse spp.	0.0000 (0.0000)	0 (0)	0 (0)	0 (0)	27 (54)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	27 (54)
Black bullhead	0.0002 (0.0003)	0 (0)	186 (244)	276 (566)	9 (19)	0 (0)	0 (0)	13 (27)	0 (0)	0 (0)	0 (0)	484 (617)
Brown bullhead	0.0009 (0.0009)	0 (0)	134 (141)	35 (72)	274 (333)	1,004 (1,664)	114 (249)	158 (206)	0 (0)	0 (0)	0 (0)	1,719 (1,735)
Channel catfish	0.0010 (0.0006)	0 (0)	222 (235)	561 (758)	184 (154)	487 (404)	534 (726)	101 (126)	13 (27)	0 (0)	0 (0)	2,102 (1,166)
White perch	0.0000 (0.0000)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	72 (145)	0 (0)	0 (0)	0 (0)	0 (0)	72 (145)
White bass	0.0000 (0.0000)	0 (0)	0 (0)	0 (0)	0 (0)	25 (51)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	25 (51)
Rock bass	0.0045 (0.0032)	0 (0)	0 (0)	154 (226)	3,388 (2,937)	2,728 (4,351)	2,279 (3,741)	542 (776)	41 (86)	0 (0)	0 (0)	9,132 (6,497)
Pumpkinseed	0.0007 (0.0004)	0 (0)	47 (101)	0 (0)	37 (75)	441 (595)	451 (505)	449 (395)	41 (86)	0 (0)	0 (0)	1,466 (888)

Table 2.—Continued:

Species	Total catch per hour	Month									Season
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
Bluegill	0.0005 (0.0004)	0 (0)	0 (0)	0 (0)	11 (20)	157 (313)	344 (489)	392 (450)	0 (0)	0 (0)	904 (735)
Smallmouth bass	0.0052 (0.0015)	0 (0)	0 (0)	2,019 (1,135)	3,649 (1,876)	1,753 (1,611)	1,311 (824)	1,426 (785)	211 (169)	0 (0)	10,369 (2,954)
Largemouth bass	0.0000 (0.0000)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	42 (85)	0 (0)	0 (0)	0 (0)	42 (85)
Black crappie	0.0023 (0.0018)	0 (0)	1,774 (1,965)	438 (815)	2,307 (2,880)	0 (0)	0 (0)	184 (316)	0 (0)	0 (0)	4,703 (3,594)
Yellow perch	0.6001 (0.0953)	0 (0)	283,861 (52,608)	46,726 (17,516)	194,214 (90,196)	379,680 (115,949)	239,823 (65,841)	47,923 (16,363)	12,287 (7,274)	121 (154)	1,204,635 (171,201)
Walleye	0.0184 (0.0053)	0 (0)	0 (0)	3,927 (2,374)	7,645 (8,390)	6,536 (2,100)	8,314 (4,687)	8,401 (2,036)	2,079 (858)	0 (0)	36,902 (10,358)
Freshwater drum	0.0013 (0.0012)	0 (0)	0 (0)	1,539 (2,233)	35 (45)	490 (474)	502 (665)	43 (69)	0 (0)	0 (0)	2,609 (2,379)
Lake whitefish	0.0060 (0.0025)	0 (0)	0 (0)	1,207 (998)	1,209 (1,552)	1,356 (971)	4,429 (3,036)	32 (66)	3,875 (3,220)	0 (0)	12,108 (4,893)
Round whitefish	0.0050 (0.0029)	0 (0)	23 (38)	160 (284)	1,396 (1,592)	1,818 (1,938)	2,908 (4,044)	487 (979)	3,060 (3,059)	178 (221)	10,030 (5,752)
Burbot	0.0001 (0.0001)	0 (0)	0 (0)	27 (55)	24 (36)	33 (72)	45 (74)	17 (34)	0 (0)	0 (0)	146 (127)
Other	0.0001 (0.0001)	0 (0)	0 (0)	33 (68)	113 (235)	0 (0)	0 (0)	44 (88)	0 (0)	0 (0)	190 (260)
Total	0.7190 (0.0998)	602 (565)	296,510 (52,719)	74,128 (18,459)	228,983 (90,803)	428,097 (116,257)	310,499 (66,792)	73,761 (16,800)	29,996 (9,070)	866 (385)	1,443,442 (172,357)
Angler hours		3,695 (2,640)	190,910 (37,770)	226,091 (34,269)	249,384 (35,487)	440,330 (59,983)	566,055 (101,048)	246,187 (47,793)	75,261 (14,522)	9,519 (2,613)	2,007,432 (142,049)
Angler trips		737 (432)	48,258 (9,216)	54,967 (7,343)	65,206 (8,117)	112,912 (13,301)	124,633 (19,746)	58,437 (9,852)	22,798 (3,588)	2,908 (1,051)	490,856 (29,712)
Angler days		661 (427)	43,627 (9,079)	48,286 (6,709)	56,215 (7,355)	104,009 (12,811)	115,721 (18,399)	51,882 (9,421)	19,660 (3,348)	2,801 (1,042)	442,862 (28,025)

Table 3.—Estimated angler effort (hours) at ten Lake Michigan sample areas, April-October, 1985-90. Two standard errors in parentheses.

Area	Year					
	1985	1986	1987	1988	1989	1990
New Buffalo	270,897 (45,486)	481,717 (151,319)	151,089 (92,752)	268,490 (72,843)	229,668 (85,620)	120,676 (30,285)
St. Joseph	834,003 (116,076)	607,060 (128,426)	369,500 (93,567)	424,635 (75,266)	440,627 (57,896)	292,064 (49,378)
Grand Haven	586,641 (66,939)	700,543 (152,499)	759,713 (145,251)	428,996 (121,822)	225,797 (37,108)	246,367 (44,054)
Muskegon	508,738 (114,646)	319,636 (53,425)	340,095 (73,750)	230,296 (58,704)	164,664 (35,554)	143,895 (38,653)
Ludington	714,442 (151,419)	833,763 (258,924)	614,485 (169,613)	376,995 (117,169)	442,578 ⁴ (85,069)	287,517 (47,285)
Manistee	629,126 (96,422)	681,144 (141,842)	509,415 (125,973)	435,687 (102,153)	283,544 (51,078)	222,637 (54,872)
Frankfort	322,122 (49,044)	593,406 (192,736)	547,140 (193,979)	262,501 (58,305)	365,263 ⁴ (176,322)	279,720 (80,854)
Grand Traverse ¹ Bay	466,505 (26,749)	335,002 (24,912)	284,478 (22,721)	262,402 (17,127)	260,728 (20,770)	191,900 (11,149)
Charlevoix	155,168 (35,350)	100,014 (24,447)	90,043 (12,480)	62,287 ³ (12,761)	64,042 ³ (12,003)	65,906 ³ (11,442)
Little Bay de Noc ²	158,157 (21,126)	239,073 (21,787)	154,421 (16,300)	157,723 (19,726)	237,044 ⁴ (67,741)	316,145 (36,008)
Total	4,645,799 (264,969)	4,891,358 (437,609)	3,820,379 (356,508)	2,922,773 (240,138)	2,713,955 (243,769)	2,166,827 (141,867)

¹Includes the East Arm, West Arm, and the port of Elk Rapids.

²Includes the Ford River access site.

³May-September.

⁴May-October.

Table 4.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the Lake Michigan boat fishery (non-charter) at all survey areas combined (13), 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month								Season
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
Pink salmon	0.0000 (0.0000)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	9 (18)	0 (0)	9 (18)
Coho salmon	0.0130 (0.0033)	334 (554)	3,617 (1,573)	4,258 (3,351)	576 (528)	836 (443)	8,910 (3,219)	3,193 (1,514)	252 (215)	21,976 (5,214)
Chinook salmon	0.0245 (0.0048)	0 (0)	485 (264)	4,974 (2,146)	3,061 (1,320)	6,812 (3,052)	20,941 (5,877)	5,138 (1,722)	95 (99)	41,506 (7,297)
Rainbow trout	0.0117 (0.0029)	2 (6)	247 (180)	254 (186)	707 (488)	6,599 (2,371)	6,053 (2,643)	2,027 (1,119)	3,907 (2,835)	19,796 (4,712)
Brown trout	0.0064 (0.0019)	3 (8)	4,885 (2,191)	1,665 (1,166)	212 (242)	1,337 (755)	2,243 (1,474)	422 (740)	59 (107)	10,826 (3,086)
Brook trout	0.0001 (0.0002)	0 (0)	0 (0)	118 (245)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	118 (245)
Lake trout	0.0215 (0.0041)	0 (0)	0 (0)	3,384 (1,208)	9,392 (3,391)	14,230 (4,441)	8,766 (2,689)	660 (387)	0 (0)	36,432 (6,329)
Northern pike	0.0011 (0.0004)	0 (0)	0 (0)	366 (377)	418 (350)	172 (148)	341 (290)	444 (260)	51 (85)	1,792 (667)
White sucker	0.0002 (0.0003)	0 (0)	231 (467)	0 (0)	27 (54)	0 (0)	0 (0)	27 (53)	0 (0)	285 (473)
Redhorse spp.	0.0000 (0.0000)	0 (0)	0 (0)	0 (0)	27 (54)	0 (0)	0 (0)	0 (0)	0 (0)	27 (54)
Black bullhead	0.0001 (0.0002)	0 (0)	93 (202)	0 (0)	9 (19)	0 (0)	0 (0)	13 (27)	0 (0)	115 (205)
Brown bullhead	0.0002 (0.0002)	0 (0)	0 (0)	35 (72)	125 (222)	0 (0)	114 (249)	129 (197)	0 (0)	403 (394)
Channel catfish	0.0002 (0.0001)	0 (0)	0 (0)	0 (0)	94 (79)	241 (283)	56 (84)	16 (24)	13 (27)	420 (308)
White perch	0.0000 (0.0000)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	72 (145)	0 (0)	0 (0)	72 (145)
White bass	0.0000 (0.0000)	0 (0)	0 (0)	0 (0)	0 (0)	25 (51)	0 (0)	0 (0)	0 (0)	25 (51)
Rock bass	0.0043 (0.0038)	0 (0)	0 (0)	138 (224)	2,347 (2,885)	2,337 (4,314)	2,257 (3,741)	162 (215)	0 (0)	7,241 (6,405)

Table 4.—Continued:

Species	Total catch per hour	Month								Season
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
Pumpkinseed	0.0004 (0.0004)	0 (0)	47 (101)	0 (0)	37 (75)	441 (595)	143 (291)	0 (0)	0 (0)	668 (674)
Bluegill	0.0000 (0.0000)	0 (0)	0 (0)	0 (0)	9 (20)	0 (0)	0 (0)	0 (0)	0 (0)	9 (20)
Smallmouth bass	0.0055 (0.0018)	0 (0)	0 (0)	1,946 (1,126)	2,995 (1,800)	1,691 (1,609)	1,193 (816)	1,302 (773)	166 (151)	9,293 (2,895)
Black crappie	0.0020 (0.0020)	0 (0)	1,674 (1,962)	0 (0)	1,656 (2,726)	0 (0)	0 (0)	0 (0)	0 (0)	3,330 (3,359)
Yellow perch	0.6302 (0.1126)	0 (0)	268,471 (52,016)	35,736 (16,545)	167,104 (89,868)	332,603 (114,337)	216,018 (64,891)	39,825 (15,563)	9,297 (6,918)	1,069,054 (169,203)
Walleye	0.0217 (0.0064)	0 (0)	0 (0)	3,927 (2,374)	7,645 (8,390)	6,536 (2,100)	8,314 (4,687)	8,347 (2,034)	2,079 (858)	36,848 (10,358)
Freshwater drum	0.0005 (0.0004)	0 (0)	0 (0)	35 (72)	19 (37)	302 (277)	502 (665)	18 (40)	0 (0)	876 (726)
Lake whitefish	0.0071 (0.0029)	0 (0)	0 (0)	1,207 (998)	1,120 (1,541)	1,356 (971)	4,429 (3,036)	32 (66)	3,875 (3,220)	12,019 (4,889)
Round whitefish	0.0048 (0.0034)	0 (0)	17 (36)	160 (284)	1,396 (1,592)	1,818 (1,938)	2,908 (4,044)	487 (979)	1,347 (2,897)	8,133 (5,664)
Burbot	0.0001 (0.0001)	0 (0)	0 (0)	27 (55)	24 (36)	33 (72)	45 (74)	17 (34)	0 (0)	146 (127)
Other	0.0000 (0.0000)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	44 (88)	0 (0)	44 (88)
Total	0.7554 (0.1183)	339 (554)	279,767 (52,126)	58,230 (17,340)	199,000 (90,469)	377,369 (114,626)	283,305 (65,841)	62,312 (15,977)	21,141 (8,689)	1,281,463 (170,316)
Angler hours		1,495 (2,579)	163,037 (37,621)	194,298 (34,164)	204,544 (34,671)	354,301 (58,032)	515,562 (100,858)	214,829 (47,659)	48,343 (14,181)	1,696,409 (140,726)
Angler trips		245 (410)	37,415 (9,107)	43,416 (7,179)	47,131 (7,490)	77,304 (12,154)	105,482 (19,550)	45,360 (9,641)	14,211 (3,415)	370,564 (28,728)
Angler days		245 (410)	34,334 (8,977)	38,517 (6,533)	40,805 (6,792)	71,647 (11,745)	98,867 (18,231)	41,464 (9,293)	12,732 (3,198)	338,611 (27,138)

Table 5.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the Lake Michigan pier fishery at all survey areas combined (9), 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month									Season
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
Coho salmon	0.0069 (0.0025)	177 (91)	179 (112)	767 (484)	0 (0)	0 (0)	252 (257)	238 (147)	121 (185)	0 (0)	1,734 (614)
Chinook salmon	0.0079 (0.0041)	6 (8)	29 (45)	14 (21)	11 (18)	0 (0)	1,463 (947)	443 (369)	0 (0)	0 (0)	1,966 (1,018)
Rainbow trout	0.0127 (0.0058)	3 (6)	127 (188)	30 (33)	51 (108)	1,534 (1,335)	196 (218)	263 (209)	534 (274)	434 (260)	3,172 (1,437)
Brown trout	0.0071 (0.0021)	77 (68)	463 (263)	891 (349)	0 (0)	69 (143)	149 (132)	126 (120)	10 (20)	0 (0)	1,785 (498)
Lake trout	0.0000 (0.0000)	0 (0)	0 (0)	0 (0)	6 (12)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	6 (12)
Channel catfish	0.0058 (0.0044)	0 (0)	222 (235)	561 (758)	90 (132)	8 (16)	478 (721)	85 (124)	0 (0)	0 (0)	1,444 (1,088)
Rock bass	0.0002 (0.0002)	0 (0)	0 (0)	16 (33)	0 (0)	0 (0)	22 (33)	9 (19)	0 (0)	0 (0)	47 (50)
Pumpkinseed	0.0002 (0.0004)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	53 (106)	0 (0)	0 (0)	0 (0)	53 (106)
Bluegill	0.0017 (0.0019)	0 (0)	0 (0)	0 (0)	2 (4)	0 (0)	162 (319)	268 (376)	0 (0)	0 (0)	432 (493)
Smallmouth bass	0.0004 (0.0005)	0 (0)	0 (0)	0 (0)	17 (35)	0 (0)	4 (8)	79 (115)	0 (0)	0 (0)	100 (120)
Largemouth bass	0.0002 (0.0004)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	42 (85)	0 (0)	0 (0)	0 (0)	42 (85)
Black crappie	0.0002 (0.0002)	0 (0)	51 (47)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	51 (47)
Yellow perch	0.4546 (0.1049)	0 (0)	13,215 (7,555)	9,730 (5,602)	22,316 (6,836)	40,818 (18,458)	21,285 (10,653)	6,082 (4,959)	0 (0)	121 (154)	113,567 (24,779)
Freshwater drum	0.0069 (0.0090)	0 (0)	0 (0)	1,504 (2,232)	16 (26)	188 (385)	0 (0)	25 (56)	0 (0)	0 (0)	1,733 (2,266)
Round whitefish	0.0075 (0.0041)	0 (0)	6 (13)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1,686 (978)	178 (221)	1,870 (1,003)
Other	0.0001 (0.0002)	0 (0)	0 (0)	33 (68)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	33 (68)

Table 5.—Continued:

Species	Total catch per hour	Month									Season
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
Total	0.5126 (0.1073)	263 (114)	14,292 (7,567)	13,546 (6,108)	22,509 (6,838)	42,617 (18,511)	24,106 (10,731)	7,618 (4,998)	2,351 (1,033)	733 (374)	128,035 (25,007)
Angler hours		2,200 (563)	26,240 (3,334)	20,922 (2,096)	31,997 (7,033)	77,629 (15,083)	45,523 (6,122)	24,015 (3,409)	13,947 (2,545)	7,317 (2,283)	249,790 (18,804)
Angler trips		492 (136)	10,165 (1,405)	6,870 (1,019)	12,996 (2,779)	31,421 (5,190)	16,779 (2,660)	10,334 (1,972)	4,138 (762)	2,014 (642)	95,209 (7,046)
Angler days		416 (119)	8,736 (1,350)	6,185 (968)	11,109 (2,449)	28,859 (4,947)	14,632 (2,354)	8,141 (1,480)	3,283 (686)	1,928 (626)	83,289 (6,468)

Table 6.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the Lake Michigan shore fishery at all survey areas combined (10), 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month								Season
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
Coho salmon	0.0018 (0.0036)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	109 (219)	0 (0)	109 (219)
Chinook salmon	0.0111 (0.0065)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	463 (340)	217 (196)	0 (0)	680 (392)
Rainbow trout	0.0527 (0.0130)	0 (0)	253 (262)	0 (0)	0 (0)	0 (0)	51 (103)	2,791 (697)	133 (89)	3,228 (757)
Brown trout	0.0028 (0.0026)	0 (0)	52 (104)	0 (0)	0 (0)	17 (34)	38 (76)	62 (84)	0 (0)	169 (157)
Rainbow smelt	0.0022 (0.0034)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	133 (204)	0 (0)	133 (204)
Northern pike	0.0009 (0.0013)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	7 (14)	48 (79)	0 (0)	55 (80)
Black bullhead	0.0060 (0.0095)	93 (137)	276 (566)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	369 (582)
Brown	0.0215 (0.0276)	134 (141)	0 (0)	149 (249)	1,004 (1,664)	0 (0)	29 (59)	0 (0)	0 (0)	1,316 (1,689)
Channel catfish	0.0039 (0.0047)	0 (0)	0 (0)	0 (0)	238 (288)	0 (0)	0 (0)	0 (0)	0 (0)	238 (288)
Rock bass	0.0301 (0.0179)	0 (0)	0 (0)	1,041 (551)	391 (566)	0 (0)	371 (745)	41 (86)	0 (0)	1,844 (1,089)
Pumpkinseed	0.0122 (0.0093)	0 (0)	0 (0)	0 (0)	0 (0)	255 (399)	449 (395)	41 (86)	0 (0)	745 (568)
Bluegill	0.0076 (0.0089)	0 (0)	0 (0)	0 (0)	157 (313)	182 (370)	124 (248)	0 (0)	0 (0)	463 (544)
Smallmouth bass	0.0159 (0.0094)	0 (0)	73 (146)	637 (526)	62 (78)	114 (114)	45 (83)	45 (75)	0 (0)	976 (574)
Black crappie	0.0216 (0.0209)	49 (100)	438 (815)	651 (927)	0 (0)	0 (0)	184 (316)	0 (0)	0 (0)	1,322 (1,278)
Yellow perch	0.3595 (0.1354)	2,175 (2,206)	1,260 (1,308)	4,794 (3,500)	6,259 (5,532)	2,520 (3,270)	2,016 (984)	2,990 (2,246)	0 (0)	22,014 (8,132)
Walleye	0.0009 (0.0016)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	54 (94)	0 (0)	0 (0)	54 (94)
Lake whitefish	0.0015 (0.0031)	0 (0)	0 (0)	89 (181)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	89 (181)

Table 6.—Continued:

Species	Total catch per hour	Month								Season
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
Round whitefish	0.0004 (0.0008)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	27 (56)	0 (0)	27 (56)
Other	0.0018 (0.0037)	0 (0)	0 (0)	113 (235)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	113 (235)
Total	0.5543 (0.1465)	2,451 (2,217)	2,352 (1,672)	7,474 (3,720)	8,111 (5,821)	3,088 (3,317)	3,831 (1,411)	6,504 (2,386)	133 (89)	33,944 (8,610)
Angler hours		1,633 (288)	10,871 (1,674)	12,843 (2,794)	8,400 (1,660)	4,970 (1,025)	7,343 (1,050)	12,971 (1,817)	2,202 (1,271)	61,233 (4,530)
Angler trips		678 (150)	4,681 (1,157)	5,079 (1,436)	4,187 (1,503)	2,372 (778)	2,743 (471)	4,449 (796)	894 (832)	25,083 (2,799)
Angler days		557 (178)	3,584 (1,178)	4,301 (1,405)	3,503 (1,304)	2,222 (780)	2,277 (447)	3,645 (713)	873 (832)	20,962 (2,665)

Table 7.—Estimated yellow perch catch rate (fish per angler hour), number caught, and angler effort (hours) at selected Lake Michigan ports and fishing areas, April-October, 1985-90. Two standard errors in parentheses.

Area	1985		1986		1987		1988		1989		1990	
	Catch per hour	Number caught	Catch per hour	Number caught	Catch per hour	Number caught	Catch per hour	Number caught	Catch per hour	Number caught	Catch per hour	Number caught
St. Joseph	0.797 (0.257)	664,671 (193,119)	0.972 (0.547)	590,044 (307,649)	1.213 (0.864)	448,285 (298,522)	1.356 (0.668)	575,937 (266,099)	0.730 (0.196)	313,077 (84,235)	1.409 (0.592)	348,313 (128,800)
Grand Haven	0.187 (0.045)	110,083 (23,606)	0.114 (0.049)	79,972 (29,962)	0.281 (0.115)	213,199 (77,071)	0.365 (0.226)	156,496 (85,951)	0.595 (0.277)	121,713 (52,258)	0.359 (0.158)	74,151 (28,632)
Muskegon	0.108 (0.049)	54,923 (21,361)	0.167 (0.162)	53,516 (51,027)	0.904 (0.503)	307,326 (157,717)	0.829 (0.382)	190,964 (73,156)	1.102 (0.475)	174,434 (64,152)	1.460 (0.578)	195,984 (53,223)
Ludington	0.170 (0.080)	121,230 (51,031)	0.078 (0.061)	64,712 (46,674)	0.374 (0.182)	229,841 (92,112)	0.473 (0.306)	178,483 (101,864)	0.284 (0.112)	115,202 (38,771)	0.516 (0.201)	119,587 (39,674)
Manistee	0.035 (0.030)	22,286 (18,626)	0.332 (0.206)	226,199 (131,847)	0.265 (0.136)	134,736 (60,864)	0.684 (0.502)	298,088 (210,724)	0.433 (0.232)	115,093 (57,456)	0.182 (0.090)	36,484 (14,952)
West Grand Traverse Bay	0.207 (0.089)	58,453 (24,657)	0.439 (0.251)	76,971 (43,181)	0.654 (0.338)	102,182 (51,052)	0.061 (0.045)	8,771 (6,431)	0.177 (0.094)	24,167 (12,406)	0.347 (0.154)	31,445 (13,693)
Little Bay de Noc	0.483 (0.217)	64,609 (27,230)	0.700 (0.265)	139,828 (50,923)	0.463 (0.141)	57,750 (16,060)	0.384 (0.209)	60,504 (32,156)	0.403 (0.171)	95,468 (30,042)	0.357 (0.096)	112,798 (27,533)
Total	0.295 (0.057)	1,096,255 (206,419)	0.346 (0.098)	1,231,242 (349,527)	0.516 (0.127)	1,493,319 (367,400)	0.669 (0.167)	1,469,243 (373,369)	0.522 (0.077)	959,154 (140,823)	0.645 (0.118)	918,762 (151,608)
Angler Hours		3,713,865 (253,547)		3,556,617 (361,386)		2,892,057 (288,228)		2,197,822 (220,751)		1,837,704 (144,156)		1,424,918 (111,738)

Table 8.—Estimated sportfishing catch and effort for nine Lake Michigan index ports combined (New Buffalo, St. Joseph, Grand Haven, Muskegon, Ludington, Manistee, Frankfort, West Grand Traverse Bay, and Charlevoix) April-October, 1985-90. Two standard errors in parentheses.

Species	Year					
	1985	1986	1987	1988	1989	1990
Coho salmon	75,585 (13,667)	107,588 (22,779)	86,876 (19,062)	36,646 (12,950)	75,364 (25,170)	33,229 (5,218)
Chinook salmon	338,855 (42,266)	404,035 (93,386)	259,718 (58,951)	106,287 (21,557)	80,114 (18,036)	58,022 (7,299)
Rainbow trout	29,846 (7,932)	23,296 (12,655)	26,981 (6,028)	29,081 (6,999)	29,854 (5,736)	33,725 (4,959)
Brown trout	33,488 (6,762)	50,897 (15,265)	19,350 (6,197)	16,336 (5,142)	14,430 (4,014)	13,669 (3,124)
Lake trout	87,620 (15,752)	113,382 (44,421)	79,929 (18,234)	67,955 (12,594)	79,886 (13,014)	51,283 (6,196)
Angler hours	4,303,895 (263,743)	3,938,697 (435,727)	3,534,084 (356,012)	2,633,377 (239,188)	2,355,718 (233,999)	1,732,593 (136,970)

Table 9.—Catch rates (fish per angler hour) of salmonids at nine Lake Michigan index ports combined, April-October, 1985-90. Two standard errors in parentheses.

Species	Year					
	1985	1986	1987	1988	1989	1990
Coho salmon	0.018 (0.003)	0.027 (0.007)	0.025 (0.006)	0.014 (0.005)	0.032 (0.011)	0.019 (0.003)
Chinook salmon	0.079 (0.010)	0.103 (0.024)	0.073 (0.017)	0.040 (0.008)	0.034 (0.008)	0.033 (0.004)
Rainbow trout	0.007 (0.002)	0.006 (0.003)	0.008 (0.002)	0.011 (0.003)	0.013 (0.002)	0.019 (0.003)
Brown trout	0.008 (0.002)	0.013 (0.004)	0.005 (0.002)	0.006 (0.002)	0.006 (0.002)	0.008 (0.002)
Lake trout	0.026 (0.005)	0.036 (0.015)	0.030 (0.008)	0.034 (0.007)	0.044 (0.009)	0.039 (0.006)

Table 10.—Estimated sport catch and catch rate (fish per angler hour) for chinook salmon and lake trout at Rogers City, Harrisville, and Oscoda combined, April-October, 1986-90. Two standard errors in parentheses.

Species	Year				
	1986	1987	1988	1989 ¹	1990
Chinook salmon					
Catch	19,485 (3,790)	34,400 (6,695)	38,495 (5,682)	—	26,313 (19,463)
Catch rate	0.047 (0.012)	0.070 (0.017)	0.062 (0.014)	—	0.048 (0.039)
Lake trout					
Catch	19,733 (6,801)	14,099 (4,494)	40,784 (35,490)	—	12,786 (2,639)
Catch rate	0.048 (0.018)	0.029 (0.001)	0.066 (0.058)	—	0.023 (0.006)
Angler hours	414,833 (69,026)	494,710 (68,897)	621,358 (109,013)	— —	549,334 (78,751)

¹No data were collected from Oscoda and Harrisville during 1989.

Table 11.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the Lake Erie boat fishery (non-charter), 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month							Season
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Chinook salmon	0.0000 (0.0000)	0 (0)	106 (227)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	106 (227)
Yellow bullhead	0.0002 (0.0005)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	366 (825)	366 (825)
Channel catfish	0.0090 (0.0086)	66 (124)	3,634 (6,163)	1,573 (2,346)	10,050 (18,513)	5,978 (6,493)	273 (517)	359 (679)	21,933 (20,715)
White perch	0.0085 (0.0057)	0 (0)	501 (1,075)	4,633 (4,391)	9,102 (9,087)	4,498 (8,533)	1,046 (2,168)	854 (1,925)	20,634 (13,573)
White bass	0.0279 (0.0142)	1,080 (1,002)	18,335 (16,174)	14,852 (10,330)	8,531 (10,697)	14,272 (16,313)	584 (787)	10,375 (19,516)	68,029 (33,635)
Rock bass	0.0006 (0.0012)	0 (0)	0 (0)	0 (0)	1,343 (2,739)	0 (0)	0 (0)	0 (0)	1,343 (2,739)
White crappie	0.0000 (0.0000)	0 (0)	94 (196)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	94 (196)
Yellow perch	0.3107 (0.1558)	106 (152)	2,430 (3,082)	9,818 (6,483)	10,526 (8,518)	208,196 (124,124)	223,570 (118,690)	302,684 (325,461)	757,330 (368,162)
Walleye	0.3065 (0.0706)	15,463 (8,951)	82,939 (38,636)	348,627 (94,149)	266,666 (102,634)	28,974 (16,599)	2,938 (5,502)	1,522 (3,236)	747,129 (145,900)
Freshwater drum	0.0013 (0.0011)	0 (0)	0 (0)	1,166 (1,597)	1,553 (2,169)	331 (672)	212 (439)	0 (0)	3,262 (2,811)
Other	0.0004 (0.0006)	0 (0)	60 (129)	724 (1,472)	0 (0)	0 (0)	0 (0)	286 (443)	1,070 (1,543)
Total	0.6652 (0.1825)	16,715 (9,009)	108,099 (42,463)	381,393 (95,091)	307,771 (105,633)	262,249 (126,743)	228,623 (118,842)	316,446 (326,069)	1,621,296 (398,237)
Angler hours		36,162 (19,833)	370,289 (138,374)	786,281 (179,102)	610,444 (170,162)	350,167 (68,193)	163,877 (44,549)	120,211 (41,363)	2,437,431 (298,193)
Angler trips		6,497 (3,332)	67,140 (24,952)	123,481 (28,251)	95,430 (27,794)	64,419 (13,509)	38,106 (10,681)	21,707 (7,824)	416,780 (50,617)
Angler days		6,497 (3,332)	67,029 (24,933)	123,329 (28,220)	95,430 (27,794)	64,419 (13,509)	38,106 (10,681)	21,707 (7,824)	416,517 (50,591)

Table 12.—Estimated yellow perch and walleye catch per hour, number caught, and angler effort (hours) for the Lake Erie boat fishery during May-September, 1986-90. Two standard errors in parentheses.

Year	Yellow perch		Walleye		Angler hours
	Catch per hour	Number caught	Catch per hour	Number caught	
1986	0.308 (0.088)	616,775 (175,555)	0.302 (0.055)	605,666 (110,365)	2,003,342 (250,754)
1987	0.132 (0.062)	310,342 (146,740)	0.382 (0.064)	901,202 (151,019)	2,357,615 (305,725)
1988	0.073 (0.047)	318,786 (205,749)	0.458 (0.096)	1,995,530 (419,052)	4,356,500 (702,517)
1989	0.259 (0.061)	905,040 (211,605)	0.305 (0.059)	1,067,851 (204,768)	3,495,520 (543,137)
1990	0.200 (0.119)	463,813 (172,100)	0.328 (0.069)	763,522 (145,589)	2,324,865 (294,644)

Table 13.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for all Lake Superior survey areas combined (7), by all modes of non-charter sportfishing, 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month						Season
		May	Jun	Jul	Aug	Sep	Oct	
Pink salmon	0.0000 (0.0000)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (5)	2 (5)
Coho salmon	0.0087 (0.0028)	242 (138)	194 (121)	231 (169)	96 (88)	205 (162)	35 (40)	1,003 (313)
Chinook salmon	0.0094 (0.0026)	397 (196)	265 (125)	85 (115)	118 (91)	214 (111)	6 (13)	1,085 (297)
Rainbow trout	0.0027 (0.0016)	76 (88)	87 (111)	21 (25)	0 (0)	87 (115)	41 (44)	312 (189)
Brown trout	0.0020 (0.0012)	26 (28)	65 (61)	23 (41)	66 (77)	40 (90)	17 (25)	237 (144)
Brook trout	0.0000 (0.0000)	0 (0)	4 (9)	0 (0)	0 (0)	0 (0)	0 (0)	4 (9)
Lake trout	0.1429 (0.0187)	1,159 (416)	3,315 (808)	6,270 (1,359)	3,785 (939)	1,353 (510)	641 (380)	16,523 (1,990)
Splake	0.0030 (0.0020)	13 (19)	51 (47)	0 (0)	0 (0)	34 (33)	246 (224)	344 (232)
Northern pike	0.0008 (0.0010)	0 (0)	34 (39)	52 (105)	10 (21)	0 (0)	0 (0)	96 (114)
Largemouth bass	0.0001 (0.0002)	0 (0)	17 (35)	0 (0)	0 (0)	0 (0)	0 (0)	17 (35)
Yellow perch	0.0047 (0.0050)	3 (6)	0 (0)	537 (576)	0 (0)	0 (0)	0 (0)	540 (576)
Walleye	0.0280 (0.0088)	0 (0)	930 (429)	1,797 (860)	484 (281)	21 (43)	0 (0)	3,232 (1,002)
Lake whitefish	0.0062 (0.0049)	85 (102)	200 (365)	83 (162)	0 (0)	0 (0)	348 (390)	716 (567)
Round whitefish	0.0114 (0.0089)	4 (8)	37 (59)	14 (29)	89 (179)	28 (57)	1,141 (1,005)	1,313 (1,025)

Table 13.—Continued:

Species	Total catch per hour	Month						Season
		May	Jun	Jul	Aug	Sep	Oct	
Total	0.2199 (0.0256)	2,005 (500)	5,199 (1,012)	9,113 (1,732)	4,648 (1,008)	1,982 (571)	2,477 (1,167)	25,424 (2,642)
Angler hours		10,893 (1,304)	24,849 (2,781)	35,683 (3,490)	24,382 (2,582)	15,291 (2,576)	4,512 (1,099)	115,610 (6,010)
Angler trips		2,764 (368)	5,232 (630)	7,272 (795)	5,435 (626)	4,163 (671)	1,406 (334)	26,272 (1,455)
Angler days		2,693 (364)	5,092 (614)	7,217 (794)	5,237 (617)	4,030 (668)	1,371 (327)	25,640 (1,440)

Table 14.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the Saginaw Bay (Tawas to Port Austin) winter ice fishery, 1991. Two standard errors in parentheses.

Species	Total catch per hour	Month			Season
		Jan	Feb	Mar	
Rainbow trout	0.0001 (0.0002)	0 (0)	23 (47)	5 (10)	28 (48)
Brown trout	0.0001 (0.0001)	0 (0)	13 (22)	20 (32)	33 (39)
Splake	0.0000 (0.0000)	0 (0)	5 (10)	0 (0)	5 (10)
Rainbow smelt	0.0001 (0.0001)	0 (0)	31 (30)	0 (0)	31 (30)
Northern pike	0.0021 (0.0012)	215 (238)	378 (253)	39 (80)	632 (356)
White sucker	0.0004 (0.0005)	0 (0)	0 (0)	111 (128)	111 (128)
Channel catfish	0.0002 (0.0003)	0 (0)	28 (59)	43 (76)	71 (96)
White perch	0.0040 (0.0057)	981 (1,665)	72 (110)	133 (203)	1,186 (1,681)
White bass	0.0023 (0.0048)	0 (0)	690 (1,449)	0 (0)	690 (1,449)
Rock bass	0.0002 (0.0003)	39 (80)	0 (0)	25 (50)	64 (94)
Pumpkinseed	0.0013 (0.0025)	0 (0)	0 (0)	386 (751)	386 (751)
Bluegill	0.0003 (0.0006)	0 (0)	0 (0)	74 (150)	74 (150)
White crappie	0.0004 (0.0006)	0 (0)	39 (84)	92 (181)	131 (200)
Black crappie	0.0031 (0.0038)	0 (0)	762 (1,097)	148 (214)	910 (1,118)
Yellow perch	2.7647 (0.5191)	317,326 (82,121)	192,226 (61,211)	305,959 (76,724)	815,511 (127,974)

Table 14.—Continued:

Species	Total catch per hour	Month			Season
		Jan	Feb	Mar	
Walleye	0.0058 (0.0039)	356 (534)	1,197 (995)	149 (169)	1,702 (1,142)
Round whitefish	0.0001 (0.0002)	0 (0)	12 (25)	11 (25)	23 (35)
Burbot	0.0003 (0.0003)	18 (36)	44 (52)	12 (20)	74 (66)
Total	2.7855 (0.5203)	318,935 (82,140)	195,520 (61,247)	307,207 (76,729)	821,662 (128,006)
Angler hours		137,092 (20,576)	84,119 (16,114)	73,765 (15,530)	294,976 (30,401)
Angler trips		36,019 (5,400)	21,224 (3,971)	26,369 (5,993)	83,612 (8,991)
Angler days		32,891 (5,197)	19,875 (3,700)	22,758 (5,071)	75,524 (8,149)

Table 15.—Estimated yellow perch and walleye catch per hour, number caught, and angler effort (hours) for the Saginaw Bay (Port Austin to Tawas) ice fishery, January-March. Two standard errors in parentheses.

Year	Yellow perch		Walleye		Angler hours
	Catch per hour	Number caught	Catch per hour	Number caught	
1984 ¹	2.454 (0.379)	1,570,402 (219,616)	0.007 (0.011)	4,481 (7,338)	639,887 (75,182)
1987	4.794 (0.832)	3,153,609 (446,851)	0.001 (0.001)	636 (388)	657,770 (65,934)
1988	2.418 (0.549)	675,723 (133,958)	0.017 (0.017)	4,658 (4,617)	279,505 (30,909)
1991	2.765 (0.519)	815,511 (127,974)	0.006 (0.004)	1,702 (1,142)	294,976 (30,401)

¹Ryckman (1986).

Table 16.—Estimated yellow perch (January-March) and walleye (January-February) catch per hour, number caught, and angler effort (hours) for the winter ice fishery on Little Bay de Noc, Lake Michigan, 1986-91. Two standard errors in parentheses.

Year	Yellow perch		Walleye		Angler hours
	Catch per hour	Number caught	Catch per hour	Number caught	
1986	0.824 (0.216)	226,409 (52,473)	0.020 (0.011)	4,890 (2,565)	274,745 (33,342)
1987 ¹	—	—	—	—	—
1988	0.491 (0.191)	65,290 (22,140)	0.128 (0.076)	11,798 (6,435)	133,107 (25,403)
1989	0.476 (0.149)	87,083 (25,187)	0.036 (0.019)	6,062 (3,048)	182,963 (21,823)
1990	0.902 (0.186)	176,068 (32,411)	0.057 (0.017)	9,448 (2,758)	195,210 (18,176)
1991	0.974 (0.202)	215,532 (39,029)	0.029 (0.012)	5,183 (2,090)	221,355 (22,579)

¹1987 data not reliable.

Table 17.—Estimated sport catch, catch rate (fish per hour), and angler effort (hours) for various species from the Keweenaw Bay winter ice fishery, February-March, 1988-91. Two standard errors in parentheses.

Species	1988		1989		1990 ²		1991	
	Catch per hour	Number	Catch per hour	Number	Catch per hour	Number	Catch per hour	Number
Coho salmon	0.075 (0.030)	5,610 (2,061)	0.004 (0.008)	320 (660)	0.060 (0.041)	661 (413)	0.062 (0.025)	5,774 (1,998)
Chinook salmon	0.004 (0.003)	286 (225)	0.007 (0.013)	552 (1,021)	0.030 (0.035)	332 (373)	0.007 (0.005)	683 (442)
Lake trout	0.114 (0.035)	8,596 (2,306)	0.320 (0.182)	26,446 (13,705)	—	—	0.048 (0.019)	4,414 (1,521)
Lake whitefish	0.065 (0.048)	4,902 (3,544)	0.385 (0.044)	3,188 (3,572)	0.001 (0.019)	106 (212)	0.003 (0.003)	267 (234)
Siscowet ¹ lake trout	—	—	—	—	—	—	0.106 (0.035)	9,776 (2,570)
Angler hours	75,204 (11,044)		82,713 (19,380)		11,031 (2,951)		92,480 (18,268)	

¹Siscowet lake trout were differentiated from lake trout beginning with the 1991 season.

²Only March was surveyed due to poor ice conditions caused by mild winter weather.

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APPENDICES

SECTION I: LAKE MICHIGAN CATCH AND EFFORT ESTIMATES BY SITE

Appendix 1.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for Little Bay de Noc, by all modes of sportfishing, 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month							Season
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Chinook salmon	0.0008 (0.0007)	0 (0)	0 (0)	0 (0)	82 (89)	0 (0)	162 (208)	0 (0)	244 (226)
Brown trout	0.0001 (0.0002)	23 (51)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	23 (51)
Northern pike	0.0046 (0.0020)	0 (0)	366 (377)	359 (328)	94 (111)	268 (265)	295 (200)	83 (106)	1,465 (619)
White sucker	0.0009 (0.0015)	231 (467)	0 (0)	27 (54)	0 (0)	0 (0)	27 (53)	0 (0)	285 (473)
Redhorse spp.	0.0001 (0.0002)	0 (0)	0 (0)	27 (54)	0 (0)	0 (0)	0 (0)	0 (0)	27 (54)
Black bullhead	0.0015 (0.0020)	186 (244)	276 (566)	0 (0)	0 (0)	0 (0)	13 (27)	0 (0)	475 (617)
Brown bullhead	0.0049 (0.0055)	134 (141)	35 (72)	226 (325)	1,004 (1,664)	114 (249)	29 (59)	0 (0)	1,542 (1,722)
Channel catfish	0.0003 (0.0003)	0 (0)	0 (0)	20 (29)	0 (0)	36 (73)	16 (24)	13 (27)	85 (86)
White perch	0.0002 (0.0004)	0 (0)	0 (0)	0 (0)	0 (0)	72 (145)	0 (0)	0 (0)	72 (145)
Rock bass	0.0197 (0.0170)	0 (0)	138 (224)	2,620 (2,900)	2,444 (4,324)	444 (751)	533 (775)	41 (86)	6,220 (5,323)
Pumpkinseed	0.0045 (0.0029)	47 (101)	0 (0)	37 (75)	441 (595)	398 (494)	449 (395)	41 (86)	1,413 (882)
Bluegill	0.0015 (0.0018)	0 (0)	0 (0)	0 (0)	157 (313)	182 (370)	124 (248)	0 (0)	463 (544)
Smallmouth bass	0.0111 (0.0058)	0 (0)	0 (0)	1,533 (1,498)	257 (305)	635 (655)	1,050 (696)	45 (75)	3,520 (1,804)
Black crappie	0.0136 (0.0112)	1,721 (1,962)	438 (815)	1,956 (2,780)	0 (0)	0 (0)	184 (316)	0 (0)	4,299 (3,513)
Yellow perch	0.3568 (0.0961)	58,621 (21,800)	4,025 (3,410)	7,605 (6,205)	22,774 (12,934)	11,447 (7,318)	6,470 (2,880)	1,856 (1,884)	112,798 (27,533)

Appendix 1.—Continued:

Species	Total catch per hour	Month							Season
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Walleye	0.0981 (0.0231)	0 (0)	3,662 (2,363)	4,135 (2,202)	5,119 (1,982)	7,712 (4,645)	8,310 (2,033)	2,079 (858)	31,017 (6,388)
Freshwater drum	0.0010 (0.0008)	0 (0)	35 (72)	19 (37)	214 (199)	45 (91)	0 (0)	0 (0)	313 (233)
Burbot	0.0001 (0.0002)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	17 (34)	0 (0)	17 (34)
Other	0.0001 (0.0002)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	44 (88)	0 (0)	44 (88)
Total	0.5198 (0.1095)	60,963 (21,895)	8,975 (4,289)	18,564 (7,871)	32,586 (13,903)	21,353 (8,756)	17,723 (3,732)	4,158 (2,078)	164,322 (29,120)
Angler hours		23,757 (7,374)	68,345 (17,696)	58,483 (15,059)	46,273 (6,162)	62,133 (24,932)	40,251 (5,442)	16,903 (3,616)	316,145 (36,008)
Angler trips		5,405 (1,691)	18,813 (4,744)	16,841 (4,378)	12,549 (2,197)	14,450 (4,437)	8,696 (1,145)	4,681 (1,137)	81,435 (8,465)
Angler days		4,681 (1,544)	14,249 (3,803)	12,303 (3,254)	10,317 (1,902)	12,828 (4,001)	7,280 (994)	3,792 (1,033)	65,450 (7,008)

Appendix 2.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for Big Bay de Noc, by all modes of sportfishing, 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month							Season
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Northern pike	0.0045 (0.0032)	0 (0)	0 (0)	0 (0)	78 (98)	73 (119)	156 (166)	16 (46)	323 (231)
Black bullhead	0.0001 (0.0002)	0 (0)	0 (0)	9 (19)	0 (0)	0 (0)	0 (0)	0 (0)	9 (19)
Brown bullhead	0.0022 (0.0029)	0 (0)	0 (0)	30 (61)	0 (0)	0 (0)	129 (197)	0 (0)	159 (206)
Channel catfish	0.0010 (0.0010)	0 (0)	0 (0)	60 (70)	10 (21)	0 (0)	0 (0)	0 (0)	70 (73)
White bass	0.0003 (0.0006)	0 (0)	0 (0)	0 (0)	25 (51)	0 (0)	0 (0)	0 (0)	25 (51)
Rock bass	0.0319 (0.0509)	0 (0)	0 (0)	449 (320)	50 (80)	1,813 (3,665)	0 (0)	0 (0)	2,312 (3,680)
Smallmouth bass	0.0661 (0.0245)	0 (0)	1,946 (1,126)	1,400 (1,066)	528 (413)	543 (486)	212 (324)	166 (151)	4,795 (1,714)
Yellow perch	0.9567 (0.2643)	57,348 (16,990)	144 (210)	715 (469)	6,262 (4,535)	3,823 (2,989)	1,147 (1,448)	0 (0)	69,439 (17,903)
Walleye	0.0332 (0.0134)	0 (0)	265 (231)	152 (170)	1,298 (637)	602 (623)	91 (116)	0 (0)	2,408 (943)
Total	1.0959 (0.2756)	57,348 (16,990)	2,355 (1,168)	2,815 (1,223)	8,251 (4,600)	6,854 (4,796)	1,735 (1,510)	182 (158)	79,540 (18,384)
Angler hours		25,752 (5,538)	10,414 (2,292)	9,506 (1,796)	14,894 (2,650)	7,027 (1,964)	4,100 (1,146)	885 (700)	72,578 (7,199)
Angler trips		6,893 (1,476)	2,738 (651)	2,518 (513)	4,405 (836)	2,470 (852)	1,143 (351)	248 (234)	20,415 (2,114)
Angler days		5,140 (1,148)	2,256 (608)	2,073 (471)	3,586 (735)	2,301 (839)	840 (281)	248 (234)	16,444 (1,813)

Appendix 3.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for Charlevoix, by all modes of sportfishing, 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month					Season
		May	Jun	Jul	Aug	Sep	
Chinook salmon	0.0442 (0.0196)	0 (0)	0 (0)	0 (0)	1,554 (864)	1,021 (549)	2,575 (1,024)
Rainbow trout	0.0128 (0.0109)	0 (0)	0 (0)	727 (617)	20 (42)	0 (0)	747 (618)
Brown trout	0.0002 (0.0004)	0 (0)	1 (2)	0 (0)	12 (26)	0 (0)	13 (26)
Lake trout	0.1455 (0.0693)	0 (0)	4,012 (2,791)	2,577 (1,915)	1,877 (1,427)	4 (8)	8,470 (3,673)
Burbot	0.0002 (0.0004)	0 (0)	11 (23)	0 (0)	0 (0)	0 (0)	11 (23)
Total	0.2030 (0.0774)	0 (0)	4,024 (2,791)	3,304 (2,012)	3,463 (1,669)	1,025 (549)	11,816 (3,863)
Angler hours		0 (0)	6,146 (852)	21,543 (8,072)	20,470 (7,846)	10,050 (1,865)	58,209 (11,442)
Angler trips		0 (0)	2,375 (625)	7,103 (2,269)	5,841 (2,241)	3,382 (1,273)	18,701 (3,490)
Angler days		0 (0)	2,067 (728)	6,796 (2,183)	5,321 (2,070)	2,259 (707)	16,443 (3,175)

Appendix 4.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for Elk Rapids, by all modes of sportfishing, 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month						Season
		May	Jun	Jul	Aug	Sep	Oct	
Coho salmon	0.0045 (0.0069)	0 (0)	0 (0)	0 (0)	0 (0)	70 (161)	109 (219)	179 (272)
Chinook salmon	0.0156 (0.0137)	0 (0)	0 (0)	45 (93)	0 (0)	364 (492)	206 (195)	615 (537)
Rainbow trout	0.0142 (0.0102)	253 (262)	0 (0)	0 (0)	0 (0)	51 (103)	255 (278)	559 (396)
Brown trout	0.0036 (0.0038)	52 (104)	0 (0)	0 (0)	17 (34)	38 (76)	36 (72)	143 (151)
Lake trout	0.0047 (0.0071)	0 (0)	0 (0)	185 (280)	0 (0)	0 (0)	0 (0)	185 (280)
Channel catfish	0.0106 (0.0101)	0 (0)	0 (0)	417 (393)	0 (0)	0 (0)	0 (0)	417 (393)
Rock bass	0.0107 (0.0138)	0 (0)	187 (265)	234 (472)	0 (0)	0 (0)	0 (0)	421 (541)
Smallmouth bass	0.0241 (0.0110)	73 (146)	645 (355)	112 (129)	114 (114)	4 (9)	0 (0)	948 (421)
Yellow perch	0.1778 (0.1929)	684 (990)	6,322 (7,497)	0 (0)	0 (0)	0 (0)	1 (3)	7,007 (7,562)
Lake whitefish	0.0634 (0.0790)	191 (104)	89 (181)	0 (0)	0 (0)	0 (0)	2,219 (3,095)	2,499 (3,102)
Total	0.3292 (0.2124)	1,253 (1,045)	7,243 (7,512)	993 (693)	131 (119)	527 (533)	2,826 (3,122)	12,973 (8,249)
Angler hours		5,713 (700)	8,809 (1,562)	10,675 (2,486)	2,061 (454)	6,720 (2,800)	5,431 (1,091)	39,409 (4,283)
Angler trips		1,603 (260)	2,663 (557)	3,249 (783)	733 (198)	2,516 (1,077)	1,892 (403)	12,656 (1,534)
Angler days		1,407 (273)	2,551 (549)	2,558 (629)	638 (202)	2,233 (1,071)	1,207 (334)	10,594 (1,439)

Appendix 5.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the East Arm of Grand Traverse Bay, by all modes of sportfishing, 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month						Season
		May	Jun	Jul	Aug	Sep	Oct	
Chinook salmon	0.0324 (0.0188)	266 (463)	43 (86)	0 (0)	1,058 (695)	218 (328)	0 (0)	1,585 (901)
Rainbow trout	0.0018 (0.0029)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	89 (142)	89 (142)
Brown trout	0.0006 (0.0010)	16 (33)	0 (0)	0 (0)	0 (0)	0 (0)	15 (36)	31 (49)
Lake trout	0.0396 (0.0261)	305 (592)	146 (225)	1,293 (1,044)	198 (297)	0 (0)	0 (0)	1,942 (1,257)
Smallmouth bass	0.0009 (0.0018)	0 (0)	0 (0)	44 (89)	0 (0)	0 (0)	0 (0)	44 (89)
Yellow perch	0.1316 (0.1191)	561 (1,144)	958 (719)	51 (104)	2,183 (4,438)	1,976 (3,277)	718 (1,064)	6,447 (5,780)
Lake whitefish	0.1824 (0.0793)	985 (991)	1,114 (1,541)	883 (767)	4,264 (3,021)	32 (66)	1,656 (887)	8,934 (3,723)
Round whitefish	0.0229 (0.0332)	0 (0)	391 (646)	733 (1,492)	0 (0)	0 (0)	0 (0)	1,124 (1,626)
Total	0.4123 (0.1562)	2,133 (1,690)	2,652 (1,835)	3,004 (1,981)	7,703 (5,422)	2,226 (3,294)	2,478 (1,393)	20,196 (7,234)
Angler hours		5,162 (1,540)	7,786 (1,599)	12,331 (2,890)	16,159 (4,493)	4,739 (1,562)	2,803 (874)	48,980 (6,056)
Angler trips		1,390 (436)	1,614 (384)	3,521 (873)	4,049 (1,155)	1,429 (528)	779 (246)	12,782 (1,665)
Angler days		1,390 (436)	1,410 (358)	3,076 (844)	3,862 (1,123)	1,328 (518)	779 (246)	11,845 (1,619)

Appendix 6.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the West Arm of Grand Traverse Bay, by all modes of sportfishing, 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month							Season
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Coho salmon	0.0012 (0.0024)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	107 (216)	0 (0)	107 (216)
Chinook salmon	0.0143 (0.0078)	62 (132)	258 (344)	0 (0)	224 (360)	281 (189)	464 (429)	11 (23)	1,300 (697)
Rainbow trout	0.0115 (0.0120)	38 (82)	0 (0)	0 (0)	718 (1,033)	253 (319)	0 (0)	33 (53)	1,042 (1,086)
Brown trout	0.0075 (0.0065)	99 (173)	0 (0)	0 (0)	478 (533)	92 (184)	0 (0)	11 (23)	680 (590)
Lake trout	0.0689 (0.0329)	0 (0)	1,572 (778)	752 (621)	3,231 (2,697)	504 (489)	189 (278)	0 (0)	6,248 (2,929)
Rainbow smelt	0.0015 (0.0023)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	133 (204)	133 (204)
Channel catfish	0.0005 (0.0010)	0 (0)	0 (0)	0 (0)	42 (86)	0 (0)	0 (0)	0 (0)	42 (86)
Rock bass	0.0005 (0.0010)	0 (0)	0 (0)	43 (88)	0 (0)	0 (0)	0 (0)	0 (0)	43 (88)
Smallmouth bass	0.0024 (0.0026)	0 (0)	0 (0)	54 (110)	84 (171)	0 (0)	81 (120)	0 (0)	219 (236)
Yellow perch	0.3469 (0.1544)	3,094 (2,972)	55 (111)	1,506 (3,112)	2,719 (3,826)	4,054 (7,989)	10,305 (6,502)	9,712 (6,945)	31,445 (13,693)
Lake whitefish	0.0074 (0.0074)	0 (0)	31 (63)	0 (0)	473 (596)	165 (297)	0 (0)	0 (0)	669 (669)
Round whitefish	0.0332 (0.0264)	0 (0)	140 (281)	685 (1,414)	1,085 (1,237)	511 (1,028)	487 (979)	101 (108)	3,009 (2,374)
Burbot	0.0003 (0.0006)	0 (0)	27 (55)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	27 (55)
Other	0.0012 (0.0025)	0 (0)	0 (0)	113 (235)	0 (0)	0 (0)	0 (0)	0 (0)	113 (235)

Appendix 6.—Continued:

Species	Total catch per hour	Month							Season
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Total	0.4973 (0.1642)	3,293 (2,981)	2,083 (907)	3,153 (3,485)	9,054 (5,031)	5,860 (8,086)	11,633 (6,600)	10,001 (6,949)	45,077 (14,297)
Angler hours		4,430 (1,536)	10,597 (2,130)	10,671 (3,138)	24,142 (5,612)	15,118 (2,286)	20,929 (3,642)	4,756 (1,599)	90,643 (8,324)
Angler trips		1,253 (374)	2,630 (596)	3,120 (963)	5,778 (1,493)	3,485 (613)	5,647 (1,061)	1,525 (597)	23,438 (2,347)
Angler days		1,126 (373)	2,300 (579)	2,743 (871)	5,479 (1,467)	3,107 (614)	5,163 (1,034)	1,294 (542)	21,212 (2,264)

Appendix 7.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for Frankfort-Elberta, by all modes of sportfishing, 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month								Season
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
Pink salmon	0.0000 (0.0000)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	9 (18)	0 (0)	0 (0)	9 (18)
Coho salmon	0.0207 (0.0132)	0 (0)	0 (0)	0 (0)	36 (55)	2,697 (2,495)	2,017 (1,096)	303 (270)	0 (0)	5,053 (2,739)
Chinook salmon	0.0287 (0.0203)	0 (0)	0 (0)	189 (164)	569 (468)	5,437 (4,327)	766 (500)	49 (60)	0 (0)	7,010 (4,384)
Rainbow trout	0.0407 (0.0190)	149 (191)	31 (49)	201 (202)	2,988 (1,869)	1,197 (1,249)	630 (449)	4,676 (2,325)	65 (76)	9,937 (3,278)
Brown trout	0.0158 (0.0092)	1,402 (1,119)	465 (359)	163 (234)	447 (448)	1,201 (1,314)	127 (164)	49 (104)	0 (0)	3,854 (1,844)
Lake trout	0.0269 (0.0133)	0 (0)	173 (221)	2,436 (1,410)	2,740 (1,677)	988 (955)	230 (210)	0 (0)	0 (0)	6,567 (2,409)
Northern pike	0.0002 (0.0004)	0 (0)	0 (0)	59 (121)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	59 (121)
Yellow perch	0.0002 (0.0004)	0 (0)	57 (116)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	57 (116)
Freshwater drum	0.0001 (0.0002)	0 (0)	0 (0)	0 (0)	0 (0)	19 (46)	0 (0)	0 (0)	0 (0)	19 (46)
Round whitefish	0.0110 (0.0130)	6 (13)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2,603 (3,036)	74 (159)	2,683 (3,040)
Burbot	0.0002 (0.0003)	0 (0)	0 (0)	0 (0)	33 (72)	16 (38)	0 (0)	0 (0)	0 (0)	49 (81)
Other	0.0001 (0.0002)	0 (0)	33 (68)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	33 (68)
Total	0.1449 (0.0570)	1,557 (1,135)	759 (445)	3,048 (1,458)	6,813 (2,595)	11,555 (5,399)	3,779 (1,313)	7,680 (3,835)	139 (176)	35,330 (7,480)
Angler hours		11,629 (6,379)	8,540 (4,294)	18,651 (7,208)	45,684 (21,508)	97,341 (74,832)	37,428 (15,803)	23,840 (10,667)	747 (545)	243,860 (80,854)
Angler trips		3,283 (1,510)	2,302 (999)	4,523 (1,648)	9,989 (4,941)	19,096 (14,022)	7,623 (2,874)	5,500 (2,043)	235 (174)	52,551 (15,475)
Angler days		2,416 (1,191)	1,886 (874)	3,551 (1,376)	9,097 (4,725)	17,252 (12,853)	6,526 (2,611)	4,648 (1,760)	182 (137)	45,558 (14,196)

Appendix 8.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for Manistee, by all modes of sportfishing, 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month								Season
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
Coho salmon	0.0119 (0.0080)	0 (0)	0 (0)	27 (58)	227 (235)	1,498 (1,110)	607 (937)	27 (51)	0 (0)	2,386 (1,474)
Chinook salmon	0.0341 (0.0187)	9 (19)	19 (31)	599 (571)	1,445 (1,487)	4,130 (2,726)	590 (766)	28 (71)	0 (0)	6,820 (3,250)
Rainbow trout	0.0189 (0.0103)	19 (40)	38 (51)	356 (410)	1,431 (1,197)	294 (270)	341 (620)	1,151 (1,053)	148 (162)	3,778 (1,788)
Brown trout	0.0145 (0.0075)	1,535 (941)	492 (322)	0 (0)	214 (224)	335 (277)	314 (723)	20 (32)	0 (0)	2,910 (1,281)
Lake trout	0.0139 (0.0095)	0 (0)	71 (85)	785 (926)	1,416 (1,412)	516 (416)	0 (0)	0 (0)	0 (0)	2,788 (1,741)
Channel catfish	0.0001 (0.0002)	0 (0)	0 (0)	0 (0)	0 (0)	20 (42)	0 (0)	0 (0)	0 (0)	20 (42)
Rock bass	0.0005 (0.0009)	0 (0)	16 (33)	89 (192)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	105 (195)
Smallmouth bass	0.0001 (0.0002)	0 (0)	0 (0)	0 (0)	0 (0)	15 (34)	0 (0)	0 (0)	0 (0)	15 (34)
Yellow perch	0.1822 (0.0897)	10,349 (7,888)	5,243 (3,532)	10,203 (10,668)	9,518 (5,615)	938 (1,622)	112 (249)	0 (0)	121 (154)	36,484 (14,925)
Freshwater drum	0.0001 (0.0002)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	18 (40)	0 (0)	0 (0)	18 (40)
Round whitefish	0.0133 (0.0199)	17 (36)	0 (0)	0 (0)	0 (0)	2,397 (3,911)	0 (0)	147 (237)	104 (154)	2,665 (3,921)
Burbot	0.0001 (0.0002)	0 (0)	0 (0)	0 (0)	0 (0)	29 (64)	0 (0)	0 (0)	0 (0)	29 (64)
Total	0.2898 (0.1130)	11,929 (7,944)	5,879 (3,548)	12,059 (10,733)	14,251 (6,105)	10,172 (5,188)	1,982 (1,561)	1,373 (1,083)	373 (271)	58,018 (16,086)
Angler hours		21,497 (5,464)	14,187 (7,011)	25,063 (12,877)	40,773 (21,583)	61,842 (39,601)	25,876 (26,692)	8,175 (4,094)	2,784 (1,681)	200,197 (54,872)
Angler trips		5,743 (1,407)	3,841 (1,700)	6,622 (3,029)	11,033 (5,239)	14,718 (8,116)	6,906 (6,231)	1,684 (885)	658 (391)	51,205 (12,129)
Angler days		5,056 (1,344)	3,606 (1,646)	5,701 (2,762)	10,012 (4,933)	13,053 (7,471)	6,447 (6,140)	1,445 (816)	636 (381)	45,956 (11,437)

Appendix 9.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for Ludington, by all modes of sportfishing, 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month							Season
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Coho salmon	0.0144 (0.0059)	0 (0)	18 (28)	29 (60)	280 (285)	2,466 (1,097)	546 (392)	13 (32)	3,352 (1,202)
Chinook salmon	0.0485 (0.0175)	0 (0)	58 (68)	716 (533)	2,850 (2,133)	5,954 (2,249)	1,645 (1,141)	18 (35)	11,241 (3,347)
Rainbow trout	0.0195 (0.0085)	11 (23)	34 (62)	48 (60)	588 (576)	2,190 (1,254)	1,100 (800)	558 (694)	4,529 (1,742)
Brown trout	0.0138 (0.0080)	1,851 (1,595)	684 (513)	20 (30)	166 (157)	388 (449)	87 (109)	0 (0)	3,196 (1,745)
Brook trout	0.0005 (0.0010)	0 (0)	118 (245)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	118 (245)
Lake trout	0.0146 (0.0066)	0 (0)	156 (128)	444 (387)	1,531 (1,130)	1,084 (626)	169 (152)	0 (0)	3,384 (1,363)
Brown bullhead	0.0001 (0.0002)	0 (0)	0 (0)	18 (40)	0 (0)	0 (0)	0 (0)	0 (0)	18 (40)
Channel catfish	0.0000 (0.0000)	0 (0)	0 (0)	9 (20)	0 (0)	0 (0)	0 (0)	0 (0)	9 (20)
Rock bass	0.0001 (0.0002)	0 (0)	0 (0)	0 (0)	0 (0)	14 (29)	0 (0)	0 (0)	14 (29)
Bluegill	0.0000 (0.0000)	0 (0)	0 (0)	9 (20)	0 (0)	0 (0)	0 (0)	0 (0)	9 (20)
Yellow perch	0.5155 (0.2007)	314 (663)	25,550 (15,745)	45,269 (23,596)	28,778 (23,259)	19,676 (15,098)	0 (0)	0 (0)	119,587 (39,674)
Round whitefish	0.0020 (0.0019)	0 (0)	20 (41)	320 (342)	0 (0)	0 (0)	0 (0)	115 (237)	455 (418)
Burbot	0.0001 (0.0002)	0 (0)	0 (0)	13 (28)	0 (0)	0 (0)	0 (0)	0 (0)	13 (28)
Total	0.6290 (0.2146)	2,176 (1,727)	26,638 (15,756)	46,895 (23,608)	34,193 (23,393)	31,772 (15,375)	3,547 (1,460)	704 (735)	145,925 (39,936)
Angler hours		8,185 (4,089)	14,772 (5,478)	26,553 (8,512)	54,020 (29,934)	85,228 (28,530)	36,733 (19,400)	6,500 (5,510)	231,991 (47,285)
Angler trips		2,834 (1,357)	3,672 (1,215)	6,708 (1,878)	13,178 (6,318)	17,069 (5,315)	7,150 (3,414)	1,680 (1,127)	52,291 (9,377)
Angler days		2,583 (1,324)	3,583 (1,191)	5,709 (1,694)	12,182 (6,002)	14,724 (4,787)	6,468 (3,176)	1,524 (1,116)	46,773 (8,736)

Appendix 10.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for Muskegon, by all modes of sportfishing, 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month								Season
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
Coho salmon	0.0061 (0.0058)	0 (0)	0 (0)	0 (0)	15 (31)	808 (750)	0 (0)	0 (0)	0 (0)	823 (751)
Chinook salmon	0.0259 (0.0138)	53 (108)	1,158 (734)	486 (456)	136 (196)	1,330 (1,234)	315 (308)	0 (0)	0 (0)	3,478 (1,554)
Rainbow trout	0.0171 (0.0174)	53 (108)	24 (50)	0 (0)	15 (31)	1,547 (1,861)	115 (240)	420 (1,224)	125 (88)	2,299 (2,245)
Brown trout	0.0032 (0.0025)	203 (199)	90 (109)	0 (0)	0 (0)	133 (213)	0 (0)	0 (0)	0 (0)	426 (311)
Lake trout	0.0089 (0.0078)	0 (0)	121 (133)	53 (110)	0 (0)	1,022 (969)	0 (0)	0 (0)	0 (0)	1,196 (984)
Channel catfish	0.0004 (0.0008)	0 (0)	0 (0)	0 (0)	10 (21)	0 (0)	50 (112)	0 (0)	0 (0)	60 (114)
Rock bass	0.0001 (0.0002)	0 (0)	0 (0)	0 (0)	0 (0)	8 (16)	0 (0)	0 (0)	0 (0)	8 (16)
Pumpkinseed	0.0004 (0.0008)	0 (0)	0 (0)	0 (0)	0 (0)	53 (106)	0 (0)	0 (0)	0 (0)	53 (106)
Bluegill	0.0012 (0.0024)	0 (0)	0 (0)	0 (0)	0 (0)	162 (319)	0 (0)	0 (0)	0 (0)	162 (319)
Smallmouth bass	0.0056 (0.0113)	0 (0)	0 (0)	17 (35)	668 (1,503)	4 (8)	67 (112)	0 (0)	0 (0)	756 (1,508)
Black crappie	0.0004 (0.0008)	53 (108)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	53 (108)
Yellow perch	1.4603 (0.5781)	154,135 (43,957)	357 (577)	4,380 (7,853)	6,645 (5,428)	29,891 (28,418)	576 (1,199)	0 (0)	0 (0)	195,984 (53,223)
Freshwater drum	0.0002 (0.0005)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	25 (56)	0 (0)	0 (0)	25 (56)
Total	1.5299 (0.5934)	154,497 (43,958)	1,750 (951)	4,936 (7,867)	7,489 (5,636)	34,958 (28,535)	1,148 (1,272)	420 (1,224)	125 (88)	205,323 (53,331)
Angler hours		28,173 (5,427)	13,327 (7,257)	10,560 (5,624)	13,798 (7,888)	40,789 (23,449)	23,354 (27,174)	3,063 (5,454)	1,140 (232)	134,204 (38,653)
Angler trips		7,017 (1,401)	3,868 (2,337)	2,623 (1,315)	3,974 (2,397)	9,749 (5,547)	5,428 (5,183)	1,006 (1,687)	353 (95)	34,018 (8,683)
Angler days		6,943 (1,397)	3,868 (2,337)	2,623 (1,315)	3,974 (2,397)	9,749 (5,547)	5,100 (4,937)	1,006 (1,687)	332 (94)	33,595 (8,537)

Appendix 11.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for Grand Haven, by all modes of sportfishing, 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month								Season
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
Coho salmon	0.0072 (0.0054)	15 (32)	0 (0)	0 (0)	24 (52)	1,356 (1,057)	61 (88)	30 (63)	0 (0)	1,486 (1,064)
Chinook salmon	0.0172 (0.0103)	120 (119)	624 (593)	619 (878)	922 (1,403)	969 (912)	308 (271)	0 (0)	0 (0)	3,562 (2,003)
Rainbow trout	0.0031 (0.0020)	11 (24)	0 (0)	0 (0)	0 (0)	282 (333)	77 (100)	49 (72)	229 (189)	648 (403)
Brown trout	0.0011 (0.0017)	0 (0)	7 (15)	0 (0)	80 (172)	146 (301)	0 (0)	0 (0)	0 (0)	233 (347)
Lake trout	0.0139 (0.0097)	0 (0)	106 (88)	51 (134)	917 (1,197)	1,786 (1,491)	15 (26)	0 (0)	0 (0)	2,875 (1,919)
Channel catfish	0.0027 (0.0036)	0 (0)	0 (0)	52 (106)	0 (0)	478 (721)	23 (47)	0 (0)	0 (0)	553 (730)
Rock bass	0.0000 (0.0000)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	9 (19)	0 (0)	0 (0)	9 (19)
Bluegill	0.0013 (0.0018)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	268 (376)	0 (0)	0 (0)	268 (376)
Largemouth bass	0.0002 (0.0004)	0 (0)	0 (0)	0 (0)	0 (0)	42 (85)	0 (0)	0 (0)	0 (0)	42 (85)
Yellow perch	0.3587 (0.1582)	0 (0)	568 (777)	16,369 (9,934)	41,046 (25,108)	14,677 (9,169)	1,491 (2,458)	0 (0)	0 (0)	74,151 (28,632)
Freshwater drum	0.0013 (0.0027)	0 (0)	0 (0)	0 (0)	0 (0)	272 (560)	0 (0)	0 (0)	0 (0)	272 (560)
Round whitefish	0.0005 (0.0006)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	94 (115)	0 (0)	94 (115)
Total	0.4073 (0.1642)	146 (126)	1,305 (982)	17,091 (9,974)	42,989 (25,176)	20,008 (9,449)	2,252 (2,506)	173 (150)	229 (189)	84,193 (28,808)
Angler hours		25,288 (32,224)	16,172 (4,923)	26,670 (12,074)	48,242 (12,637)	64,764 (21,916)	18,496 (9,308)	2,217 (1,435)	4,848 (1,911)	206,697 (44,054)
Angler trips		6,244 (8,053)	3,653 (1,078)	7,731 (2,839)	15,044 (3,355)	14,990 (4,537)	4,775 (1,974)	757 (489)	1,662 (955)	54,856 (10,534)
Angler days		6,244 (8,053)	3,653 (1,078)	7,634 (2,825)	14,680 (3,327)	14,990 (4,537)	4,685 (1,964)	757 (489)	1,651 (955)	54,294 (10,519)

Appendix 12.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for St. Joseph-Benton Harbor, by all modes of sportfishing, 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month								Season
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
Coho salmon	0.0275 (0.0146)	177 (91)	2,511 (1,314)	3,480 (3,022)	281 (450)	58 (65)	271 (267)	23 (34)	0 (0)	6,801 (3,339)
Chinook salmon	0.0159 (0.0082)	6 (8)	245 (163)	1,925 (1,694)	237 (294)	83 (102)	1,241 (650)	191 (179)	0 (0)	3,928 (1,857)
Rainbow trout	0.0088 (0.0041)	3 (6)	58 (94)	44 (58)	108 (180)	1,475 (808)	461 (382)	27 (51)	1 (1)	2,177 (920)
Brown trout	0.0047 (0.0044)	77 (68)	231 (340)	741 (982)	28 (52)	4 (8)	55 (110)	20 (30)	0 (0)	1,156 (1,049)
Lake trout	0.0067 (0.0034)	0 (0)	0 (0)	709 (600)	311 (357)	95 (100)	495 (346)	53 (65)	0 (0)	1,663 (788)
Channel catfish	0.0034 (0.0033)	0 (0)	222 (235)	561 (758)	43 (79)	8 (16)	0 (0)	12 (25)	0 (0)	846 (798)
Bluegill	0.0000 (0.0000)	0 (0)	0 (0)	0 (0)	2 (4)	0 (0)	0 (0)	0 (0)	0 (0)	2 (4)
Smallmouth bass	0.0003 (0.0006)	0 (0)	0 (0)	0 (0)	0 (0)	60 (139)	0 (0)	12 (24)	0 (0)	72 (141)
Yellow perch	1.4088 (0.5921)	0 (0)	0 (0)	9,393 (5,610)	64,978 (81,101)	127,727 (88,977)	120,369 (43,208)	25,846 (14,029)	0 (0)	348,313 (128,800)
Walleye	0.0141 (0.0330)	0 (0)	0 (0)	0 (0)	3,358 (8,094)	119 (279)	0 (0)	0 (0)	0 (0)	3,477 (8,099)
Freshwater drum	0.0068 (0.0092)	0 (0)	0 (0)	1,504 (2,232)	16 (26)	0 (0)	166 (344)	0 (0)	0 (0)	1,686 (2,259)
Lake whitefish	0.0000 (0.0000)	0 (0)	0 (0)	0 (0)	6 (14)	0 (0)	0 (0)	0 (0)	0 (0)	6 (14)
Total	1.4970 (0.6018)	263 (114)	3,267 (1,390)	18,357 (7,096)	69,368 (81,507)	129,629 (88,981)	123,058 (43,218)	26,184 (14,031)	1 (1)	370,127 (129,143)
Angler hours		2,200 (563)	26,022 (10,670)	43,998 (22,639)	22,952 (21,130)	56,129 (30,591)	77,741 (19,145)	17,511 (7,910)	688 (317)	247,241 (49,378)
Angler trips		492 (136)	6,120 (1,954)	7,977 (3,752)	4,962 (4,079)	13,693 (6,383)	15,268 (4,154)	3,742 (1,389)	3,046 (1,280)	55,300 (9,804)
Angler days		416 (119)	6,025 (1,949)	7,664 (3,709)	4,944 (4,079)	12,936 (6,299)	15,203 (4,153)	3,553 (1,366)	2,960 (1,234)	53,701 (9,722)

Appendix 13.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for New Buffalo, by all modes of sportfishing, 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month								Season
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
Coho salmon	0.0310 (0.0179)	334 (554)	1,270 (871)	1,527 (1,527)	239 (263)	196 (222)	66 (117)	0 (0)	0 (0)	3,632 (1,879)
Chinook salmon	0.0153 (0.0090)	0 (0)	25 (40)	680 (711)	183 (179)	456 (417)	450 (427)	0 (0)	0 (0)	1,794 (946)
Rainbow trout	0.0033 (0.0024)	2 (6)	35 (40)	113 (145)	45 (71)	191 (215)	5 (13)	0 (0)	0 (0)	391 (272)
Brown trout	0.0010 (0.0010)	3 (8)	4 (9)	61 (92)	0 (0)	17 (36)	30 (49)	0 (0)	0 (0)	115 (111)
Lake trout	0.0095 (0.0056)	0 (0)	0 (0)	171 (216)	408 (342)	245 (289)	296 (327)	0 (0)	0 (0)	1,120 (595)
Black crappie	0.0030 (0.0065)	0 (0)	0 (0)	0 (0)	351 (751)	0 (0)	0 (0)	0 (0)	0 (0)	351 (751)
Yellow perch	1.7303 (0.7935)	0 (0)	0 (0)	89 (210)	35,909 (24,937)	134,160 (63,973)	32,765 (34,638)	0 (0)	0 (0)	202,923 (76,904)
Freshwater drum	0.0024 (0.0038)	0 (0)	0 (0)	0 (0)	0 (0)	276 (430)	0 (0)	0 (0)	0 (0)	276 (430)
Total	1.7958 (0.8034)	339 (554)	1,334 (873)	2,641 (1,720)	37,135 (24,953)	135,541 (63,977)	33,612 (34,642)	0 (0)	0 (0)	210,602 (76,940)
Angler hours		1,495 (2,579)	16,177 (8,379)	14,864 (12,711)	17,534 (9,982)	51,826 (21,438)	15,382 (10,933)	0 (0)	0 (0)	117,278 (30,285)
Angler trips		245 (410)	3,466 (1,737)	2,480 (2,076)	2,906 (1,684)	9,396 (3,621)	2,715 (1,833)	0 (0)	0 (0)	21,208 (5,177)
Angler days		245 (410)	3,413 (1,738)	2,424 (2,074)	2,906 (1,684)	9,316 (3,570)	2,693 (1,823)	0 (0)	0 (0)	20,997 (5,138)

SECTION II: LAKE HURON CATCH AND EFFORT ESTIMATES BY SITE

Appendix 14.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for Rogers City, by all modes of sportfishing, 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month				Season
		Jun	Jul	Aug	Sep	
Pink salmon	0.0007 (0.0009)	0 (0)	13 (20)	52 (87)	11 (22)	76 (92)
Coho salmon	0.0036 (0.0025)	0 (0)	35 (42)	274 (232)	101 (107)	410 (259)
Chinook salmon	0.1458 (0.1742)	0 (0)	563 (252)	13,813 (19,297)	2,287 (1,064)	16,663 (19,328)
Rainbow trout	0.0002 (0.0003)	0 (0)	0 (0)	19 (32)	0 (0)	19 (32)
Brown trout	0.0003 (0.0004)	0 (0)	0 (0)	36 (53)	0 (0)	36 (53)
Lake trout	0.0033 (0.0030)	25 (39)	252 (289)	98 (148)	0 (0)	375 (327)
Northern pike	0.0003 (0.0005)	0 (0)	0 (0)	14 (29)	21 (48)	35 (56)
Yellow perch	0.0124 (0.0270)	0 (0)	1,417 (3,060)	0 (0)	0 (0)	1,417 (3,060)
Walleye	0.0002 (0.0004)	0 (0)	0 (0)	0 (0)	19 (39)	19 (39)
Lake whitefish	0.0001 (0.0002)	0 (0)	12 (25)	0 (0)	0 (0)	12 (25)
Total	0.1668 (0.1778)	25 (39)	2,292 (3,084)	14,306 (19,299)	2,439 (1,071)	19,062 (19,573)
Angler hours		1,684 (687)	9,443 (3,146)	83,557 (32,063)	19,611 (5,487)	114,295 (32,688)
Angler trips		465 (203)	2,436 (821)	14,668 (5,567)	4,712 (1,337)	22,281 (5,787)
Angler days		430 (186)	2,109 (721)	9,919 (3,809)	3,912 (1,166)	16,370 (4,052)

Appendix 15.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for Harrisville, by all modes of sportfishing, 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month							Season
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Pink salmon	0.0003 (0.0003)	0 (0)	0 (0)	0 (0)	12 (19)	22 (29)	0 (0)	0 (0)	34 (35)
Chinook salmon	0.0358 (0.0172)	0 (0)	66 (95)	521 (635)	119 (92)	1,646 (1,060)	1,665 (1,288)	626 (410)	4,643 (1,836)
Rainbow trout	0.0011 (0.0013)	8 (20)	0 (0)	0 (0)	0 (0)	135 (164)	0 (0)	0 (0)	143 (165)
Lake trout	0.0245 (0.0126)	0 (0)	22 (34)	593 (779)	1,364 (806)	1,161 (814)	39 (46)	0 (0)	3,179 (1,386)
Channel catfish	0.0002 (0.0003)	0 (0)	0 (0)	0 (0)	5 (10)	4 (8)	22 (44)	0 (0)	31 (46)
Yellow perch	0.0035 (0.0078)	0 (0)	446 (1,011)	0 (0)	12 (25)	0 (0)	0 (0)	0 (0)	458 (1,011)
Walleye	0.0003 (0.0004)	0 (0)	0 (0)	0 (0)	0 (0)	27 (44)	7 (10)	0 (0)	34 (45)
Total	0.0657 (0.0265)	8 (20)	534 (1,016)	1,114 (1,005)	1,512 (812)	2,995 (1,348)	1,733 (1,290)	626 (410)	8,522 (2,520)
Angler hours		520 (607)	8,086 (6,373)	7,661 (7,680)	19,541 (9,153)	49,041 (25,481)	36,153 (20,544)	8,707 (2,386)	129,709 (35,507)
Angler trips		335 (407)	2,331 (1,894)	1,348 (1,350)	3,397 (1,583)	8,761 (4,505)	7,389 (4,199)	1,743 (622)	25,304 (6,811)
Angler days		335 (407)	2,325 (1,894)	1,331 (1,340)	3,371 (1,574)	8,673 (4,453)	6,462 (3,875)	1,602 (619)	24,099 (6,577)

Appendix 16.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for Oscoda, by all modes of sportfishing, 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month							Season
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Pink salmon	0.0007 (0.0010)	0 (0)	92 (191)	0 (0)	0 (0)	108 (190)	0 (0)	0 (0)	200 (269)
Coho salmon	0.0001 (0.0002)	0 (0)	0 (0)	0 (0)	0 (0)	22 (44)	8 (17)	0 (0)	30 (47)
Chinook salmon	0.0092 (0.0055)	13 (28)	191 (169)	0 (0)	336 (369)	1,551 (1,253)	394 (364)	0 (0)	2,485 (1,367)
Rainbow trout	0.0004 (0.0003)	35 (54)	0 (0)	0 (0)	0 (0)	28 (44)	31 (51)	26 (37)	120 (94)
Atlantic salmon	0.0000 (0.0000)	7 (14)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	7 (14)
Brown trout	0.0004 (0.0008)	104 (210)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	104 (210)
Lake trout	0.0196 (0.0094)	0 (0)	377 (357)	3,159 (1,912)	1,111 (951)	595 (486)	64 (82)	0 (0)	5,306 (2,220)
Channel catfish	0.0095 (0.0062)	0 (0)	217 (563)	505 (433)	1,721 (1,389)	97 (110)	38 (69)	0 (0)	2,578 (1,565)
Yellow perch	0.0014 (0.0022)	223 (494)	0 (0)	0 (0)	0 (0)	166 (338)	0 (0)	0 (0)	389 (599)
Walleye	0.0048 (0.0035)	0 (0)	1,008 (787)	199 (412)	0 (0)	90 (99)	8 (18)	3 (7)	1,308 (894)
Freshwater drum	0.0015 (0.0019)	0 (0)	0 (0)	45 (70)	368 (497)	0 (0)	0 (0)	0 (0)	413 (502)
Round whitefish	0.0005 (0.0010)	148 (297)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	148 (297)
Total	0.0483 (0.0165)	530 (617)	1,885 (1,062)	3,908 (2,004)	3,536 (1,794)	2,657 (1,408)	543 (384)	29 (38)	13,088 (3,298)
Angler hours		10,755 (6,301)	32,478 (14,604)	43,768 (17,829)	56,931 (29,473)	86,273 (39,545)	39,275 (29,478)	1,242 (241)	270,722 (62,228)
Angler trips		2,895 (1,549)	8,706 (5,259)	8,105 (3,278)	11,041 (5,612)	15,394 (6,607)	7,300 (5,273)	361 (94)	53,802 (11,990)
Angler days		2,826 (1,549)	8,105 (4,772)	7,971 (3,225)	10,948 (5,592)	14,783 (6,351)	6,916 (5,132)	313 (91)	51,862 (11,555)

SECTION III: LAKE ERIE CATCH AND EFFORT ESTIMATES BY SITE

Appendix 17.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the Lake Erie boat fishery in the area from Point Mouillee to the mouth of the Raisin River, 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month							Season
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Channel catfish	0.0021 (0.0020)	0 (0)	0 (0)	0 (0)	1,004 (1,618)	718 (1,171)	273 (517)	316 (672)	2,311 (2,170)
White perch	0.0111 (0.0094)	0 (0)	0 (0)	4,181 (4,293)	3,109 (3,711)	4,197 (8,511)	1,046 (2,168)	0 (0)	12,533 (10,457)
White bass	0.0216 (0.0161)	827 (966)	11,225 (14,679)	4,256 (3,202)	955 (1,177)	6,403 (9,019)	584 (787)	0 (0)	24,250 (17,607)
Rock bass	0.0012 (0.0025)	0 (0)	0 (0)	0 (0)	1,343 (2,739)	0 (0)	0 (0)	0 (0)	1,343 (2,739)
White crappie	0.0001 (0.0002)	0 (0)	94 (196)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	94 (196)
Yellow perch	0.3073 (0.1376)	64 (137)	1,808 (2,887)	1,155 (1,042)	3,149 (2,945)	125,640 (105,295)	111,941 (78,949)	101,855 (57,118)	345,612 (143,529)
Walleye	0.2177 (0.0689)	3,121 (2,849)	18,636 (10,353)	123,182 (47,387)	77,085 (41,232)	18,287 (14,740)	2,938 (5,502)	1,522 (3,236)	244,771 (65,718)
Freshwater drum	0.0009 (0.0010)	0 (0)	0 (0)	518 (846)	244 (355)	0 (0)	212 (439)	0 (0)	974 (1,017)
Other	0.0008 (0.0014)	0 (0)	0 (0)	724 (1,472)	0 (0)	0 (0)	0 (0)	158 (336)	882 (1,510)
Total	0.5627 (0.1702)	4,012 (3,011)	31,763 (18,194)	134,016 (47,730)	86,889 (41,643)	155,245 (107,049)	116,994 (79,177)	103,851 (57,215)	632,770 (159,231)
Angler hours		12,441 (9,637)	154,987 (73,649)	325,291 (97,692)	277,724 (125,594)	210,057 (55,913)	91,188 (35,824)	52,846 (18,282)	1,124,534 (188,623)
Angler trips		2,345 (1,705)	30,009 (14,557)	52,905 (16,244)	41,086 (19,280)	36,173 (9,878)	18,150 (7,071)	9,119 (3,384)	189,787 (31,771)
Angler days		2,345 (1,705)	29,898 (14,524)	52,753 (16,190)	41,086 (19,280)	36,173 (9,878)	18,150 (7,071)	9,119 (3,384)	189,524 (31,729)

Appendix 18.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the Lake Erie boat fishery in the area from the mouth of the Raisin River to the Michigan-Ohio state line, 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month							Season
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Chinook salmon	0.0001 (0.0002)	0 (0)	106 (227)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	106 (227)
Yellow bullhead	0.0003 (0.0007)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	366 (825)	366 (825)
Channel catfish	0.0149 (0.0159)	66 (124)	3,634 (6,163)	1,573 (2,346)	9,046 (18,442)	5,260 (6,387)	0 (0)	43 (96)	19,622 (20,601)
White perch	0.0062 (0.0067)	0 (0)	501 (1,075)	452 (921)	5,993 (8,295)	301 (611)	0 (0)	854 (1,925)	8,101 (8,654)
White bass	0.0333 (0.0226)	253 (268)	7,110 (6,792)	10,596 (9,821)	7,576 (10,632)	7,869 (13,593)	0 (0)	10,375 (19,516)	43,779 (28,659)
Yellow perch	0.3136 (0.2641)	42 (65)	622 (1,080)	8,663 (6,399)	7,377 (7,993)	82,556 (65,725)	111,629 (88,625)	200,829 (320,410)	411,718 (339,032)
Walleye	0.3826 (0.1199)	12,342 (8,486)	64,303 (37,223)	225,445 (81,354)	189,581 (93,988)	10,687 (7,632)	0 (0)	0 (0)	502,358 (130,261)
Freshwater drum	0.0017 (0.0020)	0 (0)	0 (0)	648 (1,355)	1,309 (2,140)	331 (672)	0 (0)	0 (0)	2,288 (2,621)
Other	0.0001 (0.0002)	0 (0)	60 (129)	0 (0)	0 (0)	0 (0)	0 (0)	128 (289)	188 (316)
Total	0.7529 (0.3079)	12,703 (8,491)	76,336 (38,367)	247,377 (82,244)	220,882 (97,078)	107,004 (67,856)	111,629 (88,625)	212,595 (321,011)	988,526 (365,019)
Angler hours		23,721 (17,334)	215,302 (117,146)	460,990 (150,113)	332,720 (114,810)	140,110 (39,038)	72,689 (26,482)	67,365 (37,104)	1,312,897 (230,956)
Angler trips		4,152 (2,863)	37,131 (20,266)	70,576 (23,114)	54,344 (20,019)	28,246 (9,215)	19,956 (8,005)	12,588 (7,054)	226,993 (39,404)
Angler days		4,152 (2,863)	37,131 (20,266)	70,576 (23,114)	54,344 (20,019)	28,246 (9,215)	19,956 (8,005)	12,588 (7,054)	226,993 (39,404)

SECTION IV: LAKE SUPERIOR CATCH AND EFFORT ESTIMATES BY SITE

Appendix 19.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for Black River Harbor, by all modes of sportfishing, 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month							Season
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Coho salmon	0.0194 (0.0159)	0 (0)	0 (0)	19 (25)	170 (161)	0 (0)	19 (38)	0 (0)	208 (167)
Chinook salmon	0.0116 (0.0084)	0 (0)	0 (0)	13 (19)	34 (49)	6 (13)	71 (68)	0 (0)	124 (87)
Rainbow trout	0.0011 (0.0017)	0 (0)	0 (0)	5 (11)	7 (14)	0 (0)	0 (0)	0 (0)	12 (18)
Brown trout	0.0073 (0.0100)	0 (0)	0 (0)	0 (0)	20 (41)	18 (37)	40 (90)	0 (0)	78 (106)
Brook trout	0.0004 (0.0009)	0 (0)	0 (0)	4 (9)	0 (0)	0 (0)	0 (0)	0 (0)	4 (9)
Lake trout	0.1606 (0.0566)	0 (0)	0 (0)	306 (170)	681 (336)	448 (291)	285 (237)	0 (0)	1,720 (532)
Walleye	0.0037 (0.0076)	0 (0)	0 (0)	0 (0)	40 (82)	0 (0)	0 (0)	0 (0)	40 (82)
Lake whitefish	0.0003 (0.0006)	0 (0)	0 (0)	0 (0)	3 (6)	0 (0)	0 (0)	0 (0)	3 (6)
Total	0.2044 (0.0642)	0 (0)	0 (0)	347 (173)	955 (387)	472 (294)	415 (265)	0 (0)	2,189 (580)
Angler hours		0 (0)	0 (0)	1,752 (669)	3,830 (1,268)	2,551 (700)	2,576 (841)	0 (0)	10,709 (1,804)
Angler trips		0 (0)	0 (0)	302 (121)	540 (180)	551 (168)	721 (284)	0 (0)	2,114 (395)
Angler days		0 (0)	0 (0)	302 (121)	540 (180)	551 (168)	721 (284)	0 (0)	2,114 (395)

Appendix 20.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the Ontonagon boat fishery, 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month				Season
		Jun	Jul	Aug	Sep	
Coho salmon	0.0040 (0.0034)	31 (29)	8 (12)	64 (82)	0 (0)	103 (88)
Chinook salmon	0.0032 (0.0035)	36 (55)	0 (0)	46 (70)	0 (0)	82 (89)
Brown trout	0.0044 (0.0036)	65 (61)	0 (0)	48 (68)	0 (0)	113 (91)
Lake trout	0.0785 (0.0253)	759 (294)	532 (381)	649 (360)	61 (90)	2,001 (608)
Northern pike	0.0024 (0.0042)	0 (0)	52 (105)	10 (21)	0 (0)	62 (107)
Largemouth bass	0.0007 (0.0014)	17 (35)	0 (0)	0 (0)	0 (0)	17 (35)
Walleye	0.1252 (0.0415)	930 (429)	1,757 (856)	484 (281)	21 (43)	3,192 (999)
Total	0.2184 (0.0522)	1,838 (528)	2,349 (943)	1,301 (475)	82 (100)	5,570 (1,185)
Angler hours		8,968 (1,741)	9,838 (1,748)	5,343 (1,101)	1,352 (588)	25,501 (2,765)
Angler trips		1,718 (367)	1,932 (419)	1,335 (299)	397 (181)	5,382 (658)
Angler days		1,718 (367)	1,932 (419)	1,335 (299)	397 (181)	5,382 (658)

Appendix 21.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the Traverse Bay boat fishery, 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month				Season
		May	Jun	Jul	Aug	
Coho salmon	0.0069 (0.0050)	50 (45)	32 (35)	0 (0)	0 (0)	82 (57)
Chinook salmon	0.0101 (0.0071)	85 (75)	35 (33)	0 (0)	0 (0)	120 (82)
Brown trout	0.0006 (0.0013)	7 (15)	0 (0)	0 (0)	0 (0)	7 (15)
Lake trout	0.2237 (0.0944)	413 (296)	554 (469)	1,020 (655)	660 (524)	2,647 (1,006)
Northern pike	0.0006 (0.0013)	0 (0)	7 (15)	0 (0)	0 (0)	7 (15)
Lake whitefish	0.0013 (0.0018)	15 (21)	0 (0)	0 (0)	0 (0)	15 (21)
Total	0.2432 (0.0963)	570 (310)	628 (472)	1,020 (655)	660 (524)	2,878 (1,011)
Angler hours		2,613 (631)	1,829 (1,021)	4,820 (1,414)	2,573 (1,120)	11,835 (2,167)
Angler trips		553 (146)	401 (205)	1,133 (376)	558 (247)	2,645 (515)
Angler days		528 (144)	376 (190)	1,133 (376)	558 (247)	2,595 (509)

Appendix 22.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the Huron Bay boat fishery, 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month		Season
		Jul	Aug	
Coho salmon	0.0026 (0.0038)	8 (16)	6 (12)	14 (20)
Chinook salmon	0.0121 (0.0197)	51 (104)	15 (18)	66 (106)
Lake trout	0.2795 (0.1433)	1,289 (650)	239 (175)	1,528 (673)
Total	0.2942 (0.1466)	1,348 (658)	260 (176)	1,608 (681)
Angler hours		3,685 (1,299)	1,781 (609)	5,466 (1,435)
Angler trips		711 (259)	360 (151)	1,071 (300)
Angler days		711 (259)	340 (146)	1,051 (297)

Appendix 23.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for Marquette, 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month						Season
		May	Jun	Jul	Aug	Sep	Oct	
Coho salmon	0.0086 (0.0049)	92 (96)	81 (103)	45 (49)	18 (28)	69 (84)	0 (0)	305 (173)
Chinook salmon	0.0085 (0.0039)	184 (112)	40 (35)	0 (0)	49 (53)	24 (43)	6 (13)	303 (136)
Rainbow trout	0.0026 (0.0021)	15 (31)	28 (37)	10 (20)	0 (0)	25 (50)	15 (23)	93 (76)
Brown trout	0.0002 (0.0004)	8 (16)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	8 (16)
Lake trout	0.1886 (0.0366)	408 (204)	1,292 (516)	2,265 (721)	1,405 (466)	776 (349)	566 (368)	6,712 (1,141)
Splake	0.0005 (0.0010)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	17 (34)	17 (34)
Lake whitefish	0.0103 (0.0116)	70 (100)	200 (365)	80 (162)	0 (0)	0 (0)	17 (34)	367 (413)
Round whitefish	0.0139 (0.0248)	0 (0)	27 (56)	0 (0)	0 (0)	0 (0)	468 (880)	495 (882)
Total	0.2332 (0.0479)	777 (273)	1,668 (645)	2,400 (741)	1,472 (470)	894 (365)	1,089 (955)	8,300 (1,518)
Angler hours		3,552 (839)	6,075 (1,455)	9,735 (1,839)	8,536 (1,626)	5,621 (1,170)	2,075 (923)	35,594 (3,327)
Angler trips		847 (209)	1,409 (355)	2,295 (443)	1,764 (361)	1,536 (338)	561 (259)	8,412 (823)
Angler days		847 (209)	1,385 (351)	2,262 (441)	1,683 (355)	1,415 (332)	554 (256)	8,146 (814)

Appendix 24.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for Au Train-Shelter Bay, 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month						Season
		May	Jun	Jul	Aug	Sep	Oct	
Coho salmon	0.0077 (0.0082)	22 (46)	0 (0)	0 (0)	6 (12)	40 (83)	30 (39)	98 (103)
Chinook salmon	0.0126 (0.0079)	33 (51)	14 (28)	0 (0)	0 (0)	112 (75)	0 (0)	159 (95)
Rainbow trout	0.0148 (0.0138)	57 (82)	50 (104)	0 (0)	0 (0)	54 (102)	26 (37)	187 (171)
Brown trout	0.0013 (0.0019)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	17 (25)	17 (25)
Lake trout	0.0686 (0.0425)	160 (184)	242 (197)	0 (0)	293 (370)	100 (212)	73 (94)	868 (513)
Splake	0.0193 (0.0180)	0 (0)	15 (32)	0 (0)	0 (0)	0 (0)	229 (221)	244 (223)
Northern pike	0.0021 (0.0028)	0 (0)	27 (36)	0 (0)	0 (0)	0 (0)	0 (0)	27 (36)
Lake whitefish	0.0261 (0.0311)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	331 (389)	331 (389)
Round whitefish	0.0498 (0.0389)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	630 (478)	630 (478)
Total	0.2023 (0.0780)	272 (213)	348 (230)	0 (0)	299 (370)	306 (261)	1,336 (664)	2,561 (863)
Angler hours		2,335 (607)	2,898 (805)	0 (0)	1,951 (740)	3,765 (1,930)	1,712 (561)	12,661 (2,367)
Angler trips		812 (240)	765 (244)	0 (0)	529 (229)	942 (434)	554 (195)	3,602 (629)
Angler days		766 (235)	686 (222)	0 (0)	432 (217)	930 (434)	526 (187)	3,340 (612)

Appendix 25.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for Munising Bay, 1990. Two standard errors in parentheses.

Species	Total catch per hour	Month						Season
		May	Jun	Jul	Aug	Sep	Oct	
Pink salmon	0.0001 (0.0003)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (5)	2 (5)
Coho salmon	0.0139 (0.0097)	78 (76)	31 (35)	0 (0)	2 (4)	77 (104)	5 (9)	193 (134)
Chinook salmon	0.0167 (0.0120)	95 (133)	127 (96)	0 (0)	2 (4)	7 (15)	0 (0)	231 (165)
Rainbow trout	0.0014 (0.0015)	4 (8)	4 (9)	4 (7)	0 (0)	8 (16)	0 (0)	20 (21)
Brown trout	0.0010 (0.0013)	11 (17)	0 (0)	3 (5)	0 (0)	0 (0)	0 (0)	14 (18)
Lake trout	0.0756 (0.0387)	178 (101)	162 (110)	483 (467)	91 (87)	131 (170)	2 (5)	1,047 (526)
Splake	0.0060 (0.0038)	13 (19)	36 (35)	0 (0)	0 (0)	34 (33)	0 (0)	83 (52)
Yellow perch	0.0390 (0.0418)	3 (6)	0 (0)	537 (576)	0 (0)	0 (0)	0 (0)	540 (576)
Round whitefish	0.0136 (0.0152)	4 (8)	10 (19)	14 (29)	89 (179)	28 (57)	43 (87)	188 (210)
Total	0.1674 (0.0626)	386 (186)	370 (156)	1,041 (742)	184 (199)	285 (211)	52 (88)	2,318 (837)
Angler hours		2,393 (480)	3,327 (670)	3,775 (669)	1,647 (386)	1,977 (699)	725 (205)	13,844 (1,344)
Angler trips		552 (112)	637 (139)	661 (140)	338 (87)	567 (184)	291 (79)	3,046 (315)
Angler days		552 (112)	625 (138)	639 (140)	338 (87)	567 (184)	291 (79)	3,012 (314)

SECTION V: WINTER CATCH AND EFFORT ESTIMATES BY SITE

Appendix 26.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the Little Bay de Noc winter ice fishery, 1991. Two standard errors in parentheses.

Species	Total catch per hour	Month			Season
		Jan	Feb	Mar	
Brown trout	0.0022 (0.0014)	0 (0)	125 (134)	354 (261)	479 (293)
Splake	0.0070 (0.0031)	0 (0)	1,013 (588)	535 (332)	1,548 (675)
Rainbow smelt	0.0002 (0.0004)	39 (79)	0 (0)	0 (0)	39 (79)
Northern pike	0.0047 (0.0026)	742 (504)	293 (231)	3 (7)	1,038 (554)
White sucker	0.0003 (0.0004)	46 (92)	4 (8)	23 (47)	73 (104)
Yellow perch	0.9737 (0.2024)	78,943 (18,797)	83,470 (23,886)	53,119 (24,483)	215,532 (39,029)
Walleye	0.0236 (0.0098)	3,688 (1,984)	1,495 (658)	42 (88)	5,225 (2,092)
Burbot	0.0049 (0.0048)	447 (751)	495 (714)	137 (159)	1,079 (1,048)
Total	1.0165 (0.2049)	83,905 (18,923)	86,895 (23,914)	54,213 (24,487)	225,013 (39,110)
Angler hours		102,082 (15,652)	78,657 (6,879)	40,616 (14,748)	221,355 (22,579)
Angler trips		27,909 (4,438)	20,157 (2,285)	10,047 (3,615)	58,113 (6,163)
Angler days		23,943 (3,895)	17,852 (2,147)	8,840 (3,160)	50,635 (5,456)

Appendix 27.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the Tawas winter ice fishery, 1991. Two standard errors in parentheses.

Species	Total catch per hour	Month			Season
		Jan	Feb	Mar	
Rainbow trout	0.0012 (0.0021)	0 (0)	23 (47)	5 (10)	28 (48)
Brown trout	0.0008 (0.0011)	0 (0)	13 (22)	7 (16)	20 (27)
Splake	0.0002 (0.0004)	0 (0)	5 (10)	0 (0)	5 (10)
Northern pike	0.0129 (0.0073)	56 (70)	212 (123)	39 (80)	307 (163)
White perch	0.0021 (0.0044)	0 (0)	50 (104)	0 (0)	50 (104)
Yellow perch	1.0107 (0.3916)	1,968 (1,108)	8,237 (2,755)	13,773 (7,607)	23,978 (8,166)
Walleye	0.0023 (0.0021)	19 (28)	22 (32)	14 (26)	55 (50)
Round whitefish	0.0005 (0.0011)	0 (0)	0 (0)	11 (25)	11 (25)
Burbot	0.0031 (0.0028)	18 (36)	44 (52)	12 (20)	74 (66)
Total	1.0339 (0.3938)	2,061 (1,111)	8,606 (2,761)	13,861 (7,608)	24,528 (8,169)
Angler hours		6,118 (1,718)	9,605 (1,992)	8,000 (3,505)	23,723 (4,382)
Angler trips		2,428 (828)	3,049 (661)	2,488 (1,098)	7,965 (1,526)
Angler days		2,287 (824)	2,850 (621)	2,307 (1,021)	7,444 (1,452)

Appendix 28.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the Au Gres winter ice fishery, 1991. Two standard errors in parentheses.

Species	Total catch per hour	Month			Season
		Jan	Feb	Mar	
Brown trout	0.0002 (0.0004)	0 (0)	0 (0)	13 (28)	13 (28)
Northern pike	0.0005 (0.0010)	0 (0)	29 (60)	0 (0)	29 (60)
White sucker	0.0011 (0.0018)	0 (0)	0 (0)	63 (100)	63 (100)
White bass	0.0125 (0.0265)	0 (0)	687 (1,449)	0 (0)	687 (1,449)
Yellow perch	2.2927 (0.9347)	25,930 (12,728)	25,305 (10,931)	74,725 (42,405)	125,960 (45,603)
Walleye	0.0201 (0.0203)	287 (529)	754 (952)	64 (141)	1,105 (1,098)
Total	2.3272 (0.9383)	26,217 (12,739)	26,775 (11,068)	74,865 (42,405)	127,857 (45,640)
Angler hours		15,533 (3,161)	19,829 (5,271)	19,578 (8,262)	54,940 (10,297)
Angler trips		5,130 (1,137)	5,599 (1,507)	7,416 (3,498)	18,145 (3,975)
Angler days		4,425 (1,015)	5,309 (1,448)	6,061 (2,799)	15,795 (3,311)

Appendix 29.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the winter ice fishery in the area from Saganing Creek to the mouth of the Saginaw River, 1991. Two standard errors in parentheses.

Species	Total catch per hour	Month			Season
		Jan	Feb	Mar	
Northern pike	0.0006 (0.0013)	0 (0)	31 (66)	0 (0)	31 (66)
White sucker	0.0005 (0.0012)	0 (0)	0 (0)	29 (69)	29 (69)
Channel catfish	0.0008 (0.0014)	0 (0)	0 (0)	43 (76)	43 (76)
Rock bass	0.0007 (0.0014)	39 (80)	0 (0)	0 (0)	39 (80)
White crappie	0.0008 (0.0015)	0 (0)	39 (84)	7 (17)	46 (86)
Yellow perch	2.2194 (0.9261)	58,980 (24,657)	16,141 (10,501)	49,642 (33,525)	124,763 (42,920)
Walleye	0.0047 (0.0047)	43 (63)	170 (233)	53 (86)	266 (256)
Total	2.2274 (0.9272)	59,062 (24,657)	16,381 (10,504)	49,774 (33,525)	125,217 (42,921)
Angler hours		30,582 (7,794)	16,003 (8,583)	9,631 (6,473)	56,216 (13,278)
Angler trips		8,549 (2,287)	4,195 (2,266)	4,122 (2,880)	16,866 (4,320)
Angler days		6,789 (1,891)	3,606 (1,961)	3,436 (2,387)	13,831 (3,622)

Appendix 30.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the winter ice fishery in the area from the mouth of Saginaw River to Essexville, 1991. Two standard errors in parentheses.

Species	Total catch per hour	Month			Season
		Jan	Feb	Mar	
Yellow perch	1.5849 (3.8025)	1,008 (2,254)	0 (0)	0 (0)	1,008 (2,254)
Total	1.5849 (3.8025)	1,008 (2,254)	0 (0)	0 (0)	1,008 (2,254)
Angler hours		636 (553)	1,083 (1,404)	0 (0)	636 (553)
Angler trips		424 (372)	0 (0)	0 (0)	424 (372)
Angler days		212 (186)	0 (0)	0 (0)	212 (186)

Appendix 31.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the winter ice fishery in the area from Essexville to Sebawaing, 1991. Two standard errors in parentheses.

Species	Total catch per hour	Month			Season
		Jan	Feb	Mar	
Rainbow smelt	0.0004 (0.0004)	0 (0)	31 (30)	0 (0)	31 (30)
White sucker	0.0003 (0.0006)	0 (0)	0 (0)	19 (40)	19 (40)
White perch	0.0020 (0.0029)	0 (0)	22 (35)	119 (201)	141 (204)
White bass	0.0000 (0.0000)	0 (0)	3 (6)	0 (0)	3 (6)
White crappie	0.0012 (0.0026)	0 (0)	0 (0)	85 (180)	85 (180)
Yellow perch	2.7061 (1.1202)	80,630 (48,627)	25,851 (12,619)	80,192 (41,728)	186,673 (65,307)
Walleye	0.0038 (0.0025)	7 (14)	240 (162)	18 (22)	265 (164)
Round whitefish	0.0002 (0.0004)	0 (0)	12 (25)	0 (0)	12 (25)
Total	2.7142 (1.1211)	80,637 (48,627)	26,159 (12,620)	80,433 (41,729)	187,229 (65,308)
Angler hours		37,188 (11,078)	11,904 (5,701)	19,890 (8,815)	68,982 (15,262)
Angler trips		6,613 (1,897)	1,931 (933)	7,208 (3,219)	15,752 (3,851)
Angler days		6,426 (1,880)	1,817 (877)	6,075 (2,744)	14,318 (3,440)

Appendix 32.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the winter ice fishery in the area from Sebewaing to Sand Point, 1991. Two standard errors in parentheses.

Species	Total catch per hour	Month			Season
		Jan	Feb	Mar	
Northern pike	0.0029 (0.0034)	159 (227)	106 (202)	0 (0)	265 (304)
Channel catfish	0.0003 (0.0006)	0 (0)	28 (59)	0 (0)	28 (59)
White perch	0.0110 (0.0186)	981 (1,665)	0 (0)	14 (29)	995 (1,665)
Rock bass	0.0003 (0.0006)	0 (0)	0 (0)	25 (50)	25 (50)
Pumpkinseed	0.0043 (0.0084)	0 (0)	0 (0)	386 (751)	386 (751)
Bluegill	0.0008 (0.0016)	0 (0)	0 (0)	74 (150)	74 (150)
Black crappie	0.0101 (0.0126)	0 (0)	762 (1,097)	148 (214)	910 (1,118)
Yellow perch	3.9029 (1.3101)	148,810 (60,026)	116,692 (57,881)	87,627 (34,137)	353,129 (90,104)
Walleye	0.0001 (0.0002)	0 (0)	11 (25)	0 (0)	11 (25)
Total	3.9327 (1.3146)	149,950 (60,050)	117,599 (57,892)	88,274 (34,146)	355,823 (90,130)
Angler hours		47,035 (15,055)	26,778 (11,034)	16,666 (6,404)	90,479 (19,734)
Angler trips		12,875 (4,267)	6,450 (2,657)	5,135 (1,955)	24,460 (5,393)
Angler days		12,752 (4,262)	6,293 (2,568)	4,879 (1,899)	23,924 (5,326)

Appendix 33.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the Keweenaw Bay winter ice fishery, 1991. Two standard errors in parentheses.

Species	Total catch per hour	Month		Season
		Feb	Mar	
Coho salmon	0.0624 (0.0249)	3,671 (1,675)	2,103 (1,089)	5,774 (1,998)
Chinook salmon	0.0074 (0.0050)	156 (156)	527 (414)	683 (442)
Rainbow trout	0.0015 (0.0022)	0 (0)	143 (209)	143 (209)
Brown trout	0.0014 (0.0018)	47 (100)	86 (141)	133 (173)
Lake trout	0.0477 (0.0189)	1,659 (1,034)	2,755 (1,115)	4,414 (1,521)
Rainbow smelt	0.0206 (0.0203)	361 (647)	1,542 (1,719)	1,903 (1,837)
Northern pike	0.0003 (0.0007)	26 (57)	0 (0)	26 (57)
Yellow perch	0.0315 (0.0395)	2,914 (3,606)	0 (0)	2,914 (3,606)
Lake whitefish	0.0029 (0.0026)	218 (223)	49 (70)	267 (234)
Burbot	0.0008 (0.0012)	75 (115)	0 (0)	75 (115)
Siscowet lake trout	0.1057 (0.0348)	3,658 (1,652)	6,118 (1,969)	9,776 (2,570)
Total	0.2823 (0.0811)	12,785 (4,486)	13,323 (3,082)	26,108 (5,443)
Angler hours		38,754 (13,885)	53,726 (11,871)	92,480 (18,268)
Angler trips		13,696 (4,896)	15,379 (3,457)	29,075 (5,993)
Angler days		13,696 (4,896)	15,339 (3,457)	29,075 (5,993)

Appendix 34.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the Marquette winter ice fishery, 1991. Two standard errors in parentheses.

Species	Total catch per hour	<u>Month</u>	
		Mar	Season
Coho salmon	0.3106 (0.1233)	1,702 (627)	1,702 (627)
Chinook salmon	0.0173 (0.0168)	95 (91)	95 (91)
Rainbow trout	0.0047 (0.0071)	26 (39)	26 (39)
Atlantic salmon	0.0037 (0.0045)	20 (24)	20 (24)
Brown trout	0.0016 (0.0020)	9 (11)	9 (11)
Lake trout	0.0016 (0.0030)	9 (17)	9 (17)
Splake	0.0009 (0.0011)	5 (6)	5 (6)
Lake whitefish	0.0080 (0.0070)	44 (38)	44 (38)
Other	0.0159 (0.0107)	87 (57)	87 (57)
Total	0.3645 (0.1285)	1,997 (639)	1,997 (639)
Angler hours		5,479 (811)	5,479 (811)
Angler trips		2,400 (395)	2,400 (395)
Angler days		2,215 (376)	2,215 (376)

Appendix 35.—Estimated catch per hour, number caught, and effort (angler hours, trips, and days) for the Munising Bay winter ice fishery, 1991. Two standard errors in parentheses.

Species	Total catch per hour	Month		Season
		Feb	Mar	
Coho salmon	0.0704 (0.0306)	80 (73)	1,361 (606)	1,441 (610)
Chinook salmon	0.0007 (0.0014)	0 (0)	14 (28)	14 (28)
Lake trout	0.0284 (0.0181)	391 (342)	190 (132)	581 (367)
Splake	0.0021 (0.0037)	0 (0)	42 (74)	42 (74)
Rainbow smelt	0.0174 (0.0265)	0 (0)	355 (539)	355 (539)
Yellow perch	0.0146 (0.0156)	299 (318)	0 (0)	299 (318)
Lake whitefish	0.1283 (0.0682)	1,738 (1,207)	886 (652)	2,624 (1,372)
Round whitefish	0.0078 (0.0075)	31 (41)	128 (146)	159 (152)
Other	0.0063 (0.0080)	103 (154)	26 (53)	129 (163)
Total	0.2759 (0.0865)	2,642 (1,306)	3,002 (1,063)	5,644 (1,684)
Angler hours		9,091 (1,291)	11,366 (1,499)	20,457 (1,978)
Angler trips		2,237 (356)	2,922 (428)	5,159 (557)
Angler days		2,065 (359)	2,764 (422)	4,829 (554)