

STUDY PERFORMANCE REPORT

State: Michigan

Project No.: F-53-R-13

Study No.: 427

Title: Measurement of sportfishing harvest in lakes Michigan, Huron, Erie, and Superior

Period Covered: April 1, 1996 to March 31, 1997

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 1996 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 71,757 anglers were interviewed at the conclusion of their fishing trips during the 1996 open water season (April-October). The number of anglers interviewed by lake was: Lake Michigan, 29,981; Lake Huron, 28,033; Lake Erie, 8,042; and Lake Superior, 5,701.

Anglers spent an estimated 5.5 million angler hours fishing at all sites sampled 1996. This amounted to 1.2 million individual fishing trips or 1.1 million angler days.

A total of 3.3 million fish were harvested at all survey areas combined. Yellow perch was the most numerous species in the catch with an estimated harvest of 2.4 million. Over 264,000 walleye were estimated harvested by the sport fishery in all sample areas combined in 1996. Salmonines were also an important part of the Great Lakes sport harvest. During 1996, nearly 385,000 were estimated harvested from all sample areas. Important species of salmonines and their estimated harvest in numbers of fish were: chinook salmon, 156,000; lake trout, 80,000; rainbow trout, 45,000; brown trout, 43,000 and coho salmon, 31,000. Walleye also was important species in the sport catch in several areas of the Great Lakes.

Job 1. Title: Initiate air flight boat counts.

Findings: During the 1996 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 13 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. Data entry was completed by January, 1997 for all open water sample areas. Summaries of the catch estimates by sample area were generated for all sites by end of January, 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 (Study 427). 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 1996.

Lake Michigan anglers spent an estimated 2.1 million hours fishing the ports and areas sampled during 1996 (Table 1). This amounted to an estimated 516,000 individual fishing trips. Estimated angler effort at nine index ports (New Buffalo, St. Joseph, Grand Haven, Muskegon, Ludington, Manistee, Frankfort, West Grand Traverse Bay, and Charlevoix) increased 41% in 1996 compared to 1995 (Table 2).

The total estimated harvest at all sample areas was 1.2 million fish and represented 28 individual species (Table 1). Yellow perch were the most numerous species in the catch with an estimated harvest of 895,000. Catch rates for yellow perch at the nine Lake Michigan index ports increased over 100% compared to 1995 (Table 3). The month of June was closed for yellow perch fishing on Lake Michigan south of the 45th parallel during 1995.

Salmonines are also an important part of the Lake Michigan sport harvest. During 1996 an estimated 74,000 chinook salmon, 36,000 lake trout, 31,000 brown trout, 30,000 rainbow trout and 21,000 coho salmon were harvested from the survey areas (Table 1).

The 1996 chinook harvest (+125%) (Table 2) and catch rate (+60%) (Table 3) at the nine Lake Michigan index ports increased over the previous year. For the twelve year data series, 1996 marked the second year that the chinook harvest and catch rate increased significantly over the prior year. The harvest of coho salmon, rainbow trout, and brown trout in 1996 increased compared to 1995 (Table 2). Catch rates for all three species increased as compared to 1995, with rainbow (+92%) showing the greatest rate of increase. The lake trout harvest was virtually unchanged compared to 1995, while the catch rate decreased 42%. Taken as a group, the catch rate (14.59 ± 0.88 fish per 100 angler hours) for all salmonines combined during 1996 was the second greatest rate estimated for the 12 year data series (Table 3).

Lake Erie.—The Lake Erie boat fishery was sampled from Point Mouillee to the Michigan-Ohio state line during mid-April through October, 1996. Lake Erie anglers spent an estimated 667,000 hours fishing the Michigan waters of Lake Erie (Table 4). Non-charter angler effort during 1996 increased (87%) compared to 1995.

Anglers harvested an estimated 793,000 fish representing 18 species. Yellow perch (598,000) and walleye (135,000) were the most numerous species in the catch. The 1996 walleye harvest increased by 90%, while the catch rate remained virtually unchanged compared to 1995. The yellow perch harvest increased by 74%, but the catch rate decreased slightly compared to the previous year.

In addition to yellow perch and walleye, Lake Erie anglers also harvested an estimated 31,000 channel catfish, 14,000 white bass, 9,400 white perch, and 3,100 freshwater drum.

Lake Huron.—Lake Huron was surveyed from Lexington to Rogers City in 1996. Lake Huron anglers spent an estimated 1.9 million hours and made an estimated 394,000 fishing trips in their pursuit of some 28 species of fish (Table 5). The total estimated harvest was 793,000 fish with yellow perch making up 70% of the harvest. Saginaw Bay sample sites accounted for 538,000 yellow perch or 97% of the total yellow perch harvest.

Angler effort decreased 18% in 1996 at nine Lake Huron index ports (Rogers City, Rockport, Alpena, Harrisville, Oscoda, Port Austin, Grindstone City/Harbor Beach, Port Sanilac and Lexington) compared to 1995 (Table 6). The harvest of chinook salmon and rainbow trout decreased slightly during 1996 compared to 1995. The brown trout harvested declined by 54% compared to the previous year, while the lake trout harvest increased slightly.

The greatest changes in catch rates in 1996 compared to 1995 for Lake Huron salmonines occurred for brown trout (-44%) and lake trout (+25%) (Table 7). Catch rates for lake trout have been trending upward since 1994. The catch rate (13.42 ± 0.83) for all salmonines combined at the nine Lake Huron index ports during 1996 was the greatest point estimate for the eight year data series.

Angler effort was virtually unchanged on Saginaw Bay during 1996 compared to 1995 (Table 8). The 1996 harvest (-31%) and catch rate (-31%) for yellow perch on Saginaw Bay decreased compared to the previous year. The walleye harvest and catch rate on the Bay during 1996 remained virtually unchanged compared to 1995.

Lake Huron anglers also harvested an estimated 10,800 channel catfish and 3,500 freshwater drum (Table 5).

Lake Superior.—Six areas in western and central Lake Superior were surveyed in 1996. Lake Superior anglers at these six locations fished an estimated 146,000 angler hours and made 35,600 fishing trips (Table 9). The total sport harvest was over 108,000 fish of 22 species. Lake trout was the most abundant (19,000) species of salmonine in the catch. The harvest also included 60,000 rainbow smelt, 8,800 round whitefish, 6,200 coho salmon, 3,400 siscowet lake trout and 1,800 lake whitefish.

Winter survey.—The planned winter creel survey 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 not conducted during the winters months of 1997. A hiring freeze established by the Governor of the State of Michigan prompted the executive office of the MDNR to not request the re-instatement of the winter creel survey staff. The winter creel survey was not viewed as a high priority project by MDNR executive office personnel.

Job 3. Title: Quality control checks.

Findings: Throughout the field season data forms were scrutinized at the Charlevoix Fisheries Research Station prior to data entry. Data entry programs employed range checks on various fields for each count and interview record that was keyed. 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 1997 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 1996 were disseminated to the district management and research station offices during January, 1997.

A draft technical report was prepared 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: Catch and effort statistics along with biological data collected on lake trout in lakes Michigan, Huron and Superior were used by the U.S. Fish and Wildlife Service (USFWS), Chippewa-Ottawa Treaty Fishery Management Authority (COTFMA), and MDNR to calculate total allowable catch for lake trout in the treaty waters of Michigan for the 1994-95 seasons.

Lake trout harvest statistics for lakes Michigan, Huron, and Superior are also annually provided to the Lake Trout Technical Committees of the Great Lakes Fishery Commission (GLFC). The GLFC lake trout technical committees formulate policy recommendations for lake trout on the upper Great Lakes 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 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) the annual reporting of targeted fishing effort and targeted catch rates for important species complexes, such as salmonines, yellow perch and walleye; 4) the estimation of caught and released fish; 5) inclusion of important stream fisheries in the annual creel survey. Work continued on this project during 1996. The action plan required to implement the committee's recommendations includes redesign of the count and interview data forms so they can be entered into computer files utilizing an optical scanner, and development of up dated software for the estimation of catch and effort statistics. The redesign of the count and interview forms were completed during 1996. In the future all data forms will be entered on computer via an optical scanner, rather than by hand. Work on the sample design was not completed during 1996 and therefore the deadline for implementation of the redesigned creel survey was moved to April 1, 1998.

Literature Cited:

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.

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), 1996. Two standard errors in parentheses.

Species	Total catch per hour	Month								Season
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
Pink salmon	0.0001 (0.0001)	0 (0)	0 (0)	0 (0)	0 (0)	48 (99)	81 (127)	63 (88)	0 (0)	192 (184)
Coho salmon	0.0098 (0.0018)	530 (267)	4,375 (1,155)	1,353 (1,049)	1,383 (676)	1,139 (695)	7,269 (2,790)	4,573 (1,512)	256 (213)	20,878 (3,683)
Chinook salmon	0.0347 (0.0049)	96 (172)	462 (323)	2,512 (1,338)	6,372 (1,687)	17,495 (5,867)	32,838 (6,426)	12,800 (3,491)	1,343 (764)	73,918 (9,657)
Rainbow trout	0.0142 (0.0018)	43 (54)	1,947 (541)	3,409 (1,172)	7,208 (1,728)	5,131 (1,619)	5,352 (1,367)	4,277 (1,574)	2,827 (759)	30,194 (3,493)
Atlantic salmon	0.0000 (0.0000)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	17 (36)	0 (0)	17 (36)
Brown trout	0.0147 (0.0019)	169 (142)	5,908 (1,283)	10,412 (2,460)	2,443 (1,087)	3,676 (1,579)	4,944 (1,442)	3,012 (991)	826 (337)	31,390 (3,817)
Brook trout	0.0000 (0.0000)	0 (0)	6 (12)	0 (0)	0 (0)	13 (29)	0 (0)	0 (0)	0 (0)	19 (31)
Lake trout	0.0170 (0.0021)	0 (0)	266 (236)	4,332 (1,511)	6,275 (1,329)	12,507 (2,759)	12,414 (2,280)	433 (253)	8 (17)	36,235 (4,121)
Splake	0.0102 (0.0042)	0 (0)	12,922 (8,791)	7,383 (1,835)	34 (67)	119 (133)	697 (412)	578 (425)	51 (64)	21,784 (9,001)
Rainbow smelt	0.0001 (0.0002)	0 (0)	0 (0)	0 (0)	0 (0)	47 (94)	91 (188)	0 (0)	0 (0)	138 (210)
Northern pike	0.0002 (0.0002)	0 (0)	0 (0)	98 (121)	175 (269)	29 (60)	0 (0)	46 (64)	11 (26)	359 (309)
White sucker	0.0004 (0.0005)	73 (125)	7 (13)	321 (581)	0 (0)	341 (713)	49 (99)	5 (9)	0 (0)	796 (934)
Black bullhead	0.0002 (0.0004)	0 (0)	0 (0)	0 (0)	461 (950)	0 (0)	42 (84)	0 (0)	0 (0)	503 (954)
Yellow bullhead	0.0000 (0.0000)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	29 (59)	0 (0)	0 (0)	29 (59)
Channel catfish	0.0003 (0.0002)	2 (3)	26 (37)	0 (0)	252 (291)	302 (244)	6 (11)	4 (9)	22 (46)	614 (385)
White perch	0.0004 (0.0004)	0 (0)	0 (0)	0 (0)	757 (815)	27 (54)	0 (0)	0 (0)	0 (0)	784 (817)

Table 1.—continued.

Species	Total catch per hour	Month								Season
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
Rockbass	0.0007 (0.0004)	0 (0)	0 (0)	0 (0)	740 (758)	426 (396)	412 (383)	0 (0)	0 (0)	1,578 (937)
Pumpkinseed	0.0001 (0.0001)	0 (0)	0 (0)	0 (0)	0 (0)	180 (372)	133 (203)	0 (0)	0 (0)	313 (424)
Bluegill	0.0001 (0.0002)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	126 (225)	0 (0)	0 (0)	126 (225)
Lake herring	0.0004 (0.0005)	0 (0)	0 (0)	0 (0)	0 (0)	494 (940)	69 (140)	0 (0)	316 (283)	879 (992)
Smallmouth bass	0.0036 (0.0011)	0 (0)	0 (0)	43 (86)	2,429 (1,432)	2,588 (1,564)	2,365 (1,098)	288 (443)	0 (0)	7,713 (2,430)
Black crappie	0.0001 (0.0002)	0 (0)	0 (0)	0 (0)	0 (0)	160 (326)	52 (104)	0 (0)	0 (0)	212 (342)
Yellow perch	0.4205 (0.0550)	0 (0)	115,499 (57,229)	60,577 (32,544)	66,215 (18,209)	196,549 (39,610)	335,140 (61,961)	91,249 (36,420)	29,939 (11,994)	895,168 (107,444)
Walleye	0.0288 (0.0058)	0 (0)	32 (63)	16,548 (5,387)	19,685 (6,702)	4,268 (2,259)	20,818 (8,012)	44 (64)	3 (7)	61,398 (11,968)
Freshwater drum	0.0012 (0.0006)	0 (0)	0 (0)	0 (0)	857 (636)	1,591 (1,160)	0 (0)	44 (46)	0 (0)	2,492 (1,324)
Lake whitefish	0.0052 (0.0020)	251 (165)	339 (219)	474 (427)	4,996 (3,559)	1,243 (1,548)	0 (0)	0 (0)	3,860 (1,529)	11,163 (4,202)
Round whitefish	0.0102 (0.0035)	0 (0)	1,255 (627)	1,726 (2,131)	1,382 (1,088)	316 (588)	801 (864)	10,115 (6,787)	6,204 (1,560)	21,799 (7,464)
Burbot	0.0001 (0.0001)	0 (0)	15 (30)	77 (94)	3 (6)	10 (21)	24 (49)	9 (18)	0 (0)	138 (114)
Other	0.0000 (0.0000)	0 (0)	19 (39)	0 (0)	13 (26)	40 (67)	14 (29)	0 (0)	0 (0)	86 (87)
Total	0.5735 (0.0594)	1,164 (408)	143,078 (57,934)	109,265 (33,305)	121,680 (20,108)	248,739 (40,375)	423,766 (62,961)	127,557 (37,294)	45,666 (12,249)	1,220,915 (109,568)
Angler hours		10,665 (1,410)	111,776 (12,750)	252,221 (25,729)	304,282 (25,622)	512,344 (56,843)	644,192 (72,744)	230,751 (45,762)	62,622 (6,748)	2,128,853 (110,207)
Angler trips		3,125 (470)	29,707 (2,977)	67,089 (6,480)	80,011 (6,546)	125,179 (11,690)	140,175 (14,529)	52,214 (8,834)	18,532 (1,888)	516,032 (22,875)
Angler days		2,974 (456)	25,619 (2,717)	57,762 (5,641)	69,287 (6,206)	114,635 (10,697)	126,310 (12,908)	46,495 (7,982)	15,798 (1,687)	458,880 (20,628)

Table 2.—Estimated sport fishing catch and effort(charter and non-charter) for salmonines and yellow perch at nine Lake Michigan index ports combined (New Buffalo, St. Joseph, Grand Haven, Muskegon, Ludington, Manistee, Frankfort, West Grand Traverse Bay, and Charlevoix) April through October (May through August for lake trout), 1985-96. Two standard errors in parentheses.

Species	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
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)	33,258 (6,440)	39,370 (6,910)	50,757 (5,794)	17,794 (3,228)	15,005 (3,021)	24,253 (3,596)
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)	60,223 (8,260)	37,580 (5,350)	32,560 (3,660)	24,501 (2,558)	34,718 (4,461)	78,082 (9,132)
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)	53,582 (7,446)	50,521 (6,175)	37,752 (4,682)	25,442 (2,789)	13,473 (1,538)	36,247 (3,159)
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)	16,563 (3,283)	9,254 (2,370)	18,352 (2,850)	27,109 (10,674)	11,228 (1,862)	19,787 (2,975)
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)	67,123 (7,215)	35,953 (4,310)	45,553 (4,702)	36,980 (3,491)	38,584 (3,857)	38,562 (3,753)
Yellow perch	1,357,242 (220,294)	1,175,048 (390,585)	1,514,645 (372,190)	1,892,215 (430,513)	1,158,114 (232,509)	1,025,786 (167,751)	1,103,838 (145,052)	1,152,545 (193,450)	882,720 (162,814)	418,787 (69,610)	139,791 (34,868)	407,438 (62,420)
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)	1,862,224 (152,309)	1,717,801 (117,981)	1,812,540 (104,200)	1,343,563 (104,319)	1,017,725 (76,514)	1,429,059 (97,808)

Table 3.—Estimated catch rates (fish per 100 angler hours) of salmonines and yellow perch by charter and non-charter anglers at nine Lake Michigan index ports combined April through October (May through August for lake trout), 1985-96. Two standard errors in parentheses.

Species	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Coho salmon	1.76 (0.34)	2.73 (0.65)	2.46 (0.59)	1.39 (0.51)	3.20 (1.11)	1.92 (0.34)	1.79 (0.38)	2.29 (0.43)	2.80 (0.36)	1.32 (0.26)	1.47 (0.32)	1.70 (0.28)
Chinook salmon	7.87 (0.98)	10.26 (2.37)	7.35 (1.67)	4.04 (0.82)	3.40 (0.77)	3.35 (0.42)	3.23 (0.44)	2.19 (0.31)	1.80 (0.20)	1.82 (0.19)	3.41 (0.44)	5.46 (0.64)
Rainbow trout	0.69 (0.18)	0.59 (0.32)	0.76 (0.17)	1.10 (0.27)	1.27 (0.24)	1.95 (0.29)	2.88 (0.40)	2.94 (0.36)	2.08 (0.26)	1.89 (0.21)	1.32 (0.15)	2.54 (0.22)
Brown trout	0.78 (0.16)	1.29 (0.39)	0.55 (0.18)	0.62 (0.20)	0.61 (0.17)	0.79 (0.18)	0.89 (0.18)	0.54 (0.14)	1.01 (0.16)	2.02 (0.79)	1.10 (0.18)	1.38 (0.21)
Lake trout	2.59 (0.50)	3.57 (1.48)	3.03 (0.78)	3.38 (0.72)	4.42 (0.91)	3.90 (0.59)	4.40 (0.64)	2.57 (0.37)	3.14 (0.39)	3.90 (0.46)	4.98 (0.68)	3.51 (0.44)
Salmonines	13.69 (1.18)	18.44 (2.91)	14.15 (1.95)	10.53 (1.25)	12.90 (1.66)	11.90 (0.87)	13.19 (0.97)	10.53 (0.75)	10.83 (0.64)	10.96 (1.00)	12.29 (0.90)	14.59 (0.88)
Yellow perch	31.54 (5.12)	29.83 (9.92)	42.86 (10.53)	71.86 (16.35)	49.16 (9.87)	59.21 (9.68)	59.28 (7.79)	67.09 (11.26)	48.70 (8.98)	31.17 (5.18)	13.74 (3.43)	28.51 (4.37)

Table 4.—Estimated catch per hour, number caught, and effort (angler hours, trips and days) for the Lake Erie boat fishery (non-charter), 1996. Two standard errors in parentheses.

Species	Total catch per hour	Month							Season
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Rainbow trout	0.0001 (0.0002)	0 (0)	0 (0)	13 (27)	35 (72)	0 (0)	0 (0)	0 (0)	48 (77)
Northern pike	0.0000 (0.0000)	0 (0)	30 (67)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	30 (67)
Black bullhead	0.0000 (0.0000)	6 (14)	21 (43)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	27 (45)
Yellow bullhead	0.0000 (0.0000)	0 (0)	0 (0)	0 (0)	0 (0)	6 (13)	0 (0)	0 (0)	6 (13)
Channel catfish	0.0459 (0.0211)	534 (696)	1,298 (836)	2,377 (1,791)	23,166 (13,420)	2,181 (1,025)	636 (660)	440 (341)	30,632 (13,641)
White perch	0.0142 (0.0096)	12 (29)	237 (228)	519 (349)	1,450 (759)	5,993 (6,148)	714 (651)	527 (824)	9,452 (6,297)
White bass	0.0208 (0.0100)	70 (135)	4,349 (2,331)	1,406 (695)	5,950 (5,738)	141 (153)	130 (252)	1,833 (1,688)	13,879 (6,465)
Rockbass	0.0011 (0.0009)	0 (0)	55 (65)	77 (150)	140 (135)	186 (135)	258 (546)	34 (34)	750 (602)
Green sunfish	0.0001 (0.0001)	0 (0)	0 (0)	0 (0)	0 (0)	38 (56)	0 (0)	0 (0)	38 (56)
Pumpkinseed	0.0000 (0.0000)	0 (0)	0 (0)	0 (0)	22 (47)	0 (0)	0 (0)	0 (0)	22 (47)
Bluegill	0.0005 (0.0004)	0 (0)	49 (69)	0 (0)	50 (107)	23 (35)	25 (41)	165 (170)	312 (219)
Smallmouth bass	0.0009 (0.0005)	0 (0)	0 (0)	135 (131)	327 (242)	0 (0)	43 (73)	66 (59)	571 (291)
Largemouth bass	0.0002 (0.0003)	0 (0)	0 (0)	71 (147)	0 (0)	0 (0)	4 (8)	30 (42)	105 (153)
White crappie	0.0001 (0.0002)	0 (0)	42 (88)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	42 (88)
Black crappie	0.0000 (0.0000)	8 (18)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	8 (18)
Yellow perch	0.8962 (0.2090)	11 (17)	3,891 (3,492)	12,594 (6,926)	25,488 (10,645)	342,655 (79,904)	128,786 (79,558)	84,471 (41,222)	597,896 (120,776)

Table 4.—continued.

Species	Total catch per hour	Month							Season
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Walleye	0.2030 (0.0405)	1,176 (1,209)	14,584 (5,750)	43,261 (13,270)	69,226 (16,242)	7,047 (2,426)	159 (240)	5 (7)	135,458 (21,917)
Freshwater drum	0.0048 (0.0018)	68 (174)	319 (272)	593 (388)	1,182 (820)	683 (484)	187 (191)	149 (120)	3,181 (1,101)
Other	0.0005 (0.0003)	24 (40)	53 (51)	14 (21)	0 (0)	58 (67)	41 (79)	111 (133)	301 (182)
Total	1.1883 (0.2315)	1,909 (1,413)	24,928 (7,179)	61,060 (15,103)	127,036 (24,320)	359,011 (80,185)	130,983 (79,566)	87,831 (41,267)	792,758 (123,840)
Angler hours		14,179 (8,761)	96,175 (38,100)	142,197 (43,433)	197,892 (38,192)	137,042 (20,278)	55,343 (25,724)	24,296 (9,320)	667,124 (77,674)
Angler trips		2,621 (1,515)	18,380 (7,043)	24,844 (7,392)	34,226 (6,836)	25,924 (4,009)	13,108 (5,562)	5,162 (1,988)	124,265 (14,291)
Angler days		2,621 (1,515)	18,380 (7,043)	24,467 (7,301)	33,928 (6,783)	25,907 (4,007)	13,103 (5,560)	5,149 (1,986)	123,555 (14,217)

Table 5.—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), 1996. Two standard errors in parentheses.

Species	Total catch per hour	Month							Season
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Pink salmon	0.0007 (0.0002)	0 (0)	43 (55)	617 (289)	394 (137)	204 (159)	28 (43)	0 (0)	1,286 (364)
Coho salmon	0.0010 (0.0003)	167 (187)	527 (252)	508 (242)	348 (273)	278 (160)	26 (49)	17 (37)	1,871 (511)
Chinook salmon	0.0406 (0.0041)	549 (219)	5,296 (1,458)	7,009 (1,643)	17,076 (2,688)	24,754 (2,998)	16,562 (3,599)	8,218 (2,765)	79,464 (6,456)
Rainbow trout	0.0068 (0.0010)	705 (263)	1,536 (720)	1,441 (639)	2,872 (741)	5,874 (1,087)	670 (401)	304 (202)	13,402 (1,711)
Atlantic salmon	0.0000 (0.0000)	60 (60)	11 (18)	21 (26)	0 (0)	0 (0)	0 (0)	0 (0)	92 (68)
Brown trout	0.0041 (0.0008)	2,229 (809)	1,075 (391)	195 (135)	2,679 (1,143)	1,474 (516)	331 (411)	113 (81)	8,096 (1,604)
Brook trout	0.0000 (0.0000)	0 (0)	0 (0)	3 (7)	0 (0)	0 (0)	0 (0)	0 (0)	3 (7)
Lake trout	0.0170 (0.0022)	0 (0)	4,286 (1,606)	4,898 (1,574)	12,667 (2,334)	10,414 (1,880)	968 (827)	20 (31)	33,253 (3,837)
Northern pike	0.0002 (0.0002)	0 (0)	0 (0)	16 (33)	118 (240)	29 (43)	100 (141)	41 (60)	304 (290)
White sucker	0.0001 (0.0002)	61 (113)	130 (264)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	191 (287)
Yellow bullhead	0.0001 (0.0001)	0 (0)	227 (292)	21 (44)	0 (0)	0 (0)	0 (0)	0 (0)	248 (295)
Brown bullhead	0.0000 (0.0000)	12 (25)	0 (0)	0 (0)	64 (82)	0 (0)	0 (0)	0 (0)	76 (86)
Channel catfish	0.0055 (0.0019)	146 (290)	2,022 (1,744)	1,622 (1,005)	5,442 (3,114)	1,165 (551)	283 (284)	137 (196)	10,817 (3,776)
White perch	0.0009 (0.0016)	22 (50)	0 (0)	66 (143)	1,561 (3,083)	142 (161)	0 (0)	0 (0)	1,791 (3,091)
White bass	0.0005 (0.0004)	121 (285)	32 (65)	6 (12)	490 (658)	127 (209)	28 (60)	86 (177)	890 (773)
Rockbass	0.0003 (0.0003)	0 (0)	0 (0)	289 (447)	199 (292)	8 (17)	48 (108)	0 (0)	544 (545)

Table 5.—continued.

Species	Total catch per hour	Month							Season
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Pumpkinseed	0.0001 (0.0001)	72 (149)	0 (0)	0 (0)	46 (92)	0 (0)	0 (0)	23 (64)	141 (186)
Bluegill	0.0000 (0.0000)	0 (0)	0 (0)	16 (33)	0 (0)	0 (0)	0 (0)	0 (0)	16 (33)
Lake herring	0.0000 (0.0000)	0 (0)	9 (19)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	9 (19)
Smallmouth bass	0.0008 (0.0005)	0 (0)	0 (0)	967 (902)	236 (449)	201 (172)	235 (411)	0 (0)	1,639 (1,102)
Largemouth bass	0.0004 (0.0003)	0 (0)	175 (366)	210 (213)	209 (308)	0 (0)	0 (0)	97 (200)	691 (561)
Black crappie	0.0002 (0.0003)	0 (0)	330 (601)	0 (0)	0 (0)	0 (0)	0 (0)	23 (50)	353 (603)
Yellow perch	0.2823 (0.0468)	46,790 (32,795)	14,798 (13,024)	44,076 (19,101)	165,831 (55,270)	136,738 (30,163)	77,553 (35,865)	67,326 (22,728)	553,112 (85,892)
Walleye	0.0247 (0.0048)	1,114 (540)	1,466 (457)	1,119 (662)	24,489 (8,008)	18,196 (3,764)	1,453 (1,310)	515 (454)	48,352 (9,009)
Freshwater drum	0.0018 (0.0015)	0 (0)	116 (214)	287 (267)	2,322 (2,731)	485 (424)	301 (669)	0 (0)	3,511 (2,864)
Lake whitefish	0.0001 (0.0001)	2 (4)	0 (0)	16 (25)	48 (61)	81 (159)	20 (41)	18 (37)	185 (181)
Round whitefish	0.0001 (0.0002)	0 (0)	83 (171)	0 (0)	27 (58)	0 (0)	0 (0)	0 (0)	110 (181)
Burbot	0.0000 (0.0000)	0 (0)	9 (20)	0 (0)	0 (0)	0 (0)	8 (16)	0 (0)	17 (26)
Other	0.0168 (0.0121)	0 (0)	170 (333)	32,821 (23,613)	0 (0)	0 (0)	0 (0)	1 (3)	32,992 (23,615)
Total	0.4049 (0.0517)	52,050 (32,815)	32,341 (13,385)	96,224 (30,509)	237,118 (56,223)	200,170 (30,637)	98,614 (36,093)	76,939 (22,904)	793,456 (90,076)
Angler hours		88,240 (21,219)	157,359 (21,675)	203,824 (29,926)	644,726 (84,177)	518,858 (43,629)	251,072 (47,144)	95,572 (10,162)	1,959,651 (114,589)
Angler trips		27,546 (7,544)	34,298 (4,512)	40,516 (5,657)	116,155 (15,815)	96,673 (8,052)	55,549 (10,053)	23,489 (2,476)	394,226 (23,052)
Angler days		21,430 (5,412)	29,546 (3,782)	37,806 (5,198)	109,271 (14,918)	88,837 (7,341)	46,490 (8,456)	19,819 (2,089)	353,199 (20,565)

Table 6.—Estimated sportfishing catch and effort (charter and non-charter) for salmonines at nine Lake Huron ports combined (Rogers City, Rockport, Alpena, Harrisville, Oscoda, Port Austin, Grindstone City/Harbor Beach, Port Sanilac and Lexington), April through October, 1986-88 and 1992-96. May through August for lake trout. Two standard errors of the mean in parentheses.

Species	1986	1987	1988 ¹	1992	1993	1994	1995	1996
Coho salmon	6,143 (2,322)	3,216 (1,121)	3,875 (1,200)	768 (283)	985 (249)	938 (502)	1,897 (465)	1,946 (506)
Chinook salmon	69,801 (10,369)	75,184 (8,336)	85,102 (9,661)	39,889 (3,544)	47,452 (3,360)	51,667 (4,207)	94,341 (7,092)	81,431 (6,408)
Rainbow trout	4,247 (6,481)	4,959 (1,320)	1,955 (537)	5,023 (1,098)	6,229 (907)	6,890 (1,206)	17,068 (2,419)	14,025 (1,691)
Brown trout	8,494 (2,465)	5,903 (1,165)	2,152 (750)	3,000 (531)	7,477 (1,142)	10,092 (1,651)	10,236 (1,343)	4,669 (1,115)
Lake trout	48,059 (11,330)	40,881 (7,300)	59,930 (35,823)	13,174 (2,691)	6,546 (1,148)	11,711 (4,213)	33,242 (4,925)	34,173 (3,727)
Angler hours	1,716,728 (157,793)	1,669,510 (115,654)	1,575,453 (148,674)	1,064,804 (70,993)	1,046,961 (63,151)	1,131,180 (74,976)	1,328,600 (88,550)	1,093,415 (74,199)

¹April through September.

Table 7.—Catch rates (fish per 100 angler hours) of salmonines by charter and non-charter anglers at nine Lake Huron ports combined (Rogers City, Rockport, Alpena, Harrisville, Oscoda, Port Austin, Grindstone City/Harbor Beach, Port Sanilac and Lexington), April through October, 1986-88 and 1992-96. May through August for lake trout. Two standard errors of the mean in parentheses.

Species	1986	1987	1988 ¹	1992	1993	1994	1995	1996
Coho salmon	0.36 (0.14)	0.19 (0.07)	0.25 (0.08)	0.07 (0.03)	0.09 (0.02)	0.08 (0.04)	0.14 (0.04)	0.18 (0.05)
Chinook salmon	4.07 (0.71)	4.50 (0.50)	5.40 (0.61)	3.75 (0.33)	4.53 (0.32)	4.57 (0.37)	7.10 (0.53)	7.45 (0.59)
Rainbow trout	0.25 (0.38)	0.30 (0.08)	0.12 (0.03)	0.47 (0.10)	0.59 (0.09)	0.61 (0.11)	1.28 (0.18)	1.28 (0.15)
Brown trout	0.49 (0.15)	0.35 (0.07)	0.14 (0.05)	0.28 (0.05)	0.71 (0.12)	0.89 (0.16)	0.77 (0.11)	0.43 (0.11)
Lake trout	4.08 1.06	3.77 (0.74)	5.31 (3.24)	1.66 (0.36)	0.84 (0.16)	1.48 (0.55)	3.27 (0.55)	4.08 (0.55)
Salmonines	9.25 (1.35)	9.11 (0.90)	11.22 (3.03)	6.23 (0.50)	6.76 (0.39)	7.63 (0.69)	12.43 (0.79)	13.42 (0.83)

¹April through September.

Table 8.—Estimated yellow perch and walleye catch per hour, number harvested, and angler effort (hours) for Saginaw Bay (Port Austin to Tawas) during April through October, 1983-96. Two standard errors of the mean in parentheses.

Year	Yellow perch		Walleye		Angler hours
	Catch per hour	Number	Catch per hour	Number	
1983 ¹	2.009 (0.564)	1,459,332 (409,661)	0.003 (0.002)	2,128 (1,450)	726,273 (81,928)
1986	0.907 (0.148)	1,772,696 (289,925)	0.030 (0.013)	59,253 (25,319)	1,954,504 (145,719)
1987	1.301 (0.193)	2,455,239 (329,272)	0.034 (0.007)	63,691 (12,061)	1,882,169 (116,509)
1988 ²	0.828 (0.191)	1,182,625 (239,915)	0.070 (0.019)	100,129 (25,077)	1,428,189 (155,718)
1989	1.043 (0.184)	1,209,614 (186,292)	0.049 (0.010)	56,337 (10,580)	1,159,775 (95,472)
1991	1.162 (0.249)	1,482,443 (282,231)	0.048 (0.010)	61,028 (10,817)	1,275,439 (114,980)
1992	0.892 (0.129)	1,129,163 (134,539)	0.051 (0.008)	64,477 (8,702)	1,266,174 (100,013)
1993	0.552 (0.091)	738,712 (102,792)	0.094 (0.016)	125,160 (18,357)	1,337,059 (114,179)
1994	1.025 (0.175)	1,434,867 (213,852)	0.049 (0.009)	68,170 (11,907)	1,400,002 (114,638)
1995	0.701 (0.140)	777,701 (138,141)	0.043 (0.009)	47,887 (9,208)	1,109,642 (96,670)
1996	0.481 (0.088)	538,153 (84,949)	0.042 (0.009)	47,566 (9,990)	1,119,671 (100,283)

¹Ryckman, 1986

²April through September

Table 9.—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), 1996. Two standard errors in parentheses.

Species	Total catch per hour	Month							Season
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Pink salmon	0.0001 (0.0002)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	8 (16)	0 (0)	8 (16)
Coho salmon	0.0428 (0.0076)	2,223 (718)	1,535 (535)	644 (225)	338 (195)	183 (123)	1,078 (487)	233 (131)	6,234 (1,077)
Chinook salmon	0.0136 (0.0033)	53 (36)	281 (174)	1,296 (376)	147 (150)	40 (55)	159 (162)	0 (0)	1,976 (474)
Rainbow trout	0.0043 (0.0014)	34 (55)	246 (106)	164 (106)	108 (104)	9 (13)	31 (34)	29 (35)	621 (197)
Atlantic salmon	0.0000 (0.0000)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (2)
Brown trout	0.0056 (0.0042)	7 (12)	589 (602)	116 (79)	6 (12)	55 (73)	42 (46)	5 (10)	820 (614)
Brook trout	0.0012 (0.0015)	0 (0)	95 (194)	0 (0)	0 (0)	16 (33)	41 (62)	16 (34)	168 (209)
Lake trout	0.1304 (0.0141)	481 (188)	274 (212)	3,700 (806)	4,517 (1,276)	5,977 (900)	3,109 (660)	939 (277)	18,997 (1,918)
Splake	0.0173 (0.0045)	1,424 (543)	314 (135)	248 (196)	0 (0)	48 (80)	114 (107)	370 (225)	2,518 (648)
Rainbow smelt	0.4121 (0.1384)	59,885 (20,031)	162 (258)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	60,047 (20,033)
Northern pike	0.0005 (0.0006)	0 (0)	0 (0)	40 (67)	0 (0)	32 (47)	0 (0)	0 (0)	72 (82)
White sucker	0.0004 (0.0007)	0 (0)	0 (0)	0 (0)	8 (17)	55 (114)	0 (0)	0 (0)	63 (115)
Pumpkinseed	0.0002 (0.0004)	0 (0)	0 (0)	0 (0)	0 (0)	23 (49)	0 (0)	0 (0)	23 (49)
Siscowet	0.0233 (0.0051)	347 (275)	3 (5)	346 (212)	1,039 (420)	1,034 (365)	519 (277)	100 (152)	3,388 (728)
Lake herring	0.0023 (0.0009)	283 (107)	0 (0)	0 (0)	0 (0)	34 (56)	11 (24)	0 (0)	328 (123)
Smallmouth bass	0.0005 (0.0008)	0 (0)	0 (0)	0 (0)	0 (0)	55 (114)	22 (44)	0 (0)	77 (122)

Table 9.—continued.

Species	Total catch per hour	Month							Season
		Apr	May	Jun	Jul	Aug	Sep	Oct	
White crappie	0.0003 (0.0006)	0 (0)	0 (0)	37 (76)	0 (0)	5 (9)	0 (0)	0 (0)	42 (77)
Yellow perch	0.0055 (0.0037)	30 (40)	31 (67)	0 (0)	0 (0)	371 (333)	371 (410)	0 (0)	803 (534)
Walleye	0.0095 (0.0045)	0 (0)	41 (88)	449 (333)	186 (267)	302 (219)	400 (420)	0 (0)	1,378 (644)
Lake whitefish	0.0124 (0.0042)	1,363 (516)	76 (86)	132 (265)	26 (56)	0 (0)	0 (0)	213 (123)	1,810 (602)
Round whitefish	0.0606 (0.0135)	4,952 (1,569)	120 (146)	345 (456)	69 (103)	0 (0)	0 (0)	3,350 (1,021)	8,836 (1,935)
Burbot	0.0001 (0.0002)	11 (22)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	11 (22)
Total	0.7427 (0.1423)	71,094 (20,122)	3,767 (948)	7,517 (1,158)	6,444 (1,400)	8,239 (1,080)	5,905 (1,068)	5,255 (1,108)	108,221 (20,313)
Angler hours		7,183 (1,732)	17,914 (1,730)	29,579 (2,755)	28,331 (2,566)	35,759 (2,748)	20,494 (1,845)	6,451 (785)	145,711 (5,634)
Angler trips		1,893 (534)	4,952 (486)	7,061 (692)	6,567 (653)	7,419 (602)	5,592 (527)	2,104 (276)	35,588 (1,464)
Angler days		1,840 (532)	4,934 (485)	6,989 (688)	6,496 (648)	7,360 (602)	5,583 (527)	2,041 (272)	35,243 (1,458)

Prepared by: Gerald P. RakoczyDated: March 31, 1997