

## STUDY PERFORMANCE REPORT

State: Michigan

Project No.: F-81-R-6

Study No.: 230427

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

Period Covered: October 1, 2004 - September 30, 2005

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

**Summary:** This report presents results from the 2004 angling season. Similar data are currently being collected for the 2005 season; these will be summarized in next year's report. During the 2004 angling season, MDNR Fisheries Division conducted creel surveys at locations on Lakes Michigan, Huron, Erie, and Superior, the St. Clair System (St. Clair River, Lake St. Clair, and the Detroit River), and eight tributaries of the Great Lakes. Data were used to estimate effort and harvest at all of these locations. Estimates from lakes Michigan, Huron, Superior and Erie were combined with charter effort and harvest from Study 462 and shared with Division biologists and other agencies (See Job 5).

**Findings:** Jobs 1-6 and 8 were scheduled for 2004-05, and progress is reported below.

**Job 1. Prepare schedules, initiate aerial boat counts.**—In 2004, we conducted aerial surveys of boat, shore, and pier angling effort on the Michigan waters of Lake Erie, the Detroit River, Lake St. Clair, the St. Clair River, and portions of Lake Huron (Saginaw Bay, from Harbor Beach to Tawas City, and St. Ignace northeast to Drummond Island). We also conducted aerial surveys of shanty and open ice angling effort, January through March, on Lake St. Clair and portions of Lake Huron. All air flights were conducted using stratified random sampling schedules. At each survey area, we scheduled flights for all weekend days and three randomly selected weekdays per week. We randomly selected take-off times to ensure angler counts were made at various times during daylight hours each month.

We used aerial counts in place of ground counts for the above locations because we did not believe ground counts would provide an accurate measure of effort. Many anglers in these areas likely enter the lake/river from access sites where a fisheries assistant cannot see them; therefore we would have underestimated effort with ground counts.

**Job 2. Survey fisheries.**—Throughout the 2004 season, fisheries assistants sent completed data forms to the Charlevoix Fisheries Research Station every two weeks, where staff entered the data into a database. Data entry was completed by February, 2005. Effort, catch, catch rate, harvest, and harvest rate estimates were completed by May, 2005. Data entry for the current year (2005) is ongoing, since creel clerks are still collecting data for the season. These data will be presented in next year's report.

**Job 3. Complete quality control.**—The Michigan Department of Natural Resources, Fisheries Division, Statewide Angler Survey Program (SASP), in collaboration with management unit personnel, is responsible for quality control of creel data and estimates. SASP began to develop quality control procedures in 2004 and continues to refine them each year. As part of this quality

control, fisheries assistants who collect creel data are trained at a training session held in early spring of each year, prior to the start of most surveys on the Great Lakes. All fisheries assistants receive comprehensive creel survey manuals that are updated with new training material each year.

In 2004, MDNR developed a new creel survey position, the “Creel Lead Worker”, and hired three individuals into this position. Currently, these lead workers support 42% of the total creel fish assistants state-wide. Lead workers improve the quality of creel data because they conduct ongoing training of creel fish assistants, provide support in collection of data (e.g., covering missed shifts rather than changing randomly selected survey times, implementing new collection methods), and evaluating survey design appropriateness in the field. At those sites where there is no lead worker, technician supervisors perform similar duties, but to a lesser degree. SASP plans to eventually have enough lead workers (up to eight) to provide improved over-site of clerks across the entire state. Lead workers and supervisors make frequent contacts with the fish assistants, to field questions and evaluate performance. MDNR began monitoring the frequency of these contacts in 2004 to ensure adequate communication.

In 2004, we began to convert data collection methods from paper Scantron™ data entry sheets to electronic personal digital assistants (PDAs). As part of this conversion, data entry “traps” were added to the devices to prevent error that can occur at the collection stage. Sixteen of 37 fisheries assistants were converted to electronic data entry this year. Regardless of collection methods, all data are further checked for other data entry mistakes using error checking queries (a majority designed to check whether data are within a realistic range of values). Fewer queries are needed for data collected with PDAs.

**Job 4. Prepare succeeding year schedules.**—At the end of 2004, we reviewed our plans for creel coverage over the next 6 years. This review is coordinated with MDNR Inland Creel Program in Ann Arbor, Michigan, a MDNR Tribal Unit biologist, MDNR Basin Leaders, and MDNR Unit biologists so that creel survey coverage is optimized and meets the needs of all Division programs. Following this review, we prepared randomized sampling schedules for the 2005 season for clerks who covered the following areas: Lake Erie, Lake Michigan, Lake Huron including Saginaw Bay, western and central Lake Superior, and 9 Great Lakes tributaries (Menominee, Cedar, Bear, Manistee, Muskegon, St. Joseph, Saginaw, Tittabawassee and Dead Rivers).

**Job 5. Analyze and evaluate data.**—We estimated monthly fishing effort and species-specific harvest, harvest rate, catch, and catch rate, using equations described in Lockwood et al. (1999). We sampled most locations on Lake Michigan and Huron, and generally expanded for ports that were not sampled on these two lakes by applying a ratio from a year in which the missing port was sampled (Table 1 and 2). On Lake Superior, we estimated total effort and harvest for 6 ports, MI-4 to MI-7 (Table 3). We currently have not applied expansions to account for Huron Bay (MI-4), Big Bay (MI-5) and Black River/Ontonogon (MI-2) because we do not have a recent reference year. MI-1, MI-3 and MI-8 are typically not sampled due to low effort. On Lake Erie, we surveyed all 5 grids that contain Michigan waters (Table 4), but effort and harvest for two of these grids (703 and 802) were not always estimated in a given month due to lack of interviews, even if boat counts were significant. Beginning in 2003, we began to account for months in which these two grids were not estimated, but for which there was significant effort, by applying a harvest rate from a similar grid. We will account for missing effort in these two grids, 1997-2002, in the future. We combined effort and harvest estimates from this study with effort and harvest totals from Study 462 (“Charter boat effort and harvest from the Michigan Waters of the Great Lakes”) to obtain total recreational effort and harvest, 1997-2004, for lakes Michigan and Huron. On Lake Erie, however, we did not combine creel and charter effort and harvest; but simply compared creel estimates (Study 427). We did this because we conduct aerial counts on Lake Erie that count all boats, charter and non-charter. We are currently applying a method that adds on the

charter harvest from Study 462 and discounts the charter harvest that was estimated from Study 427, but this correction has not been applied to all years; therefore we limit our comparisons in this report to data that have not been corrected. We will apply this correction in the future. For effort on Lake Erie, we report the total effort obtained from the creel survey, which counts both charter and non-charter boats. None of the above estimates include effort and harvest from any of the tributaries that were surveyed in 1997-2004.

Total fishing effort is typically greatest in Lake Michigan, followed by Lake Huron, Lake Erie and Lake Superior (Table 5). On Lake Michigan, coho salmon, rainbow trout (steelhead), yellow perch, walleye and lake whitefish harvest rates have fluctuated over time; Chinook salmon harvest rates increased significantly in the last 3 years; and brown trout and lake trout harvest rates decreased significantly during 1997-2004 (Table 6). On Lake Huron, coho salmon, rainbow trout and brown trout harvest rates have fluctuated over time; pink salmon, lake trout and walleye harvest rates have increased; and Chinook salmon and yellow perch harvest rates have decreased (Table 7). On Lake Superior, harvest rates of most species have fluctuated or remained relatively stable over time; and lake whitefish harvest rates are highest 2001-2004 (Table 8). On Lake Erie, yellow perch and walleye harvest rates often showed opposite trends (i.e., harvest rates would be higher for one species when they were lower for the other) (Table 9).

During 2000, the State of Michigan entered into a binding agreement (Consent Decree) with various Native American tribes in the 1836 Treaty waters of lakes Michigan, Huron and Superior. The Great Lakes creel survey is an integral part of that agreement and provides essential harvest data for the management of fisheries in those shared waters. For example, lake trout harvest statistics for lakes Michigan, Huron, and Superior are provided to task groups working under the Consent Decree so they can calculate and monitor the total allowable catch (TAC) of lake trout in various zones in the 1836 Treaty waters of the Great Lakes.

In 2004, we also provided Lake Michigan creel estimates to the Lake Michigan Technical Committee (LMC-GLFC). These estimates were added to a “lake-wide” database of total effort and harvest. They are also used to estimate the total harvest of the major sport-fish from all of Lake Michigan. We continue to make improvements to the procedure that is used to append MDNR creel data to the “lake-wide” database and to ensure their continued accuracy.

In 2004, we sent effort, harvest and catch estimates, and biological data on the size and age of walleye and yellow perch to the GLFC Lake Erie Committee. Members of the committee include the Ohio Department of Natural Resources, Pennsylvania Fish and Boat Commission, New York Department of Environmental Conservation, Ontario Ministry of Natural Resources, and the Michigan Department of Natural Resources. This lake committee uses data from all of their respective jurisdictions to set harvest quota limits for the state and provincial commercial and sport fisheries.

**Job 6. Prepare annual performance report.**—We estimated the fishing effort, harvest, harvest rate, catch and catch rate for all sites sampled in 2004. An annual performance report was completed in October, 2005.

**Job 8. Prepare other reports, peer-reviewed manuscripts.**—Creel personnel and fisheries biologists across the state communicated the status and trends of the 2004 sport harvest to the public, at meetings and in the popular literature (newspapers, magazines and television). Preliminary work on summaries of catch statistics dating back to their conception in the mid-1980s was initiated in 2005. At least two MDNR Division Reports and/or manuscripts summarizing creel data are expected from this work. One (St Clair System) will focus on creel statistics. Another (St Joseph River) will likely be incorporated with the results of other MDNR studies.

**Literature cited:**

Lockwood, R. N., D. M. Benjamin, and J. R. Bence. 1999. Estimating angling effort and catch from Michigan roving and access site angler survey data. Michigan Department of Natural Resources, Research Report 2044, Ann Arbor.

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Table 1.—Lake Michigan creel survey locations. An X denotes that the port or area was sampled during that year. Shaded locations denote where monthly ratios or means were used to estimate catch. Table currently omits Great Lakes tributaries.

Survey location	Site code	Year								
		1997	1998	1999	2000	2001	2002	2003	2004	
MM-1	Menominee Harbor	001	X	X	X	X	X	X	X	X <sup>1</sup>
	Stoney Pt. to Kleinke Park	007	X	X	X	X	X	X	X	
	Cedar River PAS	015	X	X	X	X	X	X	X	
	Little Bay de Noc	020	X	X	X	X	X	X	X	X
	Big Bay de Noc	025	X	X	X	X	X	X	X	X
MM-2	Thompson	046								
	Manistique Harbor and R.	048				X	X			
	Seul Choix Point	053				X <sup>2</sup>				
	Naubinway	058				X <sup>2</sup>				
MM-3	Harbor Springs	080	X	X	X	X	X	X	X	X
	Petoskey	085	X	X	X	X	X	X	X	X
	Charlevoix	090	X	X	X	X	X	X	X	X
MM-4	Elk Rapids	094	X	X	X	X	X	X	X	X
	East Grand Traverse Bay	095	X	X	X	X	X	X	X	X
	West Grand Traverse Bay	100	X	X	X	X	X	X	X	X
MM-5	Leland	116				X	X			
	Glen Arbor	118				X	X			
	Platte Bay	122				X	X			
	Frankfort/Elberta	124	X	X	X	X	X	X	X	X
MM-6	Arcadia	126				X	X			
	Onekama (Portage Lk.)	127	X	X	X	X	X	X	X	X
	Manistee	128	X	X	X	X	X	X	X	X
	Ludington	134	X	X	X	X	X	X	X	X
	Pentwater	139		X <sup>3</sup>		X	X		X	X
MM-7	Whitehall/Montague	311		X <sup>3</sup>		X	X	X	X	X
	Muskegon	149	X	X	X	X	X	X	X	X
	Grand Haven	153	X	X	X	X	X	X	X	X
	Port Sheldon	155			X	X	X	X	X	
MM-8	Holland	156	X		X	X	X	X	X	
	Saugatuck	160		X						
	South Haven	162	X	X	X	X	X	X	X	X
	Benton Harbor/St. Joseph	164	X	X	X	X	X	X	X	X
	New Buffalo	166	X	X	X	X	X	X	X	X

<sup>1</sup> Winter survey only.

<sup>2</sup> No harvest or effort estimates could be made for Seul Choix Point or Naubinway due to the lack of angler effort.

<sup>3</sup> Sampled during May-July.

Table 2.—Lake Huron creel survey locations. An X denotes that the port or area was sampled during that year. Shaded locations denote where monthly ratios were used to estimate catch. Table currently omits Great Lakes tributaries.

Survey location	Site code	Year								
		1997	1998	1999	2000	2001	2002	2003	2004	
MH-1	Munuscong Bay <sup>1</sup>	207			X	X	X	X	X	X
	Drummond Island <sup>2</sup>	210				X	X			
	St. Vital Pt. to Detour	211				X	X	X	X	X
	Les Cheneaux Islands	214				X	X	X	X	X
	St. Ignace to St. Martins Bay	216				X	X	X	X	X
	Cheboygan	218				X	X			
	Hammond Bay	219				X	X			
	Rogers City	223	X	X	X	X	X	X	X	X
MH-2	Presque Isle Harbor	224		X	X	X	X	X	X	X
	Rockport	225	X	X	X	X	X	X	X	X
	Alpena	227	X	X	X	X	X	X	X	X
MH-3	Harrisville	232	X	X	X	X	X	X	X	X
	Oscoda	234	X	X	X	X	X	X	X	X
MH-4	Tawas	250	X	X	X	X	X	X	X	X
	AuGres	255	X	X	X	X	X	X	X	X
	Saganing Creek to Sag. R.	260	X	X	X	X	X	X	X	X
	Saginaw R. to Quanicassee	356	X	X	X	X	X	X	X	X
	Quanicassee to Sebewaing	278	X	X	X	X	X	X	X	X
	Sebewaing	288	X	X	X	X	X	X	X	X
	Caseville <sup>3</sup>	290								X
Oak Beach Rd to Port Austin	236	X	X	X	X	X	X	X	X	
MH-5	Eagle Bay to Harbor Beach	241	X	X	X	X	X	X	X	X
MH-6	Port Sanilac	245	X	X	X	X	X	X	X	X
	Lexington	246	X	X	X	X	X	X	X	X
	Port Huron	248								

<sup>1</sup> Munuscong Bay only sampled in Winter (Jan-Mar). Statistical district estimates (Table 7) currently do not include this site.

<sup>2</sup> Statistical district estimates (Table 7) currently do not include this site.

<sup>3</sup> Prior to 2004, site 290 was a part of site 288 and 236.

Table 3.—Lake Superior creel survey locations. An X denotes that the port or area was sampled during that year. No expansions have been done in Lake Superior. MI-1, MI-3 and MI-8 are not surveyed due to low effort. Only MI-4 through MI-7 ports used in calculation of harvest and harvest rate (Table 8).

Survey location		Site code	Year							
			1997	1998	1999	2000	2001	2002	2003	2004
MI-2	Black River Harbor	168	X	X						
	Ontonagon	172	X	X						
MI-4	Traverse Bay	182	X	X	X	X	X	X	X	X
	Keweenaw Bay	185	X <sup>1</sup>	X	X	X	X	X	X	X
	Huron Bay	188								
MI-5	Big Bay	189								
	Marquette	190	X	X	X	X	X	X	X	X
MI-6	Au Train	194	X	X	X	X	X	X	X	X
	Munising	195	X <sup>1</sup>	X	X	X	X	X	X	X
MI-7	Grand Marais	197					X	X	X	X

<sup>1</sup> Winter ice fishery was not sampled.

Table 4.—Lake Erie creel survey locations. An X denotes that the port or area was sampled during that year.

Survey grid	Year							
	1997	1998	1999	2000	2001	2002	2003	2004
701	X	X	X	X	X	X	X	X
702	X	X	X	X	X	X	X	X
703 <sup>1</sup>	X	X	X	X	X	X	X	X
801	X	X	X	X	X	X	X	X
802 <sup>1</sup>	X	X	X	X	X	X	X	X

<sup>1</sup> Grids not always estimated due to lack of interviews. Adjustments to account for missed grids are currently applied to 2003 and 2004.

Table 5.—Fishing effort (angler hours), including expanded areas, across all Great Lakes, 1997–2004.

Great Lake	Year							
	1997	1998	1999	2000	2001	2002	2003	2004
Lake Michigan	2,958,711	3,250,179	2,948,735	3,057,443	3,038,068	3,201,801	2,217,737	2,591,762
Lake Huron <sup>1</sup>	2,374,251 <sup>2</sup>	2,280,555	2,001,419	1,820,918	1,958,731	2,386,628	2,405,305	1,892,126
Lake Superior <sup>3</sup>	184,883 <sup>4,5</sup>	149,277 <sup>4</sup>	176,383 <sup>4</sup>	162,127 <sup>4</sup>	189,345	165,089	171,294	177,887 <sup>6</sup>
Lake Erie <sup>7</sup>	476,562	427,970	532,763	711,139	490,808	820,220	506,240	726,653

<sup>1</sup> Does not include Drummond Island expansion or Munuscong Bay winter creel results. In one statistical district (MH-1), aerial flights count charter and non-charter boats, and charter effort (Study 462) is also added, thereby “double-counting” charter harvest. This is currently uncorrected.

<sup>2</sup> Presque Isle not sampled in 1997.

<sup>3</sup> Lake Superior totals do not include expansions for Black River Harbor, Ontonagon, Huron Bay, and Big Bay.

<sup>4</sup> Does not include Grand Marais.

<sup>5</sup> No winter survey at Keweenaw Bay and Munising in 1997.

<sup>6</sup> Munising survey extended an extra month (October).

<sup>7</sup> Lake Erie effort based on aerial flight counts that count charter and non-charter boats. Note: This differs from MH-1 because it does not double-count the charter effort.



Table 6.—Fishing harvest (and harvest per 100 angler hours), including expanded areas, in Lake Michigan, 1997-2004.

Species	Year							
	1997	1998	1999	2000	2001	2002	2003	2004
Coho salmon	44,678 (1.5)	51,886 (1.6)	34,116 (1.2)	80,127 (2.6)	46,830 (1.5)	85,339 (2.7)	40,741 (1.8)	38,206 (1.5)
Chinook salmon	125,684 (4.2)	157,009 (4.8)	127,666 (4.3)	173,743 (5.7)	156,097 (5.1)	248,875 (7.8)	255,926 (11.5)	362,886 (14.0)
Rainbow trout	46,437 (1.6)	75,303 (2.3)	41,607 (1.4)	40,485 (1.3)	61,599 (2.0)	66,105 (2.1)	38,981 (1.8)	27,297 (1.1)
Brown trout	59,301 (2.0)	25,069 (0.8)	25,905 (0.9)	44,335 (1.5)	18,404 (0.6)	25,751 (0.8)	11,362 (0.5)	8,194 (0.3)
Lake trout	67,747 (2.3)	110,906 (3.4)	56,223 (1.9)	57,361 (1.9)	47,033 (1.5)	40,843 (1.3)	22,723 (1.0)	20,253 (0.8)
Yellow perch	465,441 (15.7)	369,401 (11.4)	886,922 (30.1)	417,375 (13.7)	343,169 (11.3)	400,222 (12.5)	549,429 (24.8)	515,940 (19.9)
Walleye	27,186 (0.9)	28,515 (0.9)	28,956 (1.0)	38,320 (1.3)	55,673 (1.8)	47,185 (1.5)	23,759 (1.1)	43,287 (1.7)
Lake whitefish	19,706 (0.7)	3,471 (0.1)	4,430 (0.2)	13,234 (0.4)	21,846 (0.7)	5,534 (0.2)	7,756 (0.3)	3,129 (0.1)

Table 7.—Fishing harvest (and harvest per 100 angler hours), including expanded areas, in Lake Huron, 1997-2004.

Species	Year							
	1997	1998	1999	2000	2001	2002	2003	2004
Pink salmon	751 (0.0)	742 (0.0)	1,062 (0.1)	2,670 (0.1)	9,332 (0.5)	3,297 (0.1)	6,728 (0.4)	6,768 (0.3)
Coho salmon	2,764 (0.1)	1,459 (0.1)	5,320 (0.3)	3,697 (0.2)	2,446 (0.1)	12,869 (0.5)	1,918 (0.1)	1,924 (0.1)
Chinook salmon	135,568 (5.7)	104,363 (4.6)	87,823 (4.4)	76,515 (4.2)	74,553 (3.8)	138,520 (5.8)	61,562 (3.3)	61,159 (3.1)
Rainbow trout	12,582 (0.5)	6,706 (0.3)	9,807 (0.5)	10,949 (0.6)	10,347 (0.5)	10,545 (0.4)	5,322 (0.3)	5,322 (0.3)
Brown trout	3,930 (0.2)	3,427 (0.2)	2,233 (0.1)	3,049 (0.2)	2,022 (0.1)	6,152 (0.3)	2,796 (0.1)	2,796 (0.1)
Lake trout	50,840 (2.1)	60,357 (2.6)	42,188 (2.1)	32,149 (1.8)	23,788 (1.2)	35,827 (1.5)	70,694 (3.7)	70,694 (3.6)
Yellow perch	732,110 (30.8)	893,532 (39.2)	1,180,099 (59.0)	637,037 (35.0)	893,736 (45.6)	733,248 (30.7)	188,027 (9.9)	195,182 (9.9)
Walleye	64,803 (2.7)	60,472 (2.7)	45,570 (2.3)	52,848 (2.9)	48,955 (2.5)	45,979 (1.9)	68,596 (3.6)	74,708 (3.8)

Table 8.—Fishing harvest (harvest per 100 angler hours) from MI-4 to MI-7, Lake Superior, 1997-2004. Harvest totals during these years do not include expansions for Huron Bay and Big Bay.

Species	Year							
	1997	1998	1999	2000	2001	2002	2003	2004
Coho salmon	5,165 (2.8)	5,169 (3.5)	6,907 (3.9)	5,384 (3.3)	6,231 (3.3)	6,593 (4.0)	4,067 (2.4)	7,124 (4.0)
Chinook salmon	1,601 (0.9)	724 (0.5)	1,542 (0.9)	1,320 (0.8)	1,852 (1.0)	864 (0.5)	904 (0.5)	1,662 (0.9)
Rainbow trout	846 (0.5)	536 (0.4)	491 (0.3)	926 (0.6)	669 (0.4)	582 (0.4)	679 (0.4)	705 (0.4)
Brown trout	141 (0.1)	356 (0.2)	309 (0.2)	265 (0.2)	175 (0.1)	157 (0.1)	176 (0.1)	169 (0.1)
Lake trout	24,970 (13.5)	20,000 (13.4)	19,702 (11.2)	23,995 (14.8)	25,953 (13.7)	28,415 (17.2)	22,982 (13.4)	24,428 (13.7)
Siscowet	4,400 (2.4)	3,680 (2.5)	2,385 (1.4)	2,242 (1.4)	4,564 (2.4)	4,396 (2.7)	6,141 (3.6)	4,724 (2.7)
Lake herring	1,136 (0.6)	684 (0.5)	4,836 (2.7)	1,604 (1.0)	1,915 (1.0)	2,888 (1.7)	1,821 (1.1)	1,862 (1.0)
Lake whitefish	2,821 (1.5)	6,667 (4.5)	7,011 (4.0)	6,659 (4.1)	12,973 (6.9)	10,135 (6.1)	14,169 (8.3)	10,903 (6.1)

Table 9.—Fishing harvest (harvest per 100 angler hours), on Lake Erie, 1997-2004. The totals in this table are derived from creel data in which air flights counted both charter and non-charter fishing boats. In 2002, we adopted a new reporting system in which total harvest is the sum of creel data harvest and charter harvest, with a correction made to remove the extra harvest that arises when charter boats are also counted in the creel survey. This new system has not been applied to this table. Furthermore, years prior to 2003 may ignore some months in grids that had significant boat counts but not enough interviews to produce an estimate. Adjustments to account for this additional effort and harvest are currently being applied.

Species	Year							
	1997	1998	1999	2000	2001	2002	2003	2004
Yellow perch	345,709 (72.5)	422,671 (98.8)	353,844 (66.4)	223,393 (31.4)	254,291 (51.8)	463,226 (56.5)	350,890 (69.3)	306,069 (42.1)
Walleye	72,585 (15.2)	49,748 (11.6)	90,542 (17.0)	205,105 (28.8)	115,288 (23.5)	166,145 (20.3)	109,067 (21.5)	96,126 (13.2)