

STUDY FINAL REPORT

State: Michigan

Project No.: F-81-R-8

Study No.: 230427

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

Period Covered: October 1, 2003 to September 30, 2006

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: During 2006, the MDNR Great Lakes and Inland Creel Programs were formally combined into a single statewide angler survey program (SASP); this study (230427) and study 230646 were terminated, to be replaced with a new Federal Aid study (230499) beginning in October 2006. This final report for study 230427, including analysis of data collected during the 2006 field season (through October 2006) is submitted.

Findings: Progress for this study for October 1, 2003 until October 31, 2006 is reported below. Additional data from prior to 2003 are included in some cases, for comparative purposes. Great Lakes creel surveys will continue under Study 230499 for Project F-81-R.

Job 1. Title: Prepare schedules, initiate aerial boat counts.—In 2003–06, we conducted aerial surveys of boat, shore, and pier angling effort in three areas of the Michigan waters of the Great Lakes (Table 1); Lake Erie, Saginaw Bay (from Harbor Beach to Tawas City), and northern Lake Huron (St. Ignace northeast to the St. Mary’s River). We also conducted aerial surveys of shanty and open ice angling effort, January through March, on Saginaw Bay. 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. Schedules for air flight contractors were produced and distributed prior to the start of creel survey periods.

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 or river from access sites where a fisheries assistant cannot see them; therefore, use of ground counts would have underestimated fishing effort.

Job 2. Title: Survey fisheries.—Creel clerks surveyed 88 Great Lakes sites during the 2003–06 open-water seasons (Tables 2–6). In addition, eleven Great Lakes tributaries (Dead, Menominee, Bear, Cedar, St. Joseph, St. Mary’s, Tittabawassee, Saginaw, Ocqueoc, Manistee, and Muskegon Rivers) were also surveyed (Table 7), and 24 sites were surveyed during the winter (ice-fishing) season (Table 8). Great Lakes surveys collected access-point interviews, and angler/boat counts were made by one of three methods; interval-ground, instantaneous-ground, or instantaneous-aerial. Details of the methods used in MDNR Great Lakes surveys are detailed in Lockwood (1997), Lockwood et al. (1999), and Lockwood (2000).

Each Management Unit was responsible for direct supervision (through Technician Supervisors or Lead Workers) of the creel personnel and data collection in the sample areas where they had jurisdiction. In 2004, we began to convert data collection from paper Scantron™ data entry sheets to electronic personal digital assistants (PDAs). Sixteen of 37 fisheries assistants began using electronic data entry in 2005. By 2006, all clerks were using PDAs for data entry. For each method, at the end of each two week pay period, each Unit's personnel reported in a standardized format the data gathered for each fishery identified in their respective area. Data files were delivered to the Charlevoix Fisheries Research Station, where program staff error checked data and merged individual clerk data into the Great Lakes creel survey database.

In addition to interviews and counts, creel fisheries assistants collected biological data and samples from individual fish. These data and samples included structures used to estimate fish age (usually scales), total length, weight, sex, maturity, and presence of fin clips or tags. At the beginning of every season, Great Lakes creel clerks received a chart listing the number of fish, by species and month, for which the clerk needed to collect biological data. These biological data "quotas" were developed by creel program personnel, in consultation with Management Unit and Research Section personnel.

Job 3. Title: Complete quality control.—Great Lakes creel program staff, in collaboration with management unit personnel, were responsible for quality control of creel data and estimates. Program staff began to develop improved quality control procedures in 2004, and continued to refine them each year. Areas of emphasis in quality control evaluations included existing survey design, survey scheduling, adherence to schedules, data collection methods, adequate supervision of clerks, and data integrity.

As part of creel program quality control efforts, fisheries assistants who collected creel data were trained at a session held in early spring of each year, prior to the start of most Great Lakes surveys. During 2003–06, creel training sessions were held in Grayling (March 2004), Houghton Lake (March 2005), and Boyne Falls (March 2006). Attendance by all clerks and lead workers was mandatory and technician supervisors and all permanent creel program staff were also present. Subjects covered included Division updates (e.g., VHS information, Consent Decree, new license package), fisheries of statewide importance (e.g., Lake Michigan yellow perch, southeast Michigan survey, Lake Huron walleye), new research initiatives, scheduling, personnel considerations, PDA instruction, safety, fish identification, and review of data collection methods. All fisheries assistants also received comprehensive creel survey manuals (Table 9) that were updated with new training material and operational instructions each year. This manual has been incorporated into a web site that clerks can access for agency postings, software updates, and additional information throughout the creel season.

In 2004, MDNR developed a new creel survey position, the "Creel Lead Worker", and hired three individuals into this classification. Currently, these three lead workers support 42% of the creel fish assistants statewide. Lead workers improve the quality of creel survey data because they conduct ongoing training of creel fisheries assistants and provide support in collection of data (e.g., covering missed shifts rather than changing randomly selected survey times, implementing new collection methods), and evaluate survey design appropriateness in the field. At those sites where there is no lead worker, technician supervisors perform similar duties. The Statewide Angler Survey Program (SASP; new study 230499) plans to eventually have enough lead workers (up to eight) to provide improved oversight of clerks across the entire state.

Lead workers and technician supervisors make frequent (weekly) contacts with fish assistants, to field questions and evaluate performance. Creel program staff began monitoring the frequency of these contacts in 2004, to ensure clerks received adequate communication and training.

Supervisors and lead workers filled out QAQC forms on the clerks they supervised and returned these forms to Charlevoix. Bi-weekly creel schedule change forms were also filled out by the clerks, reviewed by their supervisor or lead worker, and turned into Charlevoix every two weeks (when data was submitted). Schedule changes were discussed with and approved by Charlevoix creel program staff, prior to implementation.

In 2004, we began to convert data collection methods from paper data entry sheets to handheld electronic devices (PDAs). As part of this conversion, data-entry “traps” were added to the PDAs to prevent errors that could occur at data collection. Regardless of collection method, all data were further checked for data entry mistakes using error checking queries (a majority designed to check whether data were within a realistic range of values) in the Great Lakes creel program ACCESS database.

Job 4. Title: Prepare succeeding year schedules.—At the end of each creel season (November), we reviewed our plans for creel coverage over the next six years, to ensure that creel survey coverage was optimized and met the needs of all Division programs. This review was coordinated with MDNR Inland Creel Program staff, the MDNR Tribal Coordination Unit biologist, Basin Coordinators, and MDNR unit biologists. Following this review, we prepared randomized sampling schedules for the upcoming season.

Stratified-random schedules for creel clerks (Table 10) were produced and distributed prior to the start of creel survey periods, to cover all identified survey areas (see Job 2). Schedules indicated survey days, site (for clerks with multiple sites), shifts (AM or PM), and count times. In 2004 (and previous years), schedules were generated using a manual randomization process to determine days, shifts, and count times. Beginning in 2005, schedules were generated using MiCreel Designer (Su 2005).

Job 5. Title: Analyze and evaluate data.—We estimated monthly, species-specific fishing effort, harvest, harvest rate, catch, and catch rate, using equations described in Lockwood et al. (1999). These measures are used by fisheries managers and researchers to monitor angling trends, identify potential management issues, supplement data on fish population trends, and help manage sport fisheries (e.g. evaluate the effects of regulation changes or stocking). Data are summarized in a large variety of ways to meet these goals. Only some of these summaries are presented in this report. In this report we present overall summaries of harvest and effort for important sport fisheries on lakes Michigan (Table 11), Huron (Table 12), Superior (Table 13), and Erie (Table 14). Summaries for the St. Clair system (St. Clair River, Lake St. Clair, Detroit River) are shown in Table 15 and for data for surveyed tributaries is given in Tables 16–19. Selected summaries are also presented for winter (ice) fisheries on lakes Michigan, Huron, and St. Clair (Table 20), and on Lake Superior (Table 21).

Estimates of fishing effort, harvest, harvest rate, catch, and catch rate (by survey site, month, fishing mode, and species) were provided to Division biologists, partner agencies, and public constituents, for a variety of management and research goals. Uses of these data included calculation and monitoring of the total allowable catch (TAC) of lake trout in various zones in the 1836 Treaty waters of the Great Lakes (e.g., Jonas et al. 2006); estimation of total harvest of the major sport fish from all of Lake Michigan by the Lake Michigan Technical Committee (LMC-GLFC; e.g., Hanson et al. 2004); and setting harvest quotas for Lake Erie commercial and sport fisheries by the GLFC Lake Erie Committee (e.g., Lake Erie Committee 2005). To further facilitate use of these estimates, data (including standard queries) were made available to Fisheries Division personnel on a Lansing server (DPTWIDE.DNR on Dnrs0610/Creel_Charter).

In addition to use of data in standard management applications throughout the Great Lakes, data can be used in conceptual models to investigate and identify mechanisms that influence sport-fishing effort, catch, and harvest. During 2003–06, use of MDNR creel data in these types of modeling exercises and research applications included investigations into movement patterns of Great Lakes fish stocks (Adlerstein et al. 2007a,b; Glover et al. In revision), regulation effects (Claramunt et al. In revision), and growth dynamics (He et al. In revision). These types of investigation and problem solving would not be possible without the long-term data series amassed under the MDNR Great Lakes creel survey program.

Creel personnel and fisheries biologists across the state also communicated status and trends in sport harvest to the public, at meetings and in the popular literature (newspapers, magazines, and television). This is an important activity that is being additionally facilitated through division-wide distribution of data through State of Michigan server resources, and through collaboration with the Michigan Department of Information Technology to develop a web-based system for public distribution of recreational fishing data (DIT project #FISH-001-2006).

Job 6. Prepare annual performance report.—Annual performance reports were prepared, as scheduled, in 2004, 2005, and 2006.

Job 7. Write study renewal for next five-year cycle.—Job not active during 2003–06. A new study proposal (230499) was prepared in 2005–06, combining inland and Great Lakes creel surveys into the Statewide Angler Survey Program (SASP) beginning in October 2006.

Job 8. Write research manuscript(s).—Job not reported – not active during 2003–06.

Job 9. Publish research manuscript(s).—Job not reported – not active during 2003–06.

Job 10. Write five-year report.—Job not reported – not active during 2003–06. This report serves as a final report for Study 230427.

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Prepared by: David F. Clapp and Donna Wesander.

Dated: September 30, 2007

Table 1.—Air flight surveys conducted over Michigan waters of the Great Lakes, 2003–06.

Survey area	Contractor	Contract period	Months surveyed	Modes surveyed
Lake Erie	Monroe Aviation	Oct 1, 2001–Oct 31, 2005	Apr–Oct	Boat
	Solo Aviation	Feb 1, 2006–Jan 31 2009	Apr–Oct	Boat
St. Clair River/Lake St. Clair/Detroit River	Monroe Aviation	Oct 1, 2001–Sep 30, 2004	Jan–Mar, Apr–Oct	Boat, Pier, Shore, Ice
Saginaw Bay	Munley-Smith Aviation	Sep 15, 2000–Oct 31, 2005	Jan–Mar, Apr–Oct	Boat, Pier, Shore, Ice
	S&C Aviation	Nov 1, 2005–Oct 31, 2008	Jan–Mar, Apr–Oct	Boat, Pier, Shore, Ice
Northern Lake Huron/St. Mary's River	Great Lakes Air	May 1, 2003–Jul 14, 2005	May–Oct	Boat, Pier, Shore, Ice
	Great Lakes Air	Jul 15, 2005–Jul 15, 2008	May–Oct	Boat, Pier, Shore, Ice

Table 2.—Lake Michigan creel survey locations (tributary locations not included). An X denotes that the port or area was sampled during that year.

Survey location	Site code	Year										
		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	
<u>MM-1</u>												
Menominee Harbor	001	X	X	X	X	X	X	X				X
Stoney Pt. to Kleinke Park	007	X	X	X	X	X	X	X				X
Cedar River PAS	015	X	X	X	X	X	X	X				X
Little Bay de Noc	020	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
Fairport	330								X	X		X
<u>MM-2</u>												
Manistique Harbor and R.	048				X	X						X
Seul Choix Point	053				X							
Naubinway	058				X							
<u>MM-3</u>												
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
<u>MM-4</u>												
Elk Rapids	094	X	X	X	X	X	X	X	X	X	X	X
East Grand Traverse Bay	095	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
<u>MM-5</u>												
Leland	116				X	X					X	X
Glen Arbor	118				X	X					X	X
Platte Bay	122				X	X					X	
Frankfort/Elberta	124	X	X	X	X	X	X	X	X	X	X	X
<u>MM-6</u>												
Arcadia	126				X	X					X	
Onekama (Portage Lk.)	127	X	X	X	X	X	X	X	X	X	X	X
Manistee	128	X	X	X	X	X	X	X	X	X	X	X
Ludington	134	X	X	X	X	X	X	X	X	X	X	X
Pentwater	139		X		X	X		X	X	X	X	X
<u>MM-7</u>												
Whitehall/Montague	312		X		X	X	X	X	X	X	X	X
Muskegon	149	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
Port Sheldon	155			X	X	X	X	X			X	
<u>MM-8</u>												
Holland	156	X		X	X	X	X	X			X	
Saugatuck	160		X									
South Haven	162	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
New Buffalo	166	X	X	X	X	X	X	X	X	X		

Table 3.—Lake Huron creel survey locations (tributary locations not included). An X denotes that the port or area was sampled during that year.

Survey location	Site code	Year									
		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
<u>MH-1</u>											
Drummond Island	210				X	X				X	
St. Vital Pt. to Detour	211				X	X	X	X	X	X	X
Les Cheneaux Islands	214				X	X	X	X	X	X	X
St. Ignace to St. Martins Bay	216				X	X	X	X	X	X	X
Cheboygan	218				X	X					X
Hammond Bay	219				X	X					X
Rogers City	223	X	X	X	X	X	X	X	X	X	X
<u>MH-2</u>											
Presque Isle Harbor	224		X	X	X	X	X	X	X	X	X
Rockport	225	X	X	X	X	X	X	X	X	X	X
Alpena	227	X	X	X	X	X	X	X	X	X	X
<u>MH-3</u>											
Harrisville	232	X	X	X	X	X	X	X	X	X	X
Oscoda	234	X	X	X	X	X	X	X	X	X	X
<u>MH-4</u>											
Tawas	250	X	X	X	X	X	X	X	X	X	X
Au Gres	255	X	X	X	X	X	X	X	X	X	X
Saganing Creek to Bay City	260	X	X	X	X	X	X	X	X	X	X
Saginaw R. to Essexville	356	X	X	X	X	X	X	X	X	X	X
Quanicassee to Wiscoggin Drain	278	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
Oak Beach Rd to Port Austin (including Caseville)	236/290	X	X	X	X	X	X	X	X	X	X
<u>MH-5</u>											
Eagle Bay to Harbor Beach	241	X	X	X	X	X	X	X	X	X	X
<u>MH-6</u>											
Port Sanilac	245	X	X	X	X	X	X	X	X	X	X
Lexington	246	X	X	X	X	X	X	X	X	X	X

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

Survey location	Site code	Year										
		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	
<u>MI-2</u>												
Black River Harbor	168	X	X									X
Ontonagon	172	X	X									X
<u>MI-3</u>												
Copper Harbor	177											X
<u>MI-4</u>												
Traverse Bay	182	X	X	X	X	X	X	X	X	X	X	X
Keweenaw Bay	185	X	X	X	X	X	X	X	X	X	X	X
<u>MI-5</u>												
Marquette	190	X	X	X	X	X	X	X	X	X	X	X
<u>MI-6</u>												
Au Train	194	X	X	X	X	X	X	X	X	X	X	X
Munising	195	X	X	X	X	X	X	X	X	X	X	X
<u>MI-7</u>												
Grand Marais	197					X	X	X	X	X	X	X

Table 5.—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	2005	2006	
699											X
701	X	X	X	X	X	X	X	X	X	X	X
702	X	X	X	X	X	X	X	X	X	X	X
703	X	X	X	X	X	X	X	X	X	X	X
801	X	X	X	X	X	X	X	X	X	X	X
802	X	X	X	X	X	X	X	X	X	X	X

Table 6.—St. Clair system creel survey locations. An X denotes that the grid was sampled during that year.

Area	Grid	Year		
		2002	2003	2004
Detroit River ¹	500	X	X	X
	501	X	X	X
	502	X	X	X
	503	X	X	X
	504	X	X	X
	505	X	X	X
Lake St. Clair	506	X	X	X
	507	X	X	X
	508	X	X	X
	509	X	X	X
	510	X	X	X
	511	X	X	X
	512	X	X	X
	513	X	X	X
St. Clair River	514	X	X	X
	515	X	X	X
	516	X	X	X
	517	X	X	X
	518	X	X	X
	519	X	X	X

¹ Additional Detroit River sites were also surveyed in 2000 (sites 411–418) and in 1997–2001 (sites 602,603).

Table 7.—Tributary creel survey locations. An X denotes that the site was sampled during that year.

Lake	Tributary	Site #	Year									
			1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Superior	Chocolay R.	321	X	X	X	X	X	X				
	Dead R.	324		X	X	X	X	X	X	X	X	X
Huron	Au Sable R.	316 ¹			X	X	X					
	Ocqueoc R.	221										X
	Saginaw R.	355			X	X	X	X	X	X	X	X
	St. Mary's R.	Various ²			X	X	X	X	X	X	X	X
	Tittabawassee R.	401			X	X	X	X	X	X	X	X
Michigan	Bear R.	084	X	X	X	X	X	X	X	X	X	X
	Cedar R.	016	X	X	X	X	X	X	X			X
	Manistee R.	130/341			X	X	X	X	X	X		
	Menominee R.	002	X	X	X	X	X	X	X	X		X
	Muskegon R.	151/152			X	X	X	X	X	X	X	
	St. Joseph R.	Various ³	X	X	X	X	X	X	X	X	X	X

¹ Au Sable River surveyed in collaboration with Huron Pines Resource Council (Dave Smith). Results not presented in this report.

² St. Mary's River includes sites 207, 208, 209, 403, 404, and 405.

³ St. Joseph River includes sites 298, 345, 367, 387, 388, 389, 390, and 391.

Table 8.—Winter (ice-fishery) creel survey locations. An X denotes that the site was sampled during that year. Modes included are “open ice” (mode=4) and “shanty ice” (mode=6).

Lake	Survey location	Site code	Year							
			1999	2000	2001	2002	2003	2004	2005	2006
Michigan	Menominee Harbor	001	X	X	X		X	X		X
	Menominee River	002	X	X	X	X	X	X		X
	Little Bay de Noc	020	X	X	X	X	X	X		X
	Big Bay de Noc	025	X	X	X	X	X	X	X	X
Superior	Keweenaw Bay	185	X	X	X	X	X	X	X	X
	Marquette	190					X		X	
	Au Train	194			X		X		X	
	Munising Bay	195	X	X	X	X	X	X	X	X
Huron	St. Mary's River	Various ¹	X	X	X	X	X	X	X	X
	Les Cheneaux Is.	214			X	X	X	X	X	X
	Port Austin	236	X	X	X	X	X	X	X	
	Tawas	250	X	X	X	X	X	X	X	X
	Au Gres	255	X	X	X	X	X	X	X	X
	Saganing Creek	260	X	X	X	X	X	X	X	X
	Quanicassee	278	X	X	X	X	X	X	X	X
	Sebewaing	288	X	X	X	X	X	X	X	X
Huron	Caseville	290							X	X
	Saginaw River	355	X	X	X	X	X	X	X	X
	355 to Quanicassee	356		X	X	X	X	X	X	X
	Tittabawassee River	401		X		X			X	X
St. Clair	Grid	507					X	X	X	
	Grid	509					X	X	X	
	Grid	512					X	X	X	
	Grid	513					X	X	X	
	Grid	514					X	X	X	

¹ St. Mary's River includes sites 207, 208, 404, and 405

Table 9.–Creel clerk manual outline.

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Introduction

Introduction

Figure 1 – Territory Boundaries for Angler Survey in relation to Fisheries Management Unit boundaries

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Great Lakes Creel Census Instructions

Great Lakes Angler Surveys

Angler Party Interview Form Instructions

Angler Party Interview, 2004 – 2007 Sample Forms (Boat anglers, non-fishing boat, and pier/dock angler on second trip of the day)

Great Lakes Program Creel Count Data Form Instructions

Table 9.–Continued.

Creel Count Data, 2004 – 2007 Sample Forms (1 count per day area boat count, 2 counts per day boat count from pier for 30 minutes, and 3 counts per day open ice mode)
Angler Pier Ratio Data Form
Ice Shanty Occupancy Data Sheet
Inland Creel Census Instructions
Inland Angler Creel Surveys
Biodata Collection
Sample envelopes
Michigan County & Other Residence Codes
Scale Collection Chart
Coded Wire Tag Fish Head Collection Instructions for Creel Clerk
Biological Samples Power Point
Biodata Collection Station Photo
Biodata Length Diagram
Biodata Maxillary Clip Photo
Common Errors in Bio Data Collection
Angler Party Interview, 2004 – 2007 Form
Fish ID and Fish Health
Names of Michigan Fish DNR internet
Fish Names and Codes
Bullhead Chart
Identification of Trout and Salmon
Identification of white bass, white perch, rusty crayfish, gobies
Identification of shallowwater cisco and torch lake cisco
Identification of walleye and sauger
Identification of atlantic salmon and brown trout
Atlantic Salmon ID DNR internet
Walleye ID DNR internet
White Bass ID DNR internet
Muskellunge ID DNR internet
Lake Whitefish ID DNR internet
Smelt ID DNR internet
Brown Trout ID DNR internet
Menominee ID DNR internet
Largemouth Bass ID DNR internet
Smallmouth Bass ID DNR internet
Mudpuppies DNR internet
Snakehead DNR internet
Length of Common Michigan Fishes at Successive Ages
Sea Lamprey Management Program, Great Lakes Fishery Commission
Perch, pike, bluegill, bass, crappie, sunfish ID
New Yellow Perch Parasite
Yellow Grub DNR internet
Black Spot DNR internet
Bacterial Kidney Disease (BKD) DNR internet
Red Worm DNR internet

Table 9.–Continued.

Piscirickettsia DNR internet

Integrated Pest Management for Nuisance Exotics in Michigan Inland Lakes

Great Lakes Aquatic Nuisance Control

Mollusks

Zebra Mussels Cause Economic and Ecological Problems

Boaters: Take action against zebra mussels

Giant or Red Snakehead

Asian Carp: Bighead and Silver on the Move

Round gobies invade North America

Ruffe, A new threat to our fisheries

The spiny water flea, *Bythotrephes cederstroemi*, Another unwelcome newcomer to the Great Lakes

Zebra mussels in North America, The invasion and its implications

How to Tell Apart Fish that Look Alike

Brochures

Michigan Fish and How to Catch Them, Michigan DNR

Know your Great Lakes Salmon and Trout, Michigan DNR

Fish Tails, Trout? Salmon?, Minnesota Sea Grant Extension

Lake Sturgeon, Giant of the Great Lakes, US Fish & Wildlife Service

Asian Carp, US Fish & Wildlife Service

A Field Guide to Aquatic Exotic Plants and Animals, Minnesota DNR 1992

Pocket Size Handouts, Sarah Thayer

Public Relations

Fishing Guide 2005 DNR internet

Trout and Salmon Guide 2005 DNR internet

Fish Consumption Guide

Michigan Family Fish Consumption Guide 2004 DNR internet

Telecommunications

Fisheries Office Contact List DNR intranet

Employee Phone List DNR intranet

Communication Web List

State owned cell phone guidelines

Computer Action Request R7056

Table 9.–Continued.

PDA's and Computer Entry
**GPS and Maps*

MichFish / Personal Digital Assistants DNR Intranet
**Global Positioning System*
**MI Creel*
**Computer Workstation*
**DNR Computer Security Agreement*
**Microsoft Windows*
 HRMN
**Word*
**Excel*
**Fish Collection System*
**Intranet*
**Internet Search*
**Management Unit Map*
**Great Lakes Grid Maps*
**Creel Census Territory Map*
 Inland Lake Maps
 National Oceanic and Atmospheric Administration, Web Site Map

Vehicles, Boats and Snowmobiles

Vehicles

State Guidelines
 In Case of an Auto Accident DMB Internet

Maintenance Assistance Program (MAP) DMB Internet

Department of Management and Budget Vehicle & Travel Services Car Wash Guidelines DMB Internet

Fuel DMB Internet
 Gas Can Fires
 State Motor Vehicle Driver Agreement DMB Internet
 Vehicle Damage Report DMB Internet
 State of Michigan Certificate of No-Fault Insurance
 State Vehicle Policy and Practice Guide DMB Internet

Boats

Safety & Maintenance
 Boat Preventive Maintenance
 Boat Combination Maintenance Report
 Michigan Boating Laws and Responsibilities
 Vessel Safety Check, US Coast Guard Auxiliary

Snowmobiles

DNR Snowmobile Guide DNR Internet

Table 9.–Continued.

Safety

Fisheries Division Accident Checklist
Report of Claim R7420e
Employee Accident Report R7200E
Health Care Provider Certificate PR7401
Supervisor's Investigatory Report R7201E
FMLA Forms, R7400, CS-1790, and CS-1789
Hand Knife Safety, Brochure
Safety Information Sheets
Safe Lifting Techniques MIOSHA Internet
Hand Protection MIOSHA Internet
Slips and Falls MIOSHA Internet
Personal Protective Equipment MIOSHA Internet
Hurry Up Can Hurt MIOSHA Internet
You're Responsible MIOSHA Internet
Obey the Un-enforceable MIOSHA Internet
Lightening Protection National Weather Service Internet
Personal Flotation Device, Brochure
Safety Product Vendors
**Storms and Weather*
**Observing Clouds*
Lighting and Boats, Brochure
Don't Get Trapped, Trap Net, Brochure
**Weather Channels*
**US Weather Service*
**Cold Weather Gear*
**Ice*

Forms

**Angler interview forms:*
Great Lakes Creel R-8013
**Inland Creel R-8017*
Creel Count Data R-8012
**Scale Sample Envelopes R-8143*
Public Incident Report R-1004e
Fuel Card Log R-1434e
Travel Expenses Voucher DMB 23
DNR Official Daily Travel Logs R1404e

Glossary and FAQ's

The Manual of Fisheries Survey Methods II Table of Contents DNR internet
Glossary
Glossary of Common Fishing Terms
Glossary of Fish Disease Terms
Safety Glossary
Fish Stocking Information DNR internet
**Creel Clerks Favorite Questions*
**Creel Census Adventure Stories*
Michigan Recreation and Camping Guide 2005 DNR internet
Michigan Hunting and Trapping Guide 2005 DNR internet

Table 10.—Example Great Lakes creel survey schedule. Shaded days are scheduled creel survey days (both weekend days and three randomly-selected weekdays). Shifts (A=am shift, B=pm shift), survey sites, and randomly scheduled count times are also shown.

May 2007						
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
		1	2 Shift:A Petoskey {7:00 AM, 1:00 PM}	3	4 Shift:B Charlevoix {7:00 PM, 8:00 PM}	5 Shift:A Petoskey {7:00 AM, 1:00 PM}
6 Shift:B Charlevoix {3:00 PM, 5:00 PM}	7	8	9 Shift:B Petoskey {2:00 PM, 5:00 PM}	10 Shift:A Charlevoix {6:00 AM, 7:00 AM}	11 Shift:A Charlevoix {7:00 AM, 12:00 PM}	12 Shift:B Charlevoix {2:00 PM, 3:00 PM}
13 Shift:A**** Petoskey {9:00 AM, 1:00 PM}	14 Shift:A Petoskey {7:00 AM, 11:00 AM}	15	16	17 Shift:B Charlevoix {4:00 PM, 7:00 PM}	18 Shift:A**** Petoskey {9:00 AM, 1:00 PM}	19 Shift:B Charlevoix {7:00 PM, 8:00 PM}
20 Shift:A**** Petoskey {10:00 AM, 11:00 AM}	21	22 Shift:A Charlevoix {7:00 AM, 9:00 AM}	23 Shift:B Petoskey {3:00 PM, 8:00 PM}	24 Shift:A Petoskey {7:00 AM, 1:00 PM}	25	26 Shift:A Petoskey {9:00 AM, 1:00 PM}
27 Shift:B Charlevoix {7:00 PM, 8:00 PM}	28 Memorial Day	29 Shift:B Petoskey {4:00 PM, 8:00 PM}	30	31		

Table 11.—Fishing harvest (number of fish) and effort (hours, trips, days) in Lake Michigan, 1997–2006. Data are from April–October for nine Lake Michigan index ports (New Buffalo, St. Joseph, Grand Haven, Muskegon, Ludington, Manistee, Frankfort, West Grand Traverse Bay and Charlevoix), combined.

Species	Year									
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Atlantic salmon	233	0	39	24	228	12	0	0	9	0
Brown trout	26,822	10,668	7,441	20,741	7,051	12,695	6,443	4,317	6,636	2,152
Chinook salmon	59,717	64,890	59,552	92,325	77,369	107,978	116,580	183,052	165,695	221,065
Coho salmon	23,762	24,379	15,829	37,167	21,069	46,609	21,630	19,208	6,917	12,021
Lake trout	28,600	43,415	21,601	22,296	19,683	16,812	8,545	7,413	6,879	9,035
Lake whitefish	702	2,787	2,551	5,060	5,388	2,021	708	232	370	1,763
Rainbow trout	21,113	34,438	22,643	17,173	29,742	34,942	18,003	11,631	17,585	12,124
Smallmouth bass	428	1,437	505	1,479	766	461	405	490	697	228
Walleye	546	512	443	366	586	267	102	183	191	106
Yellow perch	158,034	92,893	338,996	145,091	132,713	186,621	297,446	298,348	282,237	160,828
Effort (hours)	1,422,156	1,469,659	1,269,192	1,371,670	1,372,994	1,439,726	1,262,867	1,575,559	1,401,574	1,303,589
Angler trips	333,342	341,382	295,621	318,011	302,745	314,419	294,014	347,860	318,163	305,548
Angler days	297,214	309,856	261,195	281,007	261,030	283,174	265,819	318,771	300,096	274,634

Table 12.—Fishing harvest (number of fish) and effort (hours, trips, days) in Lake Huron, 1997–2006. Data are from April–October for ten Lake Huron index ports (Rogers City, Rockport, Alpena, Harrisville, Oscoda, Tawas, Port Austin, Eagle Bay to Harbor Beach, Port Sanilac and Lexington), combined.

Species	Year									
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Atlantic salmon	138	23	81	143	314	135	130	111	25	85
Brown trout	3,556	2,784	1,339	2,137	1,302	3,305	5,244	1,915	633	283
Chinook salmon	117,882	82,616	66,773	59,086	52,000	98,922	76,758	41,373	10,004	8,518
Coho salmon	2,626	1,156	4,520	3,184	1,771	11,449	1,254	1,654	598	1,283
Lake trout	45,287	49,979	33,044	23,344	15,998	24,997	40,738	55,034	27,584	9,288
Pink salmon	239	667	1,062	1,072	4,813	2,595	51	3,135	171	616
Rainbow trout	11,458	5,708	6,954	7,284	7,895	8,521	4,885	4,400	1,582	1,023
Smallmouth bass	76	344	506	323	209	497	1,363	1,877	179	286
Walleye	5,488	7,769	7,299	1,850	7,602	5,483	14,366	5,554	5,115	2,515
Yellow perch	26,572	20,003	36,471	48,418	42,204	18,425	24,022	4,238	16,305	82,226
Effort (hours)	1,318,279	1,096,688	922,895	874,111	821,606	1,077,244	1,051,433	809,294	433,571	281,715
Angler trips	280,329	235,540	192,289	189,909	177,814	229,445	231,411	181,621	108,882	74,806
Angler days	241,521	213,780	172,816	173,276	161,050	201,103	205,457	166,224	103,751	71,998

Table 13.—Fishing harvest (number of fish) and effort (hours, trips, days) in Lake Superior, 1997–2006. Data are from April–October for five Lake Superior sites (Traverse Bay, Keweenaw Bay, Marquette, Au Train, Munising), combined.

Species	Year									
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Brown trout	122	173	159	135	158	149	109	130	102	117
Chinook salmon	1,471	458	1,452	1,232	1,743	776	703	1,414	1,334	765
Coho salmon	4,022	1,918	5,229	2,150	3,902	3,502	1,745	4,264	4,322	3,805
Lake trout (“fat”)	1,740	3,641	2,143	2,234	2,555	2,011	1,778	1,819	2,389	2,723
Lake trout (“lean”)	19,467	15,637	16,492	20,392	20,466	21,292	15,784	17,373	15,078	12,254
Lake herring	177	23	12	0	85	1,091	45	47	49	13
Lake whitefish	2,346	1,787	1,000	1,575	644	1,669	1,371	1,676	935	1,258
Rainbow trout	755	343	421	659	602	495	428	430	395	432
Splake	1,261	591	385	432	451	302	787	1,099	641	914
Yellow perch	351	182	1,373	482	67	243	126	227	3	704
Effort (hours)	125,412	106,633	120,957	107,822	121,612	106,848	88,900	97,885	95,623	91,353
Angler trips	33,420	27,289	31,320	28,001	31,566	28,923	23,800	25,959	24,362	24,262
Angler days	32,675	27,079	31,137	27,696	31,321	28,755	23,565	25,531	22,831	22,718

Table 14.–Fishing harvest (number of fish) and effort (hours, trips, days) in Lake Erie, 1997–2006. Data are from April–October for Lake Erie grids 701–703 and 801–803, combined. NS = not sampled.

Species	Year									
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Channel catfish	NS	NS	15,605	3,775	3,463	7,953	13,008	9,373	3,902	2,576
Freshwater drum	NS	NS	4,363	2,082	378	2,153	1,612	1,523	1,114	857
Smallmouth bass	734	155	615	2,235	244	1,185	458	238	297	69
Walleye	72,585	49,748	90,542	205,105	115,288	166,145	109,067	96,126	33,407	287,387
White bass	NS	NS	8,864	6,665	3,819	11,976	10,429	7,918	4,943	9,399
Yellow perch	345,709	422,671	353,844	223,393	254,291	463,226	350,890	306,069	162,439	195,294
Effort (hours)	476,562	427,970	532,763	711,139	490,808	820,220	506,240	726,653	365,915	731,540
Angler trips	88,849	89,263	102,047	128,527	94,333	156,394	106,414	145,155	76,830	161,752
Angler days	88,797	86,217	100,810	127,174	93,808	156,055	105,773	145,023	76,645	160,945

Table 15.—Fishing harvest (number of fish) and effort (hours, trips, days) in the St. Clair system, 2002–04. Data are from April–October for grids 500–519, combined.

Species	Year		
	2002	2003	2004
Bluegill	15,577	7,861	10,293
Freshwater drum	2,518	3,096	2,850
Smallmouth bass	13,709	16,383	8,246
Walleye	214,726	159,567	128,934
White bass	216,139	54,734	143,566
Yellow perch	497,964	295,186	223,833
Effort (hours)	2,365,153	1,858,927	2,000,121
Angler trips	481,287	381,714	417,230
Angler days	467,796	375,716	415,367

Table 16.—Rainbow trout harvest in Lake Michigan tributary fisheries, 1999–2006. Data are for all months sampled, combined. NS = not sampled.

Tributary	Site code	Year							
		1999	2000	2001	2002	2003	2004	2005	2006
Menominee	002	491	583	176	208	336	69	NS	164
Cedar	016	51	27	3	0	10	NS	NS	0
Bear	084	248	355	303	178	170	341	262	190
Manistee	130	15,606	18,230	14,826	9,646	14,045	15,135	NS	NS
	341	6,485	3,207	5,681	2,558	2,766	3,496	NS	NS
Muskegon	151	46,361	23,842	14,945	10,160	18,665	13,375	20,222	NS
	152	4,667	3,820	4,705	2,793	2,224	2,350	534	NS
St. Joseph	298	9,679	3,890	5,577	1,358	3,578	2,902	2,220	1,019
	345	385	981	197	314	627	607	NS	NS
	367	1,335	1,050	675	374	849	497	NS	NS
	387	639	636	303	116	55	164	NS	NS
	388	138	1,933	431	55	462	97	0	NS
	389	968	3,880	898	119	388	286	1,811	NS
	390	5,543	4,489	2,040	1,149	1,319	4,911	2,206	NS
	391	478	687	550	87	219	153	NS	0

Table 17.—Chinook salmon harvest in Lake Superior, Huron, and Michigan tributary fisheries, 1999–2006. Data are for all months sampled, combined. NS = not sampled.

Lake	Tributary	Site code	Year							
			1999	2000	2001	2002	2003	2004	2005	2006
Superior	Chocolay	321	15	0	0	0	NS	NS	NS	NS
		324	159	302	50	23	18	134	110	167
Huron	St. Mary's	207	306	0	0	0	0	0	51	0
		208	4,057	3,441	2,628	NS	NS	NS	577	371
		209	1,301	550	1,549	NS	NS	NS	NS	2,288
		403	88	NS	NS	NS	NS	NS	NS	NS
		404	0	0	NS	NS	NS	NS	NS	NS
		405	138	0	NS	NS	NS	NS	0	NS
Michigan	Menominee	002	138	50	468	143	379	0	NS	228
		016	165	40	0	0	21	NS	NS	0
	Bear	084	698	1,697	1,597	1,614	777	1,074	1,267	1,653
		130	22,169	22,625	32,742	29,750	31,308	29,192	NS	NS
	Manistee	341	2,768	2,534	3,817	986	4,743	5,938	NS	NS
		Muskegon	151	5,280	11,214	1,310	2,448	4,499	7,233	3,503
	152		706	1,021	1,053	103	1,367	1,603	0	NS
	St. Joseph	345	368	0	0	155	24	31	NS	NS
		367	78	21	60	30	52	0	NS	NS
		387	28	22	109	0	19	0	NS	NS
		388	212	29	0	0	17	0	0	NS
		389	1,341	131	108	61	118	0	111	NS
		390	331	509	135	21	8	0	120	NS
	391	370	830	275	57	171	173	NS	272	

Table 18.—Walleye harvest in Lake Huron and Michigan tributary fisheries, 1999–2006. Data are for all months sampled, combined.

Lake	Tributary	Site code	Year							
			1999	2000	2001	2002	2003	2004	2005	2006
Huron	St. Mary's	207	4,761	6,547	12,191	1,268	596	1,071	9,009	4,855
		208	58	269	1,670	NS	NS	NS	667	4,323
		209	2,258	1,402	2,760	NS	NS	NS	NS	5,514
		403	0	NS	NS	NS	NS	NS	NS	NS
		404	920	0	NS	NS	NS	NS	NS	NS
		405	1,173	0	NS	NS	NS	NS	2,892	NS
	Saginaw	355	9,906	31,091	9,017	5,400	2,340	1,322	9,059	12,658
	Tittabawassee	401	3,343	7,737	34,850	7,152	6,850	72	18,667	4,430
Michigan	Menominee	002	22,137	9,039	32,377	11,687	8,880	0	NS	14,481
		016	147	23	253	101	245	NS	NS	4
	Cedar	084	17	0	0	0	0	0	0	0
		Bear	130	119	235	219	210	553	765	NS
	341		0	25	21	0	74	0	NS	NS
	Manistee	151	374	496	67	103	0	81	18	NS
		152	357	566	217	0	0	161	105	NS
	Muskegon	298	1,016	1,779	1,036	2,160	950	1,399	289	114
		345	58	108	37	119	699	529	NS	NS
	St. Joseph	367	2,501	2,110	1,062	905	851	772	NS	NS
		387	133	0	0	0	70	436	NS	NS
		388	31	92	37	235	2	109	0	NS
		389	221	413	188	185	101	397	43	NS
		390	466	123	15	129	107	82	0	NS
		391	39	80	0	0	0	19	NS	0

Table 19.—Fishing effort (hours) in Lake Superior, Huron, and Michigan tributary fisheries, 1999–2006. Data are for all months sampled, combined. NS = not sampled.

Lake	Tributary	Site code	Year								
			1999	2000	2001	2002	2003	2004	2005	2006	
Superior	Chocolay	321	5,586	4,574	6,397	6,002	NS	NS	NS	NS	
		324	1,877	3,394	2,414	1,348	618	1,329	1,445	2,738	
Huron	St. Mary's	207	112,223	133,460	180,084	34,446	14,279	16,552	100,095	121,285	
		208	96,668	62,803	93,066	NS	NS	NS	52,210	71,529	
		209	68,442	61,758	82,382	NS	NS	NS	NS	84,845	
		403	13,574	NS	NS	NS	NS	NS	NS	NS	
		404	58,166	11,356	NS	NS	NS	NS	NS	NS	
		405	65,306	5,138	NS	NS	NS	NS	46,811	NS	
	Saginaw	355	85,211	280,264	98,845	90,148	126,808	133,617	84,250	48,577	
	Tittabawassee	401	38,293	28,669	147,234	51,230	37,975	1,789	88,435	32,228	
	Michigan	Menominee	002	132,711	113,165	131,064	78,898	98,489	3,412	NS	99,698
			016	18,146	11,900	14,306	13,213	10,567	NS	NS	11,906
Bear		084	11,515	10,532	9,727	11,238	10,897	12,466	8,510	9,889	
		Manistee	130	408,186	473,943	521,227	459,005	435,121	473,232	NS	NS
341			120,581	126,304	123,996	87,745	96,395	102,285	NS	NS	
Muskegon		151	279,860	355,659	291,751	208,791	232,465	239,412	230,101	NS	
		152	95,034	89,185	66,362	35,276	39,604	43,692	12,174	NS	
St. Joseph		298	161,163	144,500	136,096	99,915	103,502	83,813	83,951	66,716	
		345	27,100	25,573	20,898	23,262	35,405	31,961	NS	NS	
		367	62,515	49,664	41,845	46,646	39,491	30,452	NS	NS	
		387	22,759	20,422	15,874	14,880	19,129	19,620	NS	NS	
		388	28,525	29,672	13,677	10,097	11,474	10,848	6,574	NS	
		389	46,071	34,340	16,131	13,680	13,157	16,219	7,522	NS	
390	90,938	76,745	50,416	32,683	46,013	64,382	21,522	NS			
391	39	80	0	0	0	0	19	NS	0		

Table 20.—Yellow perch harvest (number of fish) and effort (hours; in parentheses) in winter ice fisheries on Lake Michigan and Huron, 2003–06. Modes included are “open ice” (mode=4) and “shanty ice” (mode=6). NS = not sampled.

Lake	Site	Site code	Year			
			2003	2004	2005	2006
Michigan	Menominee	001	221 (4,373)	0 (455)	NS	18 (92)
	Menominee R.	002	0 (5,402)	0 (3,412)	NS	683 (6,132)
	L. Bay de Noc	020	66,352 (174,867)	42,304 (166,480)	31,853 (125,675)	103,265 (122,810)
Huron	St. Mary's R.	207	3,008 (14,279)	1,247 (16,552)	1,736 (31,657)	3,994 (31,064)
	Cedarville	214	7,955 (8,047)	615 (3,197)	2,515 (5,900)	24,391 (26,646)
	Saginaw Bay	236	4,315 (14,273)	13,796 (14,499)	0 (179)	NS
		250	11,842 (45,196)	4,899 (23,469)	399 (31,907)	4,605 (17,051)
		255	32,457 (64,368)	7,252 (26,600)	12,005 (82,678)	44,013 (46,206)
		260	11,568 (179,413)	28,306 (132,603)	50,135 (242,092)	31,979 (44,020)
		278	4,456 (23,878)	473 (7,128)	487 (38,167)	5,929 (21,033)
		288	34,414 (68,612)	24,913 (30,439)	65,503 (83,445)	21,740 (28,084)
		290	NS	NS	3,013 (3,770)	15,685 (11,410)
	356	2 (811)	1,013 (1,837)	0 (467)	0 (1,176)	
	Saginaw R.	355	46,302 (118,620)	76,997 (132,837)	7,478 (67,246)	901 (2,861)
	Tittabawassee R.	401	NS	0 (0)	0 (413)	0 (87)
	St. Clair	Grid	507	22,970 (42,837)	17,789 (23,949)	1,265 (8,739)
509			99,516 (136,574)	141,787 (179,770)	12,253 (63,982)	NS
512			246,293 (210,013)	204,769 (180,578)	72,203 (88,155)	NS
513			111,754 (89,710)	146,213 (160,419)	12,276 (16,228)	NS
514			51,895 (133,767)	102,974 (74,775)	32,917 (72,765)	NS

Table 21.—Harvest (numbers of fish) and effort (hours) in winter ice fisheries on Lake Superior, 1997–2006. Modes included are “open ice” (mode=4) and “shanty ice” (mode=6). Data are for Keweenaw Bay (site 185) and Munising (site 195) surveys, combined.

Species	Year									
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Coho salmon	865	1,937	862	2,033	1,815	2,768	1,524	1,338	2,853	733
Lake herring	647	452	4,794	1,572	1,886	2,826	1,803	1,825	2,318	1,254
Lake trout (“fat”)	2,797	13	242	8	1,984	489	2,754	1,995	2,826	0
Lake trout (“lean”)	158	78	499	201	751	225	604	922	933	239
Lake whitefish	492	4,606	6,006	4,561	4,471	4,335	6,294	2,950	2,496	2,721
Splake	55	181	68	336	33	344	212	98	413	526
Yellow perch	1,011	700	3,638	3,398	4,927	437	305	880	390	719
Effort (hours)	38,620	17,822	41,410	30,323	45,069	28,987	44,463	45,757	47,881	17,779
Angler trips	11,516	4,963	12,501	8,579	12,794	8,533	12,557	13,392	11,331	4,501
Angler days	11,182	4,835	12,291	8,477	12,329	8,390	12,225	13,346	10,855	4,246