STUDY PERFORMANCE REPORT

State: Michigan **Project No.:** F-53-R-14

Study No.: 427 **Title:** Measurement of sportfishing harvest in lakes Michigan, Huron, Erie, and Superior

Period Covered: April 1, 1997 to March 31, 1998

Study Objective: To obtain a continuous record of sport catch, catch rates, and catch composition in the Great Lakes (Superior, Michigan, Huron, and Erie) and anadromous river fisheries.

Summary: During the 1997 angling season the Michigan Department of Natural Resources (MDNR) conducted creel surveys at key ports and fishing areas on lakes Michigan, Huron, Erie, and Superior. On Lake Michigan, 21 areas were sampled from New Buffalo to Harbor Springs in the Lower Peninsula, and from Menominee to Big Bay de Noc in the Upper Peninsula. On Lake Huron, 15 areas were sampled from Lexington to Rogers City. Lake Erie creel survey operations covered the area from Point Mouillee to the Michigan-Ohio state line. Six areas were sampled on western and central Lake Superior.

A total of 76,531 anglers were interviewed at the conclusion of their fishing trips during the 1997 open water season (April-October). The number of anglers interviewed by lake was: Lake Michigan, 29,907; Lake Huron, 29,269; Lake Erie, 10,846; and Lake Superior, 6,509.

Anglers spent an estimated 5.5 million angler hours fishing at all sites sampled in 1997. This amounted to 1.2 million individual fishing trips or 1.1 million angler days.

A total of 2.8 million fish were harvested at all sample areas combined of the 15 species that were on the survey data form (angler party interview form). Yellow perch was the most numerous species in the catch with an estimated harvest of 2.1 million fish. Over 197,000 walleye were estimated harvested by the sport fishery in all sample areas combined in 1997. Salmonines were also an important part of the Great Lakes sport harvest. During 1997, over 503,000 were estimated harvested from all sample areas. Important species of salmonines and their estimated harvest in numbers of fish were: chinook salmon, 234,000; lake trout, 126,000; brown trout, 55,000; rainbow trout, 40,000; and coho salmon, 36,000.

A 5-year study segment was completed this year. A summary of the on-going review of survey methods is presented, as well as a 10-year historical perspective on catch and effort estimates. Statistical review of the creel survey sample design by a statistician from MDNR's Institute for Fisheries Research and a researcher from Michigan State University concluded that the basic survey design was adequate and changes were not recommended.. After using the Lake Michigan count and interview data collected during 1985-96 to test other survey methods, the reviewers concluded that no labor savings would be realized by employing other methods nor would accuracy or precision of the estimates be improved. Thus, study was amended to continue another 5-year segment with no major changes in survey methods.

New estimation software is being developed for use in 1998. The software will handle estimation of catch rates as recommended by Lockwood (1997). The software will also allow the reporting of targeted effort as well as targeted catch rates by species and estimates of caught and released fish.

Job 1. Title: Initiate air flight boat counts.

Findings: During the 1997 open-water season, air flights were utilized to count boats on Lake Erie. Boats, shore and pier anglers were also counted using air flights on Saginaw Bay, Lake Huron from Tawas to Harbor Beach.

All air flights were conducted using stratified random sampling schedules. At each survey area flights were attempted on each weekend day and three on randomly selected weekdays per week. Random take off times were used to insure that fishing pressure counts were made at various times during daylight hours each month.

Mean monthly counts for weekdays and weekend days by mode of fishing (i.e., boat, shore, or pier) were combined with angler catch rates using a computer program written by MDNR personnel to make monthly catch and effort estimates by port or sample area.

Job 2. Title: Monitor Great Lakes and anadromous sport fisheries.

Findings: Personnel from district management offices and research stations monitored the sport fisheries in their respective Great Lakes shoreline areas. All census clerks used stratified random work schedules specifically designed for the areas in which they were sampling.

Throughout the season creel clerks sent completed data forms to the Charlevoix Fisheries Research Station every two weeks for computer entry. Redesigned count and interview forms were implemented at the beginning (April 1) of the 1997 season. The forms were designed to be optically scanned eliminating the need for hand data entry. Data entry was completed by the middle of November, 1997 for all open water sample areas, a full two months earlier than previous years. Summaries of the catch estimates by sample area were generated for all sites by the end of November, 1997.

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MDNR initiated a mandatory state-wide catch reporting program for charter fishing boats on August 1, 1989 (Study 462). Prior to that date, charter boats counts and interviews were combined with the non-charter boat fishery as part of the Great Lakes creel survey. In order to make valid year-to-year, and port-to-port comparisons after August 1, 1989, the charter boat data were added to the creel census catch and effort estimates. Therefore, all comparisons in this report regarding year to year changes in species harvest, catch rates, and angler effort take into account the charter boat data.

Lake Michigan.–Twenty-one ports and fishing areas from New Buffalo to Harbor Springs in the Lower Peninsula and Big Bay de Noc to Menominee in the Upper Peninsula were sampled on Lake Michigan during 1997.

Lake Michigan anglers spent an estimated 2.3 million hours fishing the ports and areas sampled during 1997 (Table 1). This amounted to an estimated 563,000 individual fishing trips. The total estimated harvest at all sample areas was 786,000 fish of the 15 species that were on the survey form. (Table 1). Yellow perch were the most numerous species in the catch with an estimated harvest of 478,000. Salmonines are also an important part of the Lake Michigan sport harvest. During 1997 an estimated 85,000 chinook salmon, 50,000 brown trout , 46,000 lake trout, 25,000 rainbow trout, and 28,000 coho salmon were harvested from the survey areas (Table 1).

Lake Huron.–Lake Huron was surveyed from Lexington to Rogers City in 1997. Lake Huron anglers spent an estimated 2.4 million hours and made an estimated 515,000 fishing trips during the 1997 season (Table 2). The total estimated harvest was 1.4 million fish with yellow perch making up 78% of the harvest. In addition to yellow perch, other important species in the Lake Huron sport harvest included; 146,000 chinook salmon, 81,000 walleye, 56,000 lake trout, 14,000 rainbow trout, and 4,500 brown trout.

Lake Erie.–The Lake Erie boat fishery was sampled from Point Mouillee to the Michigan-Ohio state line during mid-April through October, 1997. Lake Erie anglers spent an estimated 522,000 hours fishing the Michigan waters of Lake Erie (Table 3). Anglers harvested an estimated 583,000 fish. Yellow perch (497,000) and walleye (84,000) were the most numerous species in the catch.

Lake Superior.–Six areas in western and central Lake Superior were surveyed in 1997. Lake Superior anglers at these six locations fished an estimated 162,000 angler hours and made 41,000 fishing trips (Table 4). The total sport harvest was over 40,000 fish of the 15 species on the survey data form. Lake trout was the most abundant (24,000) species of salmonine in the catch. The harvest also included 5,400 coho salmon, 2,200 siscowet lake trout, 2,100 chinook salmon and 2,100 lake whitefish.

Winter survey.–During the 1997-98 winter, creel surveys of Saginaw Bay, Lake Huron, Little Bay de Noc, and the Menominee area of Green Bay on Lake Michigan and Keweenaw, Marquette and Munising Bays on Lake Superior were in progress.

Job 3. Title: <u>Quality control checks.</u>

Findings: Throughout the field season data forms were scrutinized at the Charlevoix Fisheries Research Station prior to data entry (optical scanning). During 1997 the project biologist developed new data editing routines utilizing software modules that accompanied the scanner hardware. The data editing programs employed range checks on various fields for each count and interview record. In addition, a module of the creel estimate program did a final check of the data before the monthly catch estimates were made.

Frequent contact and communications were necessary to field questions, check progress, and head off problems. When consistent errors by certain employees were noted, those personnel were contacted to rectify the problem.

Frequent trips were made by the project biologist or his assistant to meet creel clerks to discuss the creel survey methods, and to solicit comments and ideas on how the program could be more efficiently carried out.

Job 4. Title: Prepare succeeding years sampling schedules.

Findings: Sampling schedules have been prepared for the 1998 open water season to cover the following areas: Lake Erie, 24 sites on Lake Michigan, 16 sites on Lake Huron including Saginaw Bay, and 8 sites on western and central Lake Superior.

Job 5. Title: Prepare status report summarizing results.

Findings: Summaries in tabular form of the catch and effort estimates for all sites sampled during 1997 were disseminated to the district management and research station offices during December, 1997.

A technical report was published during the year titled *Sportfishing catch and effort from the Michigan waters of lakes Michigan, Huron, Erie, and Superior, April 1, 1994-March 31, 1995*

Job 6. Title: Analyze and evaluate data.

Findings: Lake trout harvest statistics for lakes Michigan, Huron, and Superior are provided annually to the Lake Technical Committees of the Great Lakes Fishery Commission (GLFC). The GLFC formulates policy recommendations for lake trout on the upper Great Lakes through the lake committees to the state agencies.

The Lake Erie sport catch estimates and biological data for walleye and yellow perch are used annually by the Lake Erie Technical Committee of the GLFC to set harvest quota limits for the various state and provincial commercial and sport fisheries. Members of the committee include the Ohio Department of Natural Resources, Pennsylvania Fish Commission, New York Department of Environmental Conservation, Ontario Ministry of Natural Resources, and MDNR. All agencies contributed their sport and commercial assessment data to this modeling effort.

During 1997, under the direction of the Great Lakes Fishery Commission's Lake Michigan Technical Committee, an ad hoc committee was assigned the task of making predator stocking recommendations for Lake Michigan. The project biologist was a member of this committee which included representatives of the State agencies (Michigan, Indiana, Illinois, Wisconsin), the U. S. Fish and Wildlife Service and the Indian Tribes (Chippewa-Ottawa Treaty Fishery Management Authority). Among other important inputs, the group utilized the creel survey data which has been collected over the years by all state agencies on Lake Michigan to develop a computer model called CONNECT. The model was then used to test various stocking scenarios of five species of salmonines in Lake Michigan and their probable impact on the lake wide forage base. The results of the committee's work was presented to the Lake Michigan Technical Committee in January, 1997.

Multi-year program and data review.–During 1994, the project biologist was assigned to chair a committee made up of internal research personnel and a university research biologist. The charge to the committee was to review the present Great Lakes creel survey methods and to recommend improvements to the overall program. The committee's recommendations were accepted by the Fisheries Division Management Team during August, 1995. The recommendations included: 1) changing the current sampling strata from port to lake statistical district; 2) discontinuing the current practice of creel survey clerks collecting biological data and setting up bio-sampling teams on lakes Michigan and Huron; 3) reporting targeted fishing effort

and targeted catch rates annually for important species complexes, such as salmonines, yellow perch and walleye; 4) estimating numbers of fish caught and released; and 5) including important stream fisheries in the annual creel survey.

Work on implementing the committee's recommendations continued during 1997. The action plan required redesign of the count and interview data forms so they could be entered into computer files utilizing an optical scanner, and development of updated software for estimatiing catch and effort statistics. The redesign of the count and interview forms were completed and the optical scanner was used for all data entry beginning April 1, 1997.

Statistical review of the creel survey sample design by Roger Lockwood of the Institute for Fisheries Research (MDNR) and Dr. James Bence of Michigan State University has concluded that no changes in the survey's sample design are needed. At one time, committee members thought that changing the sample design to strata based on larger lake units (statistical districts) rather than ports would require less personnel and might improve precision and accuracy. After using the Lake Michigan count and interview data collected during 1985-96 to test other survey methods Lockwood and Bence concluded that no labor savings would be realized by employing other methods nor would accuracy or precision of the estimates be improved.

The rewriting of the estimation software will continue into 1998. The new software will handle estimation of catch rates as recommended by Lockwood (1997). The software will also allow the reporting of targeted effort for salmonines, yellow perch and walleye as well as targeted catch rates by species. In addition, the software will calculate estimates for caught and released fish when those data fields are added to the angler party interview form beginning April 1, 1999.

Annual creel surveys of the Lake Michigan sport fishery have been conducted at most ports since 1985 (Table 5). Budget considerations forced a cut back in sampling effort during 1989-91. Since 1992, most of the major sportfishing ports and areas have been surveyed annually. A full lake wide survey was done only during 1985. Since 1985, lake wide catch and effort estimates for Michigan waters of Lake Michigan for major sport species by lake statistical district (Figure 1) have been calculated using monthly ratios based on the 1985 data. For example, in MM-7, Whitehall/Montague was not surveyed during 1986-97 and Port Sheldon was not surveyed during 1989-97 (Table 5). Catch and total effort for MM-7 were calculated for these years based on monthly ratios calculated from the 1985 data for adjacent ports (Muskegon and Grand Haven). The assumption that the ratio of catch and effort for Whitehall/Montague and Port Sheldon would be somewhat constant from one year to the next is fair since the fisheries at these ports are similar (salmonines) in nature. Where this assumption could not be made (MM-2), no attempt was made to calculate catch and effort. However, the assumption that these ratios would hold true for 12 years probably is not fair. Therefore, the project biologist plans to update these ratios every 3-5 years by sampling additional ports on a revolving basis.

During the period 1985-97 total fishing effort on Lake Michigan has declined from approximately 7.2 million angler hours in 1985-86 to 3.1 million angler hours in 1997 (Table 6). The catch of salmonines for all districts combined has ranged from over 1 million in 1986 to a low of 242,000 in 1992. The yellow perch harvest peaked in 1988 at over 3.2 million fish and declined to under 600,000 fish in 1997.

Annual creel surveys of Lake Huron began in 1986. Virtually the entire shoreline of the Michigan waters of Lake Huron were covered during 1986-88 as a part of coho and chinook salmon marking study (Rakoczy 1991) (Table 7). During 1989-90, budget considerations forced

a cut back in sampling effort. Since 1992, all important Lake Huron ports south of Rogers City have been surveyed.

Angler effort on Lake Huron during 1986-97 for all lake districts (Figure 2) combined has ranged from 4.7 million angler hours in 1987 to 2.2 million during 1996 (Table 8). The harvest of salmonines has ranged from a low of 75,000 in 1993 to over 240,000 in 1997. The yellow perch harvest ranged from 6.1 million in 1987 to 794,000 in 1996. Most yellow perch harvested in Lake Huron come from MM-4 which includes the Saginaw Bay area. Walleye are also an important species to the Lake Huron sport fishery, especially in the Saginaw Bay area. The Saginaw Bay walleye harvest peaked in 1993 at nearly 140,000.

Creel surveys have been conducted on three Lake Superior districts (Figure 3) since 1987 (Table 9). The most abundant salmonine in the Lake Superior sport catch is lake trout. The lake trout harvest for all districts combined have averaged around 25,000 fish. Compared to lakes Michigan and Huron, angler effort on Lake Superior is low and has not exceeded 300,000 angler hours during 1987-97.

The Lake Erie boat fishery has been surveyed since 1986 along Michigan's 27 miles shoreline of this Great Lake. During 1986 through 1990 angler effort for this fishery ranged from 2.2 to 4.3 million angler hours (Table 11). During recent years (1995-97) total boat fishing effort has ranged from 400,000 to 700,000 angler hours. The sport harvest of walleye and yellow perch has also fluctuated widely over the years on Lake Erie. The walleye harvest, which peaked at nearly 2.0 million fish in 1988, has averaged approximately 178,000 fish the past five years (1993-97). The yellow perch sport harvest ranged from 1.4 million in 1989 to 246,000 in 1994.

Literature Cited:

Lockwood, R. N. 1997. Evaluation of catch rate estimators from Michigan access point angler surveys. North American Journal of Fisheries Management 17(3):611-620

Rakoczy, G. P. 1991. Harvest, movement, return to the creel, and growth of chinook and coho salmon in Lake Huron, 1985-88. Michigan Department of Natural Resources, Fisheries Research Report No. 1983, Ann Arbor

Ryckman, J. R. 1986. A creel survey of sportfishing in Saginaw Bay, Lake Huron, 1983-84. Michigan Department of Natural Resources, Fisheries Technical Report No. 86-4, Ann Arbor.

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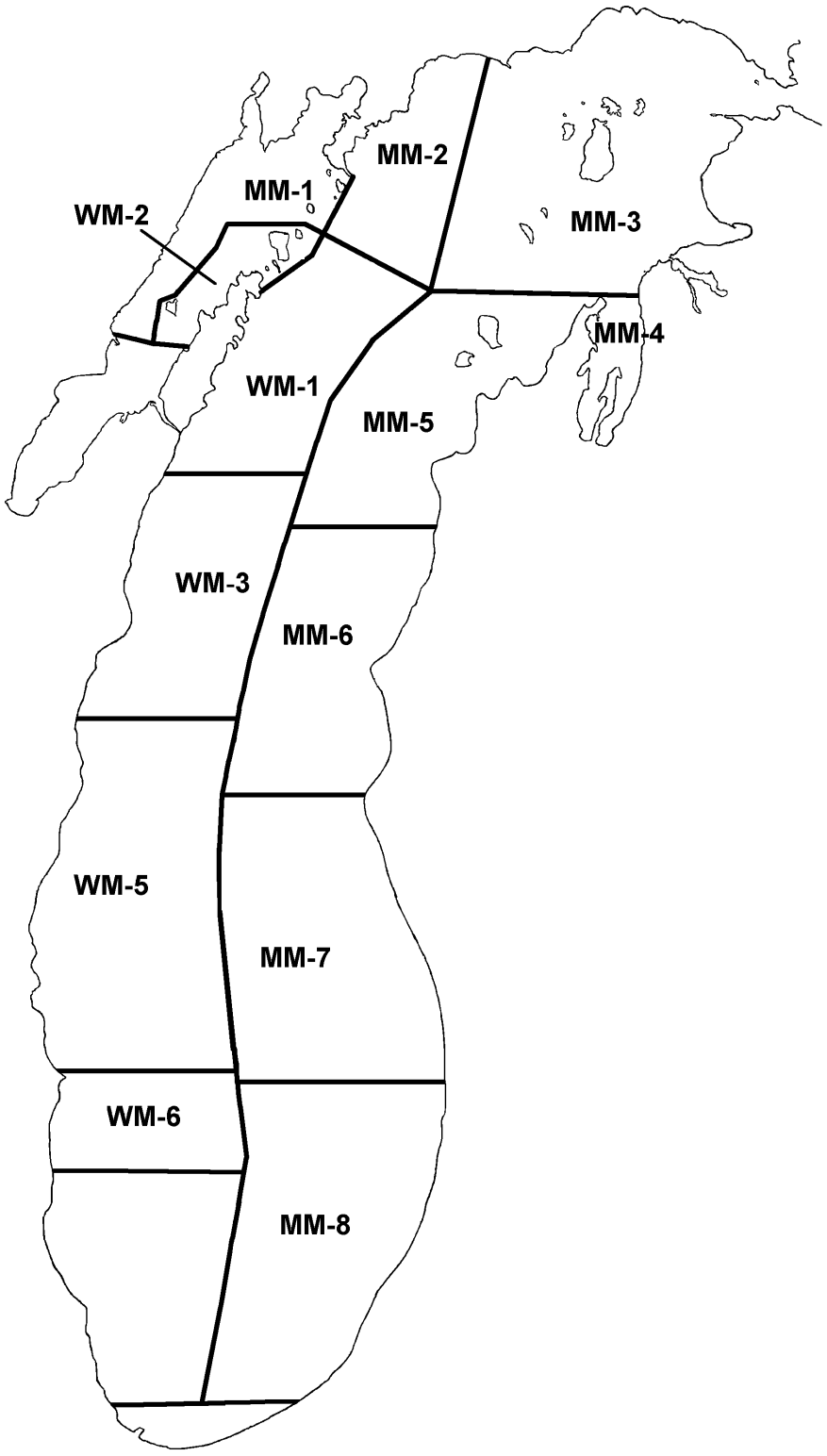

Figure 1.–Lake Michigan statistical districts.

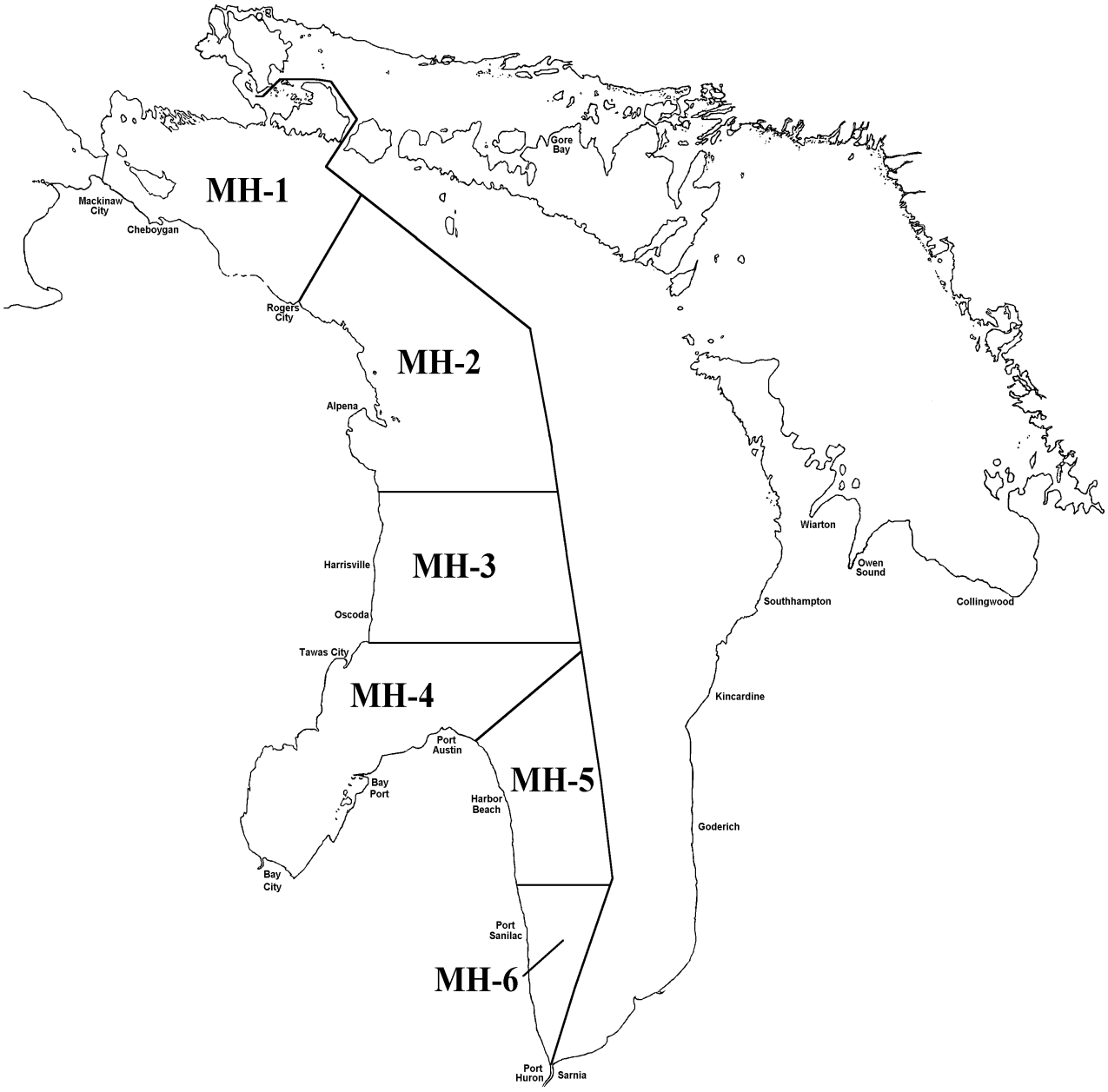

Figure 2.–Lake Huron statistical districts.

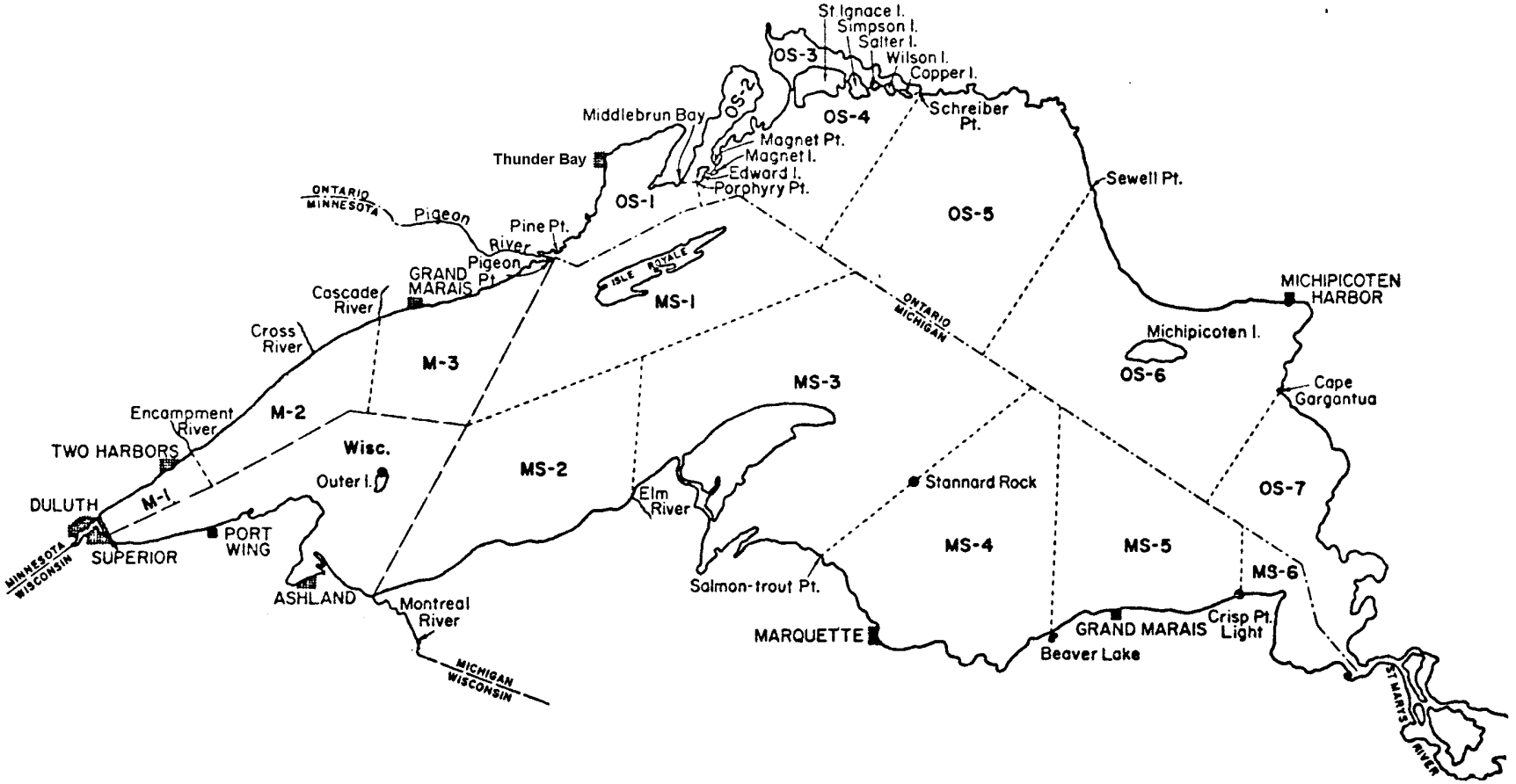

Figure 3.–Lake Superior statistical districts.

Table 1.–Estimated catch per hour, number caught, and effort (angler hours, trips and days) for all Lake Michigan sample areas (21) combined, by all modes of sportfishing (non-charter), 1997. 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	0	0	0	0	0	70	10	80
	(0.0000)	(0)	(0)	(0)	(0)	(0)	(0)	(132)	(21)	(134)
Coho salmon	0.0117	1,231	6,027	3,041	1,066	1,521	4,259	9,958	559	27,662
	(0.0020)	(711)	(2,766)	(2,330)	(550)	(771)	(1,397)	(2,167)	(228)	(4,602)
Chinook salmon	0.0359	2	1,721	8,182	9,173	15,561	37,308	12,369	969	85,285
	(0.0047)	(5)	(1,203)	(3,373)	(2,393)	(6,432)	(6,510)	(2,295)	(359)	(10,378)
Rainbow trout	0.0105	11	2,721	1,772	3,786	5,676	5,839	2,858	2,307	24,970
	(0.0015)	(15)	(1,110)	(785)	(1,171)	(1,820)	(1,648)	(983)	(837)	(3,304)
Atlantic salmon	0.0001	0	3	0	0	18	151	27	0	199
	(0.0001)	(0)	(7)	(0)	(0)	(38)	(254)	(62)	(0)	(264)
Brown trout	0.0210	476	17,402	9,316	5,751	6,845	8,446	994	475	49,705
	(0.0028)	(218)	(4,746)	(2,070)	(1,901)	(1,674)	(2,222)	(413)	(253)	(6,200)
Brook trout	0.0000	0	32	0	0	0	0	0	4	36
	(0.0000)	(0)	(64)	(0)	(0)	(0)	(0)	(0)	(8)	(64)
Lake trout	0.0195	0	817	5,322	10,686	15,767	12,525	1,107	0	46,224
	(0.0025)	(0)	(502)	(1,940)	(2,342)	(3,146)	(3,068)	(801)	(0)	(5,427)

(Table 1.–continued.)

Species	Total catch per hour	Month								Season
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
Splake	0.0038	0	4,766	1,988	0	1,528	508	77	35	8,902
	(0.0008)	(0)	(1,093)	(1,283)	(0)	(695)	(375)	(100)	(50)	(1,865)
Lake herring	0.0011	0	269	53	1,913	143	0	0	212	2,590
	(0.0006)	(0)	(544)	(77)	(1,285)	(296)	(0)	(0)	(136)	(1,435)
Smallmouth bass	0.0036	0	0	644	5,498	1,643	703	76	0	8,564
	(0.0016)	(0)	(0)	(693)	(3,444)	(1,167)	(708)	(93)	(0)	(3,770)
Yellow perch	0.2017	5	140,561	60,215	99,521	101,824	41,047	29,224	6,222	478,619
	(0.0590)	(11)	(117,120)	(30,331)	(27,306)	(55,357)	(19,287)	(14,866)	(4,502)	(138,059)
Walleye	0.0128	0	539	1,087	16,520	2,864	4,510	972	3,948	30,440
	(0.0043)	(0)	(533)	(852)	(8,700)	(3,270)	(2,624)	(741)	(2,930)	(10,169)
Lake whitefish	0.0098	175	246	1,091	10,570	3,533	898	264	6,517	23,294
	(0.0027)	(128)	(214)	(740)	(4,920)	(2,933)	(876)	(315)	(2,617)	(6,414)
Total	0.3316	1,900	175,104	92,711	164,484	156,923	116,194	57,996	21,258	786,570
	(0.0610)	(755)	(117,269)	(30,803)	(29,589)	(56,068)	(21,018)	(15,278)	(6,055)	(139,400)
Angler hours		6,045	284,339	239,550	398,350	440,464	599,877	303,201	100,542	2,372,368
		(2,130)	(42,624)	(32,340)	(36,464)	(52,927)	(72,738)	(34,712)	(8,756)	(116,493)

(Table 1.–continued.)

Species	Total catch per hour	Month								Season
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
Angler trips		2,010	70,022	58,265	89,800	109,001	138,676	69,884	25,641	563,299
		(634)	(9,463)	(6,911)	(7,458)	(11,512)	(15,301)	(6,786)	(2,121)	(24,709)
Angler days		1,967	63,665	54,168	84,534	100,065	124,423	61,951	22,345	513,118
		(615)	(9,327)	(6,759)	(7,263)	(10,379)	(14,332)	(6,359)	(1,974)	(23,308)

Table 2.–Estimated catch per hour, number caught, and effort (angler hours, trips and days) for all Lake Huron sample areas (15) combined by all modes of sportfishing (non-charter), 1997. Two standard errors in parentheses.

Species	Total catch per hour	Month							
		Apr	May	Jun	Jul	Aug	Sep	Oct	Season
Pink salmon	0.0001	0	51	0	22	146	0	34	253
	(0.0001)	(0)	(48)	(0)	(25)	(135)	(0)	(69)	(161)
Coho salmon	0.0013	1,295	423	279	533	392	134	0	3,056
	(0.0003)	(503)	(260)	(177)	(244)	(302)	(160)	(0)	(727)
Chinook salmon	0.0599	9,442	13,645	16,816	30,453	52,066	18,741	5,018	146,181
	(0.0054)	(1,991)	(4,255)	(3,589)	(3,708)	(7,353)	(2,704)	(1,547)	(10,605)
Rainbow trout	0.0058	854	1,104	1,689	4,287	4,394	906	855	14,089
	(0.0009)	(244)	(375)	(511)	(1,216)	(1,447)	(666)	(537)	(2,183)
Atlantic salmon	0.0001	7	221	52	0	6	0	12	298
	(0.0001)	(10)	(226)	(46)	(0)	(12)	(0)	(26)	(233)
Brown trout	0.0019	1,203	339	102	2,328	274	76	200	4,522
	(0.0004)	(435)	(177)	(86)	(859)	(145)	(60)	(198)	(1,015)
Brook trout	0.0000	0	2	0	22	13	0	0	37
	(0.0000)	(0)	(5)	(0)	(45)	(26)	(0)	(0)	(52)
Lake trout	0.0230	0	7,270	13,155	20,414	15,290	3	0	56,132
	(0.0031)	(0)	(3,141)	(2,795)	(4,105)	(3,634)	(7)	(0)	(6,909)

(Table 2.–continued.)

Species	Total catch per hour	Month							
		Apr	May	Jun	Jul	Aug	Sep	Oct	Season
Smallmouth bass	0.0004	10	27	122	233	483	0	200	1,075
	(0.0003)	(21)	(61)	(164)	(488)	(523)	(0)	(382)	(830)
Yellow perch	0.4535	56,480	5,427	20,315	120,723	352,356	348,769	202,731	1,106,801
	(0.0678)	(19,194)	(6,118)	(11,375)	(44,383)	(97,919)	(91,320)	(59,502)	(154,832)
Walleye	0.0333	3,869	3,877	8,058	41,555	22,656	510	719	81,244
	(0.0065)	(2,135)	(1,362)	(3,022)	(12,018)	(8,300)	(303)	(798)	(15,152)
Lake whitefish	0.0001	0	218	3	6	44	11	0	282
	(0.0001)	(0)	(363)	(7)	(12)	(78)	(23)	(0)	(372)
Total	0.5794	73,160	32,604	60,591	220,576	448,120	369,150	209,769	1,413,970
	(0.0708)	(19,428)	(8,227)	(12,631)	(46,340)	(98,625)	(91,363)	(59,531)	(156,109)
Angler hours		168,608	166,133	293,717	658,838	738,904	290,107	124,065	2,440,372
		(20,198)	(30,895)	(30,342)	(79,292)	(79,961)	(33,868)	(17,133)	(128,081)
Angler trips		49,876	41,128	59,595	122,862	147,847	62,866	31,105	515,279
		(6,855)	(6,757)	(6,019)	(14,922)	(15,915)	(7,087)	(4,098)	(25,920)
Angler days		37,395	34,947	54,393	113,486	133,286	54,719	27,910	456,136
		(4,727)	(5,877)	(5,620)	(14,065)	(14,641)	(6,246)	(3,785)	(23,537)

Table 3.–Estimated catch per hour, number caught, and effort (angler hours, trips and days) for the Lake Erie boat fishery (non-charter), 1997. Two standard errors in parentheses.

Species	Total catch per hour	Month							Season
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Coho salmon	0.0000	4	0	0	0	0	0	0	4
	(0.0000)	(9)	(0)	(0)	(0)	(0)	(0)	(0)	(9)
Chinook salmon	0.0000	3	0	0	3	0	0	0	6
	(0.0000)	(6)	(0)	(0)	(7)	(0)	(0)	(0)	(9)
Rainbow trout	0.0000	0	12	7	4	0	0	0	23
	(0.0000)	(0)	(20)	(11)	(9)	(0)	(0)	(0)	(25)
Smallmouth bass	0.0019	0	0	37	400	289	217	54	997
	(0.0008)	(0)	(0)	(41)	(323)	(205)	(180)	(58)	(429)
Yellow perch	0.9546	0	991	4,654	17,192	135,010	294,832	45,266	497,945
	(0.2609)	(0)	(543)	(2,184)	(20,414)	(44,060)	(111,719)	(19,205)	(123,341)
Walleye	0.1613	2,278	6,095	28,271	42,870	4,180	193	249	84,136
	(0.0363)	(1,989)	(2,041)	(11,828)	(10,664)	(1,771)	(136)	(332)	(16,279)
Lake whitefish	0.0004	0	97	99	0	0	0	0	196
	(0.0005)	(0)	(200)	(133)	(0)	(0)	(0)	(0)	(240)
Total	1.1183	2,285	7,195	33,068	60,469	139,479	295,242	45,569	583,307
	(0.2712)	(1,989)	(2,122)	(12,029)	(23,034)	(44,096)	(111,719)	(19,208)	(124,412)

(Table 3.–continued.)

Species	Total catch per hour	Month							Season
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Angler hours		12,571 (8,909)	35,755 (11,314)	114,363 (38,982)	160,771 (33,371)	77,350 (20,118)	97,371 (17,826)	23,426 (8,144)	521,607 (60,245)
Angler trips		2,756 (2,033)	6,486 (2,039)	19,695 (6,605)	26,808 (5,556)	15,428 (4,145)	20,600 (3,862)	4,855 (1,681)	96,628 (10,849)
Angler days		2,748 (2,032)	6,457 (2,033)	19,695 (6,605)	26,808 (5,556)	15,412 (4,144)	20,600 (3,862)	4,855 (1,681)	96,575 (10,848)

Table 4.–Estimated catch per hour, number caught, and effort (angler hours, trips and days) for all Lake Superior sample areas (6) combined by all modes of sportfishing (non-charter), 1997. Two standard errors in parentheses.

Species	Total catch per hour	Month								Season
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
Pink salmon	0.0001	0	0	0	0	0	0	14	0	14
	(0.0001)	(0)	(0)	(0)	(0)	(0)	(0)	(19)	(0)	(19)
Coho salmon	0.0332	238	1,814	1,033	367	225	536	1,009	153	5,375
	(0.0049)	(121)	(513)	(297)	(167)	(108)	(281)	(299)	(86)	(762)
Chinook salmon	0.0130	51	512	695	677	45	94	28	0	2,102
	(0.0039)	(33)	(259)	(377)	(405)	(54)	(109)	(25)	(0)	(624)
Rainbow trout	0.0068	0	270	543	177	34	0	10	68	1,102
	(0.0030)	(0)	(179)	(409)	(166)	(44)	(0)	(16)	(56)	(482)
Atlantic salmon	0.0001	0	11	0	0	0	0	0	0	11
	(0.0002)	(0)	(22)	(0)	(0)	(0)	(0)	(0)	(0)	(22)
Brown trout	0.0022	5	106	110	119	0	10	9	1	360
	(0.0009)	(10)	(73)	(88)	(97)	(0)	(20)	(11)	(2)	(152)
Brook trout	0.0005	0	0	14	62	0	0	0	0	76
	(0.0008)	(0)	(0)	(27)	(125)	(0)	(0)	(0)	(0)	(128)
Lake trout	0.1458	3	68	1,113	6,102	6,361	6,583	2,500	866	23,596
	(0.0142)	(6)	(61)	(347)	(1,146)	(1,326)	(1,009)	(504)	(321)	(2,138)

(Table 4.–continued.)

Species	Total catch per hour	Month								Season
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
Splake	0.0077	44	511	359	43	0	38	37	214	1,246
	(0.0022)	(33)	(240)	(171)	(77)	(0)	(70)	(30)	(141)	(346)
Siscowet	0.0134	0	0	122	392	713	728	212	0	2,167
	(0.0039)	(0)	(0)	(154)	(229)	(397)	(346)	(171)	(0)	(619)
Lake herring	0.0017	167	77	4	0	20	2	0	0	270
	(0.0008)	(109)	(64)	(8)	(0)	(41)	(4)	(0)	(0)	(133)
Smallmouth bass	0.0002	0	0	0	0	0	0	30	0	30
	(0.0004)	(0)	(0)	(0)	(0)	(0)	(0)	(62)	(0)	(62)
Yellow perch	0.0012	0	0	0	71	118	0	0	0	189
	(0.0015)	(0)	(0)	(0)	(154)	(176)	(0)	(0)	(0)	(234)
Walleye	0.0094	0	0	7	328	797	368	14	0	1,514
	(0.0039)	(0)	(0)	(15)	(303)	(520)	(184)	(34)	(0)	(630)
Lake whitefish	0.0133	132	612	10	0	0	9	0	1,382	2,145
	(0.0047)	(100)	(383)	(21)	(0)	(0)	(18)	(0)	(649)	(761)
Total	0.2484	640	3,981	4,010	8,338	8,313	8,368	3,863	2,684	40,197
	(0.0190)	(197)	(762)	(762)	(1,316)	(1,495)	(1,126)	(616)	(745)	(2,715)

(Table 4.–continued.)

Species	Total catch per hour	Month								Season
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
Angler hours		1,526	11,569	19,959	36,302	37,685	32,973	15,102	6,676	161,792
		(307)	(1,850)	(1,732)	(2,660)	(3,292)	(2,602)	(1,231)	(863)	(5,784)
Angler trips		504	4,153	5,470	8,131	8,875	7,269	4,659	2,085	41,146
		(109)	(646)	(521)	(692)	(802)	(596)	(419)	(281)	(1,560)
Angler days		504	4,034	5,305	7,972	8,765	7,120	4,521	2,036	40,257
		(109)	(644)	(511)	(684)	(798)	(593)	(414)	(281)	(1,547)

Table 5.–Lake Michigan creel survey locations by lake statistical district. An X denotes that the port or area was sampled during that year. Shaded locations denote where monthly ratios, based on the 1985 creel survey, were used to estimate catch.

		Year												
Survey location	Site code	85	86	87	88	89	90	91	92	93	94	95	96	97
MM-1														
Menominee Harbor	001	X	X	X	X	X				X	X	X	X	X
Stoney Pt. to Kleinke Park	007	X[1]	X[1]	X[1]	X[1]	X[1]				X	X	X	X	X
Cedar River PAS	015	X[1]	X[1]	X[1]	X[1]	X[1]				X	X	X	X	X
Ford River PAS	018	X	X	X	X[4]	X[4]	X[4]	X[4]	X[4]	X[4]	X[4]	X[4]	X[4]	X[4]
Little Bay de Noc	020	X	X	X	X	X	X	X	X	X	X	X	X	X
Big Bay de Noc	025	X	X	X	X	X	X	X	X	X	X	X	X	X
MM-2														
Thompson	046	X[2]	X[2]	X[2]	X[2]									
Manistique Harbor and R.	048	X[2]	X[2]	X[2]	X[2]	X								
MM-3														
Harbor Springs	080	X	X	X	X			X	X	X	X	X	X	X
Petoskey	085	X	X	X	X			X	X	X	X	X	X	X
Charlevoix	090	X	X	X	X	X	X	X	X	X	X	X	X	X
MM-4														
Elk Rapids	094	X[3]	X	X	X	X	X	X	X	X	X	X	X	X
East Grand Traverse Bay	095	X[3]	X	X	X	X	X	X	X	X	X	X	X	X
West Grand Traverse Bay	100	X	X	X	X	X	X	X	X	X	X	X	X	X
MM-5														
Leland	116	X	X	X	X									
Platte Bay	122	X		X	X									
Frankfort/Elberta	124	X	X	X	X	X	X	X	X	X	X	X	X	X
MM-6														
Onekama (Portage Lk.)	127	X		X	X				X	X	X	X	X	X
Manistee	128	X	X	X	X	X	X	X	X	X	X	X	X	X
Ludington	134	X	X	X	X	X	X	X	X	X	X	X	X	X
Pentwater	139	X	X	X	X									
MM-7														
Whitehall/Montague	311	X												
Muskegon	149	X	X	X	X	X	X	X	X	X	X	X	X	X
Grand Haven	153	X	X	X	X	X	X	X	X	X	X	X	X	X
Port Sheldon	155	X	X	X	X									
MM-8														
Holland	156	X	X	X	X				X	X	X	X	X	X
Saugatuck	160	X	X	X	X									
South Haven	162	X	X	X	X				X	X	X	X	X	X
Benton Harbor/St. Joseph	164	X	X	X	X	X	X	X	X	X	X	X	X	X
New Buffalo	166	X	X	X	X	X	X	X	X	X	X	X	X	X

[1] Cedar River PAS and Stoney Point to Kleinke Park sites were reported as one site during 1985-89.
[2] Manistique and Thompson were reported as one site during 1985-86.
[3] East Grand Traverse Bay and Elk Rapids were reported as one site during 1985.
[4] Ford River PAS was combined with the Little Bay de Noc site beginning with the 1988 season.

Table 6.–Estimated sport catch (numbers of fish) and angler effort (angler hours) by charter [1] and non-charter anglers for Lake Michigan by lake statistical district, 1985-97.

Lake district	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
MM 1													
Chinook salmon	1,244	3,602	4,640	6,661	4,829	773	343	674	727	1,545	6,485	1,834	5,448
Brown trout	3,135	2,561	3,624	2,124	4,386	191	769	478	21,251	11,687	10,594	8,704	12,626
Yellow perch	459,089	432,646	210,872	323,294	291,003	372,402	564,597	399,671	104,902	139,409	156,720	323,789	43,908[2]
Walleye	18,738	21,682	12,005	25,535	42,029	43,144	50,009	23,374	25,425	32,508	80,323	62,752	30,016[2]
Angler hours	523,167	486,339	303,077	551,750	656,462	736,599	948,456	692,284	734,400	609,360	666,976	627,900	452,044[2]
MM2													
Coho salmon	0	222	418	327	6								
Chinook salmon	329	4,207	3,214	969	1,676								
Rainbow trout	113	679	618	655	1,001								
Brown trout	167	70	109	12	36								
Walleye	33	501	216	466	527								
Angler hours	12,093	40,199	45,139	28,374	28,613								
MM 3													
Chinook salmon	13,332	12,306	11,213	5,889	3,153	3,700	3,079	4,199	2,224	846	993	5,100	5,348
Rainbow trout	3,776	475	1,311	241	539	756	321	777	385	63	237	110	204
Brown trout	1,441	47	237	272	143	53	192	66	1,006	156	176	85	385
Lake trout	26,521	9,404	4,829	12,623	16,365	16,206	13,618	7,502	8,032	7,427	12,766	13,500	13,615
Angler hours	286,181	159,599	169,200	107,185	125,909	117,536	93,552	103,194	107,583	53,616	73,009	103,045	124,056

(Table 6.–continued.)

Lake district	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
MM 4													
Chinook salmon	12,064	5,768	8,089	5,768	5,770	4,082	3,115	4,150	2,019	1,442	2,997	5,215	3,987
Rainbow trout	2,115	1,404	1,364	2,384	1,712	1,752	981	2,159	1,955	2,280	1,721	2,037	3,249
Brown trout	1,165	414	823	1,325	629	895	276	384	646	5,294	3,905	4,334	4,308
Lake trout	9,920	11,543	12,455	14,444	18,163	10,081	13,763	7,094	6,934	5,778	5,350	4,857	11,986
Lake whitefish	89,866	53,875	20,011	13,636	13,806	12,102	10,746	4,978	2,480	4,152	4,428	10,490	21,932
Yellow perch	80,114	247,612	181,548	24,378	38,073	44,899	21,802	14,500	32,511	8,830	13,613	79,527	25,623
Angler hours	466,505	335,002	284,478	262,402	251,561	191,901	223,139	191,459	179,805	184,550	196,525	191,401	278,426
MM 5													
Coho salmon	19,354	14,619	25,945	7,982	36,919	11,233	5,941	7,498	14,740	8,400	5,311	11,882	5,305
Chinook salmon	42,998	72,337	61,211	21,426	29,470	14,193	15,492	10,122	7,562	5,823	11,723	24,974	26,071
Rainbow trout	9,154	3,274	7,559	11,036	9,958	13,326	12,444	11,557	10,756	7,077	2,860	6,403	6,814
Brown trout	2,974	18,540	6,268	2,889	4,538	7,733	7,702	3,094	8,451	19,668	4,539	7,282	7,955
Lake trout	9,119	17,212	14,210	19,441	20,443	11,166	12,527	6,345	9,550	11,538	16,062	15,613	12,250
Angler hours	464,492	678,392	703,739	438,575	558,051	424,096	367,319	359,986	406,490	405,460	269,784	323,133	332,193
MM 6													
Coho salmon	31,024	48,274	40,956	12,259	9,627	12,433	9,213	9,243	9,859	3,324	2,464	7,520	6,736
Chinook salmon	208,796	291,408	157,323	85,172	40,600	33,879	55,655	18,545	18,084	11,026	20,550	45,032	33,112
Rainbow trout	15,060	17,735	30,851	23,060	15,290	24,496	60,511	28,697	22,714	11,555	7,956	21,365	13,228
Brown trout	21,727	37,451	12,089	12,436	7,081	9,156	8,344	5,261	10,154	14,229	5,480	11,468	20,560
Lake trout	30,410	23,904	32,900	25,477	35,371	17,034	30,711	9,695	16,429	9,421	11,937	17,931	15,172
Yellow perch	155,758	321,338	389,395	510,620	241,455	164,126	147,511	337,587	220,025	33,478	9,395	112,098	21,765
Angler hours	1,759,287	2,026,550	1,553,502	1,194,750	938,654	663,355	712,998	707,660	808,294	462,666	372,991	627,747	537,387

(Table 6.–continued.)

Lake district	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
MM 7													
Coho salmon	24,534	8,725	34,628	5,358	5,839	5,559	5,448	6,312	2,884	2,352	1,454	1,217	11,759
Chinook salmon	137,033	148,176	114,304	26,727	12,882	17,466	17,095	7,009	10,437	12,398	14,676	27,741	48,305
Rainbow trout	5,199	7,813	4,951	4,709	6,862	5,961	6,075	12,011	4,668	18,645	6,983	11,184	10,748
Brown trout	10,021	7,092	6,855	2,345	1,275	1,112	3,633	1,522	994	5,242	3,612	6,360	12,327
Lake trout	29,232	39,118	48,294	25,002	17,100	19,779	25,265	13,072	20,401	17,988	16,644	7,084	14,653
Yellow perch	197,346	161,712	660,780	394,797	361,654	355,324	239,132	392,460	130,031	188,463	60,764	245,542	158,592
Angler hours	1,536,124	1,441,813	1,566,320	959,065	564,082	501,268	502,476	458,137	389,240	479,000	304,429	509,728	784,081
MM 8													
Coho salmon	32,400	71,548	37,080	28,299	46,564	17,659	25,110	24,693	29,709	13,758	20,685	21,929	29,934
Chinook salmon	108,999	88,128	32,224	60,565	56,507	26,604	23,480	9,277	5,960	9,403	10,244	16,667	20,902
Rainbow trout	9,570	14,568	4,854	15,367	9,493	5,781	8,759	12,063	7,168	7,719	6,956	14,670	8,834
Brown trout	8,028	9,093	2,759	1,974	3,177	2,364	5,345	3,112	4,470	3,789	5,256	2,637	3,933
Lake trout	37,667	37,834	37,965	36,888	33,064	14,080	26,724	15,480	17,597	19,512	21,961	6,726	8,534
Yellow perch	1,576,775	1,359,106	1,071,373	1,978,168	1,286,822	1,100,135	793,893	1,129,978	1,608,172	1,835,730	1,383,106	388,694	331,682
Angler hours	2,251,618	2,098,239	1,526,822	1,769,305	1,466,989	874,125	1,158,888	825,431	890,236	855,524	1,035,683	624,175	631,772

(Table 6.–continued.)

Lake district	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
All Districts													
Coho salmon	107,312	143,388	139,027	54,225	98,955	46,884	45,712	47,746	57,192	27,834	29,914	42,548	53,734
Chinook salmon	524,795	625,932	392,218	213,177	154,887	100,697	118,259	53,976	47,013	42,483	67,668	126,563	143,173
Rainbow trout	44,987	45,948	51,508	57,452	44,855	52,072	89,091	67,264	47,646	47,339	26,713	55,769	43,077
Brown trout	48,658	75,268	32,764	23,377	21,265	21,504	26,261	13,917	46,972	60,065	33,562	40,870	62,094
Lake trout	142,869	139,015	150,653	133,875	140,506	88,346	122,608	59,188	78,943	71,664	84,720	65,711	76,210
Lake whitefish	89,866	53,875	20,011	13,636	13,806	12,102	10,746	4,978	2,480	4,152	4,428	10,490	21,932
Yellow perch	2,469,082	2,522,414	2,513,968	3,231,257	2,219,007	2,036,886	1,766,935	2,274,196	2,095,641	2,205,910	1,623,598	1,149,650	581,570[2]
Walleye	18,771	22,183	12,221	26,001	42,556	43,144	50,009	23,374	25,425	32,508	80,323	62,752	30,016[2]
Angler hours	7,299,467	7,266,133	6,152,277	5,311,406	4,590,321	3,508,880	4,006,828	3,338,151	3,516,048	3,050,176	2,919,397	3,007,129	3,139,959[2]

[1] Charter boats were included as part of the Great Lakes creel survey prior to 1990. Beginning in 1990 charter boats were required to file monthly catch reports. The data from these reports were summed by lake district and added to the Great Lakes creel survey estimates.

[2] No winter (January-March) creel survey was conducted in MM-1 during 1997 and therefore, the harvest and effort estimates for 1997 are not comparable to prior years which included the winter data.

Table 7.–Lake Huron creel survey sample ports/areas by lake statistical district. An X denotes that the port or area was sampled during that year.

Area	Site code	86	87	88	89	90	91	92	93	94	95	96	97
MH-1													
St. Ignace to St. Martins Bay	216	X	X	X			X						
Les Cheneaux Islands	214	X	X	X			X				X		
St. Vital Pt. to Detour	211		X	X			X						
Drummond Island	210	X	X	X			X						
Rogers City	223	X	X	X	X	X	X	X	X	X	X	X	X
MH-2													
Rockport	224	X	X	X			X	X	X	X	X	X	X
Alpena	227	X	X	X			X	X	X	X	X	X	X
MH-3													
Harrisville	232	X	X	X		X	X	X	X	X	X	X	X
Oscoda	234	X	X	X		X	X	X	X	X	X	X	X
MH-4 (Saginaw Bay)													
Tawas	250	X	X	X	X		X	X	X	X	X	X	X
AuGres	255	X	X	X	X		X	X	X	X	X	X	X
Saganing Creek to Sag. R.	260	X	X	X	X		X	X	X	X	X	X	X
Saginaw R. to Quanicassee	356	X	X	X	X		X	X	X	X	X	X	X
Quanicassee to Sebewaing	278	X	X	X	X		X	X	X	X	X	X	X
Sebewaing to Sand Point	288	X	X	X	X		X	X	X	X	X	X	X
Sand Point to Port Austin	236	X	X	X	X		X	X	X	X	X	X	X
MH-5													
Eagle Bay to Harbor Beach	241	X	X	X			X	X	X	X	X	X	X
MH-6													
Port Sanilac	245	X[1]	X[1]	X[1]				X	X	X	X	X	X
Lexington	246	X[1]	X[1]	X[1]				X	X	X	X	X	X
Port Huron	248	X	X	X									

[1] Lexington and Port Sanilac were combined as one sample site during 1986-88.

Table 8.–Estimated sport catch (numbers of fish) and effort (angler hours) by charter[1] and non-charter anglers for Lake Huron by lake statistical district, 1986-97.

District/Species	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
MH 1												
Pink salmon	25	20,008	461	2,708	76	12,802	71	227	94	48	30	24
Coho salmon	407	1,196	3,263	238	427	24	2	16	12	3	44	28
Chinook salmon	16,184	23,448	28,227	9,342	17,516	11,051	5,635	6,756	11,334	12,765	13,103	21,917
Rainbow trout	87	469	120	453	36	471	51	165	558	504	885	487
Brown trout	673	1,084	860	31	40	678	25	98	170	637	143	117
Lake trout	2,514	974	1,631	827	458	1,938	1,193	268	2,044	4,736	4,686	3,567
Yellow perch	827,756	387,940	244,362	98	1,631	158,909	42	284	0	66,469	0	66
Walleye	10,021	9,124	10,379	11	19	10,915	23	31	0	14	0	27
Angler hours	963,114	778,627	717,845	124,356	124,247	564,314	71,700	72,093	95,784	183,575	118,030	125,822
MH 2												
Pink salmon	79	1,124	11			3,834	46	561	735	275	443	79
Coho salmon	185	466	284		25	189	86	35	52	69	137	166
Chinook salmon	9,576	11,809	14,711		1,124	11,508	11,570	11,030	12,214	26,620	23,152	34,909
Rainbow trout	620	848	375		54	1,245	735	945	1,546	2,904	3,965	1,805
Brown trout	3,895	3,130	710		53	622	2,368	4,033	3,506	3,589	2,254	1,269
Lake trout	808	548	1,188		177	1,735	1,480	856	2,091	4,893	10,958	12,942
Yellow perch	692	0	468		0	3	0	49	4	6	0	0
Walleye	0	100	91		31	2,611	1,121	765	2,016	1,239	1,595	2,577
Angler hours	112,091	116,694	143,814		8,303	130,008	157,423	140,236	164,862	220,685	213,906	212,802
MH 3												
Pink salmon	0	1,762	38		234	327	180	530	9	175	67	64
Coho salmon	444	218	234		80	142	116	25	36	35	101	203
Chinook salmon	12,213	22,661	22,675		8,960	10,725	9,892	12,050	13,528	30,026	27,100	32,374
Rainbow trout	15	1,702	363		370	1,026	2,114	1,426	1,664	4,605	4,197	4,041
Brown trout	195	871	259		121	54	273	353	660	689	573	270
Lake trout	18,173	13,125	39,153		12,382	7,209	3,216	1,667	2,300	10,018	9,297	16,723
Walleye	0	1,059	980		1,526	1,298	1,603	1,482	826	1,873	603	1,629
Angler hours	349,695	412,012	467,404		429,470	232,339	224,758	194,155	228,109	319,119	260,326	330,551

Table 8.–Continued.

District/Species	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
MH 4[2]												
Pink salmon	0	1,611	60	212		10	46	136	82	78	22	13
Coho salmon	1,737	375	425	268	45	175	154	147	62	61	113	52
Chinook salmon	10,798	11,543	11,211	4,422	657	2,720	3,932	3,781	2,690	5,726	6,966	22,407
Rainbow trout	3,907	1,618	982	610	29	296	928	1,287	1,158	2,358	1,854	2,902
Brown trout	7,490	1,920	888	288	7	254	424	764	3,089	4,449	5,698	2,028
Lake trout	9,590	10,517	7,205	7,484	3,367	4,495	5,173	1,728	4,401	6,585	6,053	16,278
Yellow perch	1,818,812	5,608,848	1,858,348	1,562,774	7,093	2,297,459	2,036,662	1,046,859	2,047,288	1,600,289	778,320	1,102,917
Walleye	59,268	64,327	104,878	73,543	3,751	63,378	67,015	139,774	88,437	52,058	49,934	78,143
Angler hours	1,967,722	2,539,939	1,707,694	1,381,258	27,137	1,579,366	1,630,439	1,654,782	1,887,179	1,532,613	1,410,160	1,422,317
MH 5												
Pink salmon	0	2,981	0			68	25	166	0	74	134	35
Coho salmon	1,593	520	617		21	133	222	127	481	127	49	246
Chinook salmon	17,286	15,257	12,777		353	5,332	5,806	5,104	4,543	9,918	6,444	18,158
Rainbow trout	252	712	337		18	334	723	1,398	1,031	2,651	1,929	2,510
Brown trout	2,947	704	415		7	61	123	973	2,220	2,504	239	268
Lake trout	13,127	16,613	13,137		665	4,970	3,912	3,022	2,686	8,895	6,270	10,530
Yellow perch	176,221	146,776	69,785		150	46,927	30,959	24,258	6,388	33,716	10,885	1,511
Walleye	3,961	2,269	5,092		110	11,842	4,723	8,987	1,814	270	136	228
Angler hours	405,603	374,267	320,748		5,425	195,467	188,325	201,362	151,207	199,479	123,369	189,651
MH 6												
Pink salmon	0	1,975	67				4	32	0	238	590	38
Coho salmon	3,109	2,122	2,159		17	27	205	780	369	1,603	1,639	2,491
Chinook salmon	18,145	7,877	15,781		203	144	4,077	10,846	9,110	12,978	9,115	26,505
Rainbow trout	281	886	709		18	13	1,115	2,005	1,298	5,288	2,007	3,235
Brown trout	231	349	316		1	5	36	1,738	3,096	2,755	824	763
Lake trout	308	653	87		1	9	51	10	49	806	1,066	1,468
Yellow perch	51,200	40,081	22,819		26	31	20,087	20,549	5,173	8,335	5,512	2,839
Walleye	33,198	63,241	26,889		102	64	474	277	1,188	394	256	267
Angler hours	438,105	478,097	315,034		3,081	3,151	176,452	198,416	190,886	231,184	167,810	212,558

Table 8.–Continued.

District/Species	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
All Districts												
Pink salmon	104	29,461	637	2,920	310	17,041	372	1,652	920	888	1,286	253
Coho salmon	7,475	4,897	6,982	506	615	690	785	1,130	1,012	1,898	2,083	3,186
Chinook salmon	84,202	92,595	105,382	13,764	28,813	41,480	40,912	49,567	53,419	98,033	85,880	156,270
Rainbow trout	5,162	6,235	2,886	1,063	525	3,385	5,666	7,226	7,255	18,310	14,837	14,980
Brown trout	15,431	8,058	3,448	319	229	1,674	3,249	7,959	12,741	14,623	9,731	4,715
Lake trout	54,520	42,430	62,401	8,311	17,050	20,356	15,025	7,551	13,571	35,933	38,330	61,508
Yellow perch	2,874,681	6,183,645	2,195,782	1,562,872	8,900	2,503,329	2,087,750	1,091,999	2,058,853	1,708,815	794,717	1,107,333
Walleye	106,448	140,120	148,309	73,554	5,539	90,108	74,959	151,316	94,281	55,848	52,524	82,871
Angler hours	4,236,330	4,699,636	3,672,539	1,505,614	597,663	2,704,645	2,449,097	2,461,044	2,718,027	2,686,655	2,293,601	2,493,701

[1] Charter boats were included in the Great Lakes creel survey prior to 1990. Beginning in 1990 charter boats were required to file monthly catch reports and these data were summed by lake district and added to the Great Lakes creel survey estimates.

[2] Creel surveys were not conducted during the winter (January-March) in MM-4 during 1986, 1990 and 1997. For all other years, January through October were surveyed.

Table 9.–Lake Superior creel survey locations by lake distict. An X denotes that the port or area was sampled during that year.

Survey location	Site code	Year										
		87	88	89	90	91	92	93	94	95	96	97
MS-2												
Black River Harbor	168	X	X		X[1]	X	X	X	X[2]	X	X	X
Ontonagon	172	X	X		X[1]	X	X	X	X[2]	X	X	X
MS-3												
Traverse Bay	182	X	X	X	X	X	X	X	X	X	X	X
Keweenaw Bay	185	X	X	X	X	X[3]	X	X	X	X	X	X[4]
Huron Bay	188	X	X	X	X	X						
MM-4												
Big Bay	189	X										
Marquette	190	X	X		X	X	X	X	X	X	X	X
Au Train	194					X	X	X	X	X	X	X
Munising	195	X	X		X[4]	X	X	X	X	X	X	X[4]

[1] June through September was surveyed.
[2] May through July was surveyed.
[3] Only the month of May was sampled.
[4] Winter ice fishery was not sampled.

Table 10.–Estimated sport catch (numbers of fish) and angler effort (angler hours) by charter[1] and non-charter anglers for Lake Superior by lake statistical district, 1987-97.

Lake district	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
MS 2											
Coho salmon	1,229	2,193		393	1,085	746	824	482	1,087	1,314	474
Chinook salmon	837	345		226	1,282	185	277	145	122	420	358
Rainbow trout	160	378		43	16	82	114	76	190	171	91
Brown trout	24	112		165	453	138	92	77	85	644	195
Lake trout	8,502	7,951		5,379	3,782	4,275	3,891	2,012	3,370	5,094	2,949
Siscowet[2]							2,333	463	1,456	1,122	696
Walleye	428	245		3,232	3,839	1,703	1,495	994	1,680	1,334	1,514
Lake whitefish	19	53		3	0	215	60	0	0	0	0
Lake herring	0	0		0	0	0	12	0	1,680	34	0
Angler hours	52,833	51,578		42,115	51,202	50,263	46,831	26,661	46,317	45,532	35,158
MS 3											
Coho salmon	197	5,868	618	777	2,587	1,152	4,270	6,941	3,016	948	1,608
Chinook salmon	34	315	614	519	722	1,515	1,896	751	497	369	335
Rainbow trout	53	339	57	15	82	142	261	217	372	125	645
Brown trout	1	140	0	64	62	49	115	124	69	22	56
Lake trout	5,766	15,316	32,432	5,400	6,774	5,713	5,695	4,374	1,369	3,317	3,306
Siscowet[2]							6,822	18,708	4,504	14,411	3,887
Lake whitefish	1,184	5,160	5,421	121	212	364	471	408	10	97	0
Lake herring	0	0	0	0	0	0	985	1,164	211	1,054	126
Angler hours	29,365	102,597	107,951	32,551	57,647	67,137	94,709	125,975	69,297	86,569	48,386

(Table 10.–continued.)

Lake district	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
MS 4											
Coho salmon	8,768	14,996		694	14,587	11,867	7,723	7,738	4,385	6,694	4,772
Chinook salmon	601	636		729	1,001	1,449	1,359	886	395	2,190	1,483
Rainbow trout	627	616		302	717	538	890	561	260	392	460
Brown trout	371	72		39	368	586	285	70	73	94	121
Lake trout	11,310	8,416		10,937	17,367	21,176	20,472	14,241	13,115	17,645	21,504
Siscowet[2]							127	247	106	395	419
Lake whitefish	9,587	8,023		698	4,082	1,192	2,536	1,102	4,225	2,515	2,729
Lake herring	0	0		0	0	0	1,296	1,091	370	1,150	1,228
Angler hours	157,697	138,865		69,777	168,410	150,663	152,316	116,497	94,848	118,204	134,001
All Districts											
Coho salmon	10,194	23,057	618	1,864	18,259	13,765	12,817	15,161	8,488	8,956	6,854
Chinook salmon	1,472	1,296	614	1,474	3,005	3,149	3,532	1,782	1,014	2,979	2,176
Rainbow trout	840	1,333	57	360	815	762	1,265	854	822	688	1,196
Brown trout	396	324	0	268	883	773	492	271	227	760	372
Lake trout	25,578	31,683	32,432	21,716	27,923	31,164	30,058	20,627	17,854	26,056	27,759
Siscowet[2]							9,282	19,418	6,066	15,928	5,002
Walleye	428	245	0	3,232	3,839	1,703	1,495	994	1,680	1,334	1,514
Lake whitefish	10,790	13,236	5,421	822	4,294	1,771	3,067	1,510	4,235	2,612	2,729
Lake herring	0	0	0	0	0	0	2,293	2,255	2,261	2,238	1,354
Angler hours	239,895	293,040	107,951	144,443	277,259	268,063	293,856	269,133	210,462	250,305	217,545

[1] Charter boats were included as part of the Great Lakes creel survey prior to 1990. Beginning in 1990 charter boats were required to file monthly catch reports. The data from these reports were summed by lake district and added to the Great Lakes creel survey estimates.

[2] Siscowet were not distinguished from lean lake trout until the 1993 season.

Table 11.–Estimated yellow perch and walleye catch per hour, number harvested, and angler effort (hours) for the Lake Erie boat fishery (charter and non-charter) during April through October, 1986-97. Bounds on the error of estimation in parentheses.

	Yellow perch		Walleye		
Year	Catch per hour	Number harvested	Catch per hour	Number harvested	Angler hours
1986[1]	0.399	834,310	0.293	605,666	2,068,779
	(0.106)	(218,909)	(0.053)	(110,365)	(252,761)
1987	0.252	619,112	0.367	902,378	2,455,903
	(0.160)	(385,740)	(0.077)	(151,024)	(308,709)
1988[2]	0.073	318,786	0.458	1,996,824	4,362,452
	(0.049)	(205,749)	(0.121)	(419,055)	(702,522)
1989	0.386	1,466,442	0.288	1,092,289	3,799,067
	(0.084)	(242,822)	(0.068)	(205,068)	(545,688)
1990	0.310	770,507	0.314	780,508	2,482,242
	(0.156)	(368,162)	(0.071)	(145,900)	(298,193)
1991[1]	0.470	378,716	0.164	132,322	805,294
	(0.129)	(80,078)	(0.037)	(22,873)	(120,402)
1992	0.306	255,747	0.299	249,713	836,216
	(0.102)	(72,114)	(0.070)	(44,354)	(120,008)
1993	0.506	473,580	0.289	270,376	935,249
	(0.162)	(126,436)	(0.066)	(47,319)	(134,149)
1994	0.243	246,327	0.213	216,040	1,012,595
	(0.075)	(64,150)	(0.047)	(36,667)	(139,623)
1995	0.913	367,171	0.273	109,691	401,983
	(0.317)	(101,310)	(0.051)	(14,973)	(51,264)
1996	0.889	635,233	0.244	174,607	714,744
	(0.209)	(120,896)	(0.041)	(21,917)	(77,674)
1997	0.934	529,435	0.216	122,467	567,042
	(0.261)	(123,341)	(0.036)	(16,279)	(60,245)

[1]May through October.
[2]May through September.