STUDY PERFORMANCE REPORT

Project No.: F-81-R-1

State: Michigan

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

Study No.: 427

Period Covered: October 1, 1999 to September 30, 2000

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

Summary: This report presents results from the d1999 angling season. Similar data were collected for the 2000 season; these will be summarized in next year's report. During the 1999 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, 22 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, 16 areas were sampled from Lexington to Rogers City. In addition, a major tributary to Lake Huron, the St. Mary's River system, was sampled. The St. Mary's River creel survey was a joint project with the St. Mary's River Task Group of the Lake Huron Technical Committee of the Great Lakes Fisheries Commission. Members of the Task Group included the Bay Mills Indian Community (U.S.), the Ontario Ministry of Natural Resources (OMNR), the Batchewana First Nation of Ojibways (Canada), the Garden River First Nation of Ojibways (Canada) and the MDNR. Five areas were also sampled on western and central Lake Superior.

A total of 90,852 anglers were interviewed at the conclusion of their fishing trips during the 1999 season (January-December 15). The number of anglers interviewed by lake was: Lake Michigan, 27,360; Lake Huron, 28,685; Lake Erie, 5,957; Lake Superior, 6,620. The number of anglers interviewed on some of the large rivers surveyed were: St. Mary's River, 5,024; Manistee River, 4,601; Muskegon River, 2,273; and the Saginaw/Tittabawassee rivers, 1,419.

Anglers spent an estimated 6.7 million angler hours fishing at all sites sampled in 1999. This amounted to an estimated 1.6 million individual fishing trips or 1.4 million angler days.

A total of 3.4 million fish (of the 29 species that were on the survey data form-angler party interview form) were harvested at all sample areas combined. Yellow perch was the most abundant species in the catch with an estimated harvest of 2.5 million fish. Over 209,000 walleye were estimated as harvested by the sport fishery in all sample areas combined in 1999. Salmonines were also an important part of the Great Lakes sport harvest. During 1999, over 461,000 were estimated to have been harvested from all sample areas. Important species of salmonines and their estimated harvest in numbers were: chinook salmon, 193,000; rainbow trout, 111,000; lake trout, 82,000; brown trout 33,000 and coho salmon, 31,000.

New software for the estimation of catch and effort was used during 1999. The software calculates catch rates as recommended by Lockwood (1997). The software also produces estimates of targeted effort as well as targeted catch rates for two species complexes: trout and salmon, and yellow perch and walleye. Numbers of caught and released fish are also estimated.

The angler party interview form was re-designed for 1999 and the new form was put in service January 1, 1999 in time for the winter ice creel survey. The new form has space for 15 additional kept species as well as eight species that anglers may have caught and released (legal size fish).

Job 1. Title: Initiate air flight boat counts.

Findings: During 1999, air flights were utilized to count boats on Lake Erie. Boats, and shore and pier anglers were counted using air flights on Saginaw Bay, Lake Huron (Tawas to Harbor Beach), northern Lake Huron (St. Ignace to Drummond Island), and the St. Mary's River system. During winter 2000, open ice anglers and ice shanties were also counted on Saginaw Bay during the winter ice fishery.

All air flights were conducted using stratified random sampling schedules. At each survey area, flights were attempted on each weekend day and three 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.

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

Findings: Personnel from MDNR Management Unit 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 they were sampling.

Throughout the 1999 season creel clerks sent completed data forms to the Charlevoix Fisheries Research Station every two weeks for computer entry. Data entry (optical scanning) was completed by the middle of January 2000 for all sample areas surveyed in 1999. Summaries of the catch estimates by sample area were generated for all sites by the end of January 2000. Data entry (optical scanning) for the 2000 season is ongoing.

Lake Michigan.–Twenty-two 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 1999.

Lake Michigan anglers spent an estimated 2.4 million hours fishing the ports and areas sampled during 1999 (Table 1). This amounted to an estimated 570,000 individual fishing trips. Yellow perch were the most abundant species in the catch with an estimated harvest of 839,000. Salmonines are also an important part of the Lake Michigan sport harvest. During 1999, an estimated 80,000 chinook salmon, 31,600 lake trout, 27,900 rainbow trout, 20,800 brown trout and 20,000 coho salmon were harvested from the survey areas (Table 1). In addition, an estimated 27,400 walleye were harvested from Lake Michigan.

During the 2000 season, the Lake Michigan creel survey was expanded to cover all ports in the 1836 Treaty Waters (Grand Haven to Little Bay de Noc) (Figure 1.). Four new creel clerk positions were added to sample Whitehall/Montague, Pentwater, Arcadia, Platte Bay, Glen Arbor, Leland, Naubinway, and Manistique.

Lake Huron.– Lake Huron was surveyed from Lexington to Rogers City in 1999. Lake Huron anglers spent an estimated 1.9 million hours and made an estimated 398,000 fishing trips during the 1999 season (Table 2). Yellow perch made up the majority of the harvest with an estimated 1.2 million fish.

In addition to yellow perch, other important species in the Lake Huron sport harvest included an estimated 72,000 chinook salmon, 43,000 walleye, 34,000 lake trout, 8,800 rainbow trout, and 2,100 brown trout.

The St. Mary's River system, a major tributary to Lake Huron, was surveyed in 1999 in cooperation with Canadian Fisheries authorities (OMNR) and three Native American Tribes, one from the U.S. side (Bay Mills Indian Community) and two from the Canadian side (Batchewana First Nation of Ojibways and Garden River First Nation of Ojibways). This was the first creel survey done for the entire river system. Anglers on the St. Mary's River spent an estimated 555,000 hours and made 137,000 fishing trips (Table 3) in the area from Gros Cap on the upper river to Detour, including Potagannissing Bay and the St. Joseph Channel (Figure 2).

During the 2000 season, the Lake Huron creel survey was expanded to cover all ports in the 1836 Treaty Waters (Alpena to Detour) (Figure 3.). Three new creel clerk positions were added to sample St Ignace, the Les Chenaux Islands, Detour, Cheboygan, and Hammond Bay. In addition, the creel survey of Michigan waters of the St. Mary's River System was continued.

Lake Erie.–The Lake Erie boat fishery was sampled from Point Mouillee to the Michigan-Ohio state line during mid-April through October, 1999. Lake Erie anglers spent an estimated 533,000 hours fishing Michigan waters of Lake Erie (Table 4). Anglers harvested an estimated 354,000 yellow perch and 90,500 walleye, in all, 14 species of fish were observed. The same area and time period were covered by the creel survey in 2000.

Lake Superior.– Five areas in western and central Lake Superior were surveyed in 1999. Lake Superior anglers at these locations fished an estimated 167,000 angler hours and made 45,600 fishing trips (Table 5). Lake trout was the most abundant (17,000) species in the catch. The harvest also included an estimated 6,800 coho salmon, 7,000 lake whitefish, 2,400 siscowet lake trout and 1,500 chinook salmon. The same sites were sampled during 2000.

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 (optical scanning). During 1999-2000, the project biologist developed new data editing routines using Microsoft Access queries, which allows for additional error checking and has improved the speed of editing errors. The data editing queries employ range checks on various fields and search for illegal values for each count and interview record.

Frequent contacts and communications with creel clerks were employed 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 were prepared for the 2000 season to cover the following areas: Lake Erie, 31 sites on Lake Michigan, 21 sites on Lake Huron including Saginaw Bay, 5 sites on western and

central Lake Superior, the Michigan waters of the St. Mary's River system, and 10 sites on several river systems.

Job 5. Title: Prepare status report summarizing results.

Findings: Summaries in tabular form of harvest and effort estimates for all sites sampled during 1999 were disseminated to the management unit and research station offices during January 2000.

The preparation of technical reports is on hold due to the fact that all historical (1985-98) creel survey data may be re-estimated using the new software package.

Job 6. Title: Analyze and evaluate data.

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

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

During 1997, under the direction of the Great Lakes Fishery Commission's Lake Michigan Technical Committee, an ad hoc committee was assigned the task of making predator stocking recommendations for Lake Michigan. The project biologist was a member of this committee, which included representatives of the State agencies (Michigan, Indiana, Illinois, Wisconsin), the U. S. Fish and Wildlife Service and the Indian Tribes (Chippewa-Ottawa Treaty Fishery Management Authority). Among other important inputs, the group utilized creel survey data, which have been collected over the years by all State agencies on Lake Michigan to develop a computer model called CONNECT. The model was then used to test various stocking scenarios of five species of salmonines in Lake Michigan and their probable impact on the lake wide forage base. The results of the committee's work were presented to the Lake Michigan Technical Committee in January 1997. As a result of this exercise, chinook stocking was reduced by all agencies on Lake Michigan in the spring of 1999. Chinook stocking was also reduced by MDNR in Lake Huron in 1999. Creel survey harvest estimates will be used to evaluate the effectiveness of those stocking reductions beginning in 2001.

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) the annual reporting of targeted fishing effort and targeted catch rates for important species complexes, such as salmonines, yellow perch and walleye; 2) the estimation of caught and released fish; 3) inclusion of important stream fisheries in the annual creel survey. Work was completed on this project during 1999-00. The rewriting of the estimation software

was completed during the fall months of 1999 and the new software was used to generate the 1999 estimates using the catch rates estimator recommended by Lockwood (1997).

Literature Cited:

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

Prepared by: Gerald P. Rakoczy
Dated: September 30, 2000

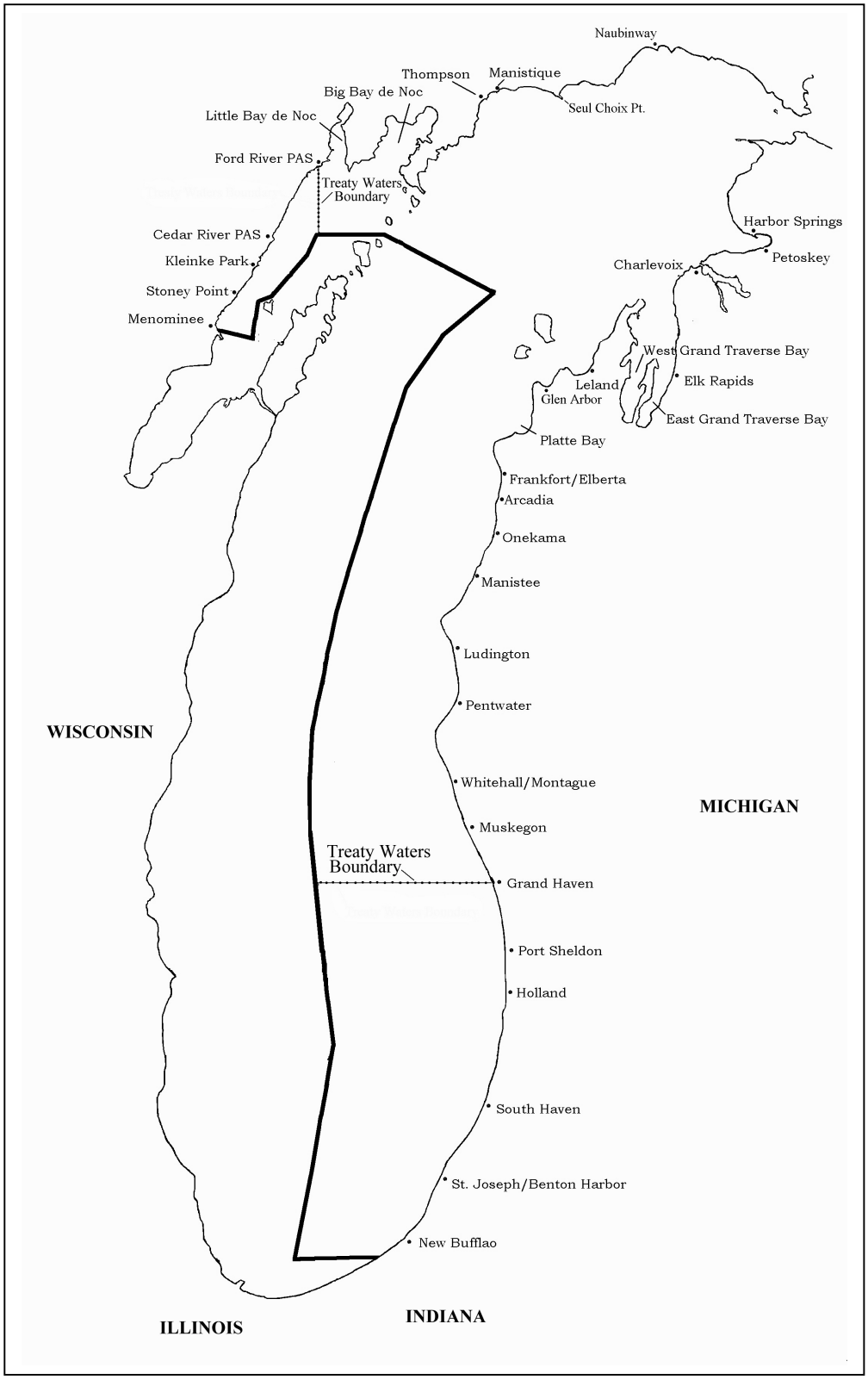

Figure 1.–Lake Michigan creel survey locations, 2000.

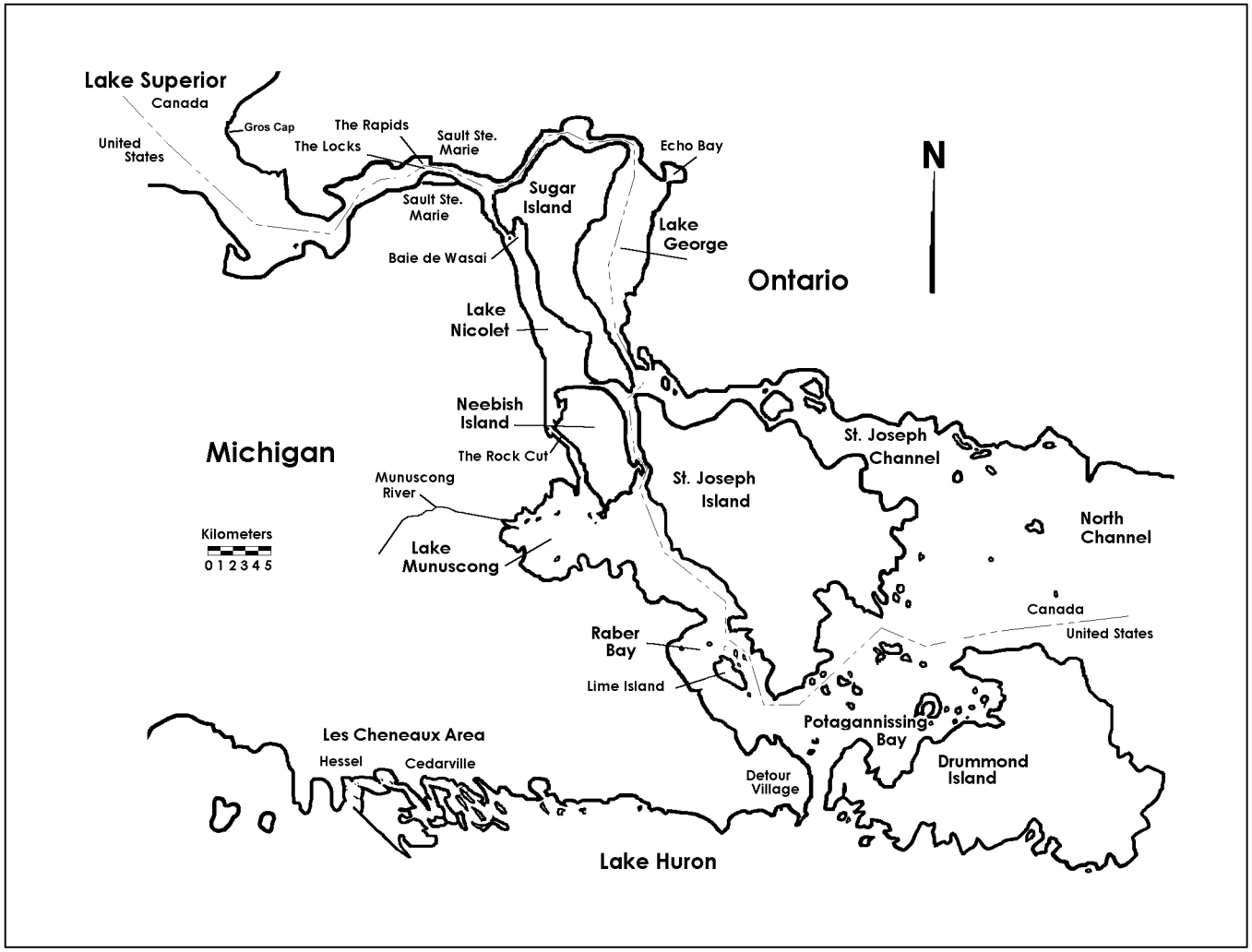

Figure 2.–St. Mary's River system.

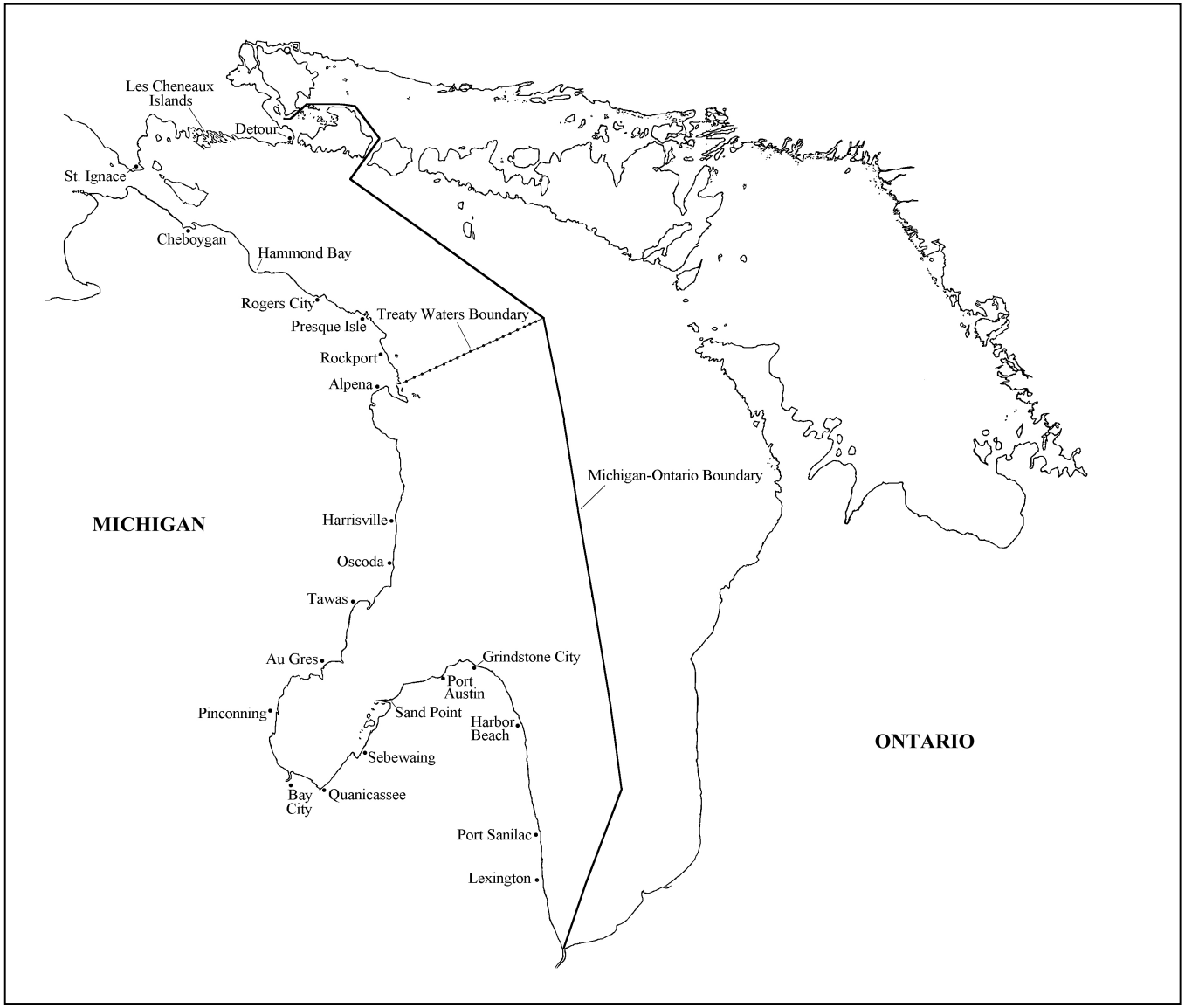

Figure 3.–Lake Huron creel survey locations, 2000.

Table 1.–Estimated harvest per hour, number harvested, and effort (angler hours, trips, and days) for all Lake Michigan open lake sites (22) combined, by all modes (non-charter) of sportfishing, 1999. Two standard errors of the mean are shown in parentheses.

Species	Harvest per hour	Month										
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Season
Pink salmon	0.0000	0	0	0	0	0	0	0	0	0	11	11
	(0.0000)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(21)	(21)
Coho salmon	0.0084	0	0	1,780	3,629	2,865	447	472	8,045	2,584	193	20,015
	(0.0019)	(0)	(0)	(1,986)	(1,752)	(2,123)	(207)	(300)	(2,553)	(1,377)	(128)	(4,482)
Chinook salmon	0.0337	0	0	116	180	3,342	3,585	11,050	39,090	20,623	2,123	80,109
	(0.0052)	(0)	(0)	(110)	(128)	(2,016)	(1,185)	(3,032)	(8,100)	(6,919)	(819)	(11,351)
Rainbow trout	0.0118	0	0	65	1,924	2,628	4,954	3,837	2,743	6,469	5,271	27,891
	(0.0025)	(0)	(0)	(65)	(587)	(1,064)	(2,881)	(3,131)	(1,113)	(3,192)	(939)	(5,647)
Atlantic salmon	0.0000	0	0	0	39	0	0	0	0	0	35	74
	(0.0000)	(0)	(0)	(0)	(76)	(0)	(0)	(0)	(0)	(0)	(0)	(76)
Brown trout	0.0087	112	0	1,243	8,771	1,048	343	1,354	4,568	2,453	874	20,766
	(0.0017)	(46)	(0)	(742)	(3,121)	(469)	(187)	(545)	(1,494)	(1,062)	(294)	(3,781)
Brook trout	0.0000	0	0	0	0	32	0	0	0	0	0	32
	(0.0000)	(0)	(0)	(0)	(0)	(63)	(0)	(0)	(0)	(0)	(0)	(63)
Lake trout	0.0133	0	0	0	1,538	4,220	6,699	9,620	8,016	1,503	0	31,596
	(0.0018)	(0)	(0)	(0)	(882)	(1,257)	(2,205)	(2,036)	(1,920)	(918)	(0)	(3,986)
Splake	0.0015	162	94	694	2,470	0	55	0	32	76	59	3,642
	(0.0007)	(67)	(41)	(231)	(1,649)	(0)	(81)	(0)	(47)	(98)	(69)	(1,674)
Northern pike	0.0016	1,350	1,627	103	13	0	426	27	49	90	110	3,795
	(0.0004)	(407)	(346)	(20)	(23)	(0)	(762)	(42)	(75)	(65)	(113)	(944)
White sucker	0.0001	0	0	0	0	88	51	104	0	0	20	263
	(0.0001)	(0)	(0)	(0)	(0)	(108)	(77)	(180)	(0)	(0)	(40)	(227)

(Table 1.–continued.)

Species	Harvest per hour	Month										
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Season
Channel catfish	0.0002	0	0	0	125	90	0	53	152	77	27	524
	(0.0001)	(0)	(0)	(0)	(160)	(100)	(0)	(86)	(230)	(95)	(37)	(326)
White perch	0.0000	0	0	0	0	0	0	0	36	0	0	36
	(0.0000)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(56)	(0)	(0)	(56)
White bass	0.0000	0	0	0	0	0	0	0	0	19	0	19
	(0.0000)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(34)	(0)	(34)
Rock bass	0.0010	0	0	0	0	49	259	907	1,184	0	0	2,399
	(0.0005)	(0)	(0)	(0)	(0)	(54)	(220)	(899)	(641)	(0)	(0)	(1,127)
Pumpkinseed	0.0000	0	0	0	0	0	52	0	0	0	0	52
	(0.0000)	(0)	(0)	(0)	(0)	(0)	(63)	(0)	(0)	(0)	(0)	(63)
Bluegill	0.0002	0	0	0	99	0	0	0	0	405	0	504
	(0.0002)	(0)	(0)	(0)	(197)	(0)	(0)	(0)	(0)	(429)	(0)	(472)
Smallmouth bass	0.0027	0	0	0	0	656	1,537	1,597	561	877	1,070	6,298
	(0.0007)	(0)	(0)	(0)	(0)	(549)	(1,103)	(721)	(314)	(527)	(140)	(1,560)
Black crappie	0.0001	0	0	0	69	158	0	0	0	0	0	227
	(0.0001)	(0)	(0)	(0)	(0)	(192)	(0)	(0)	(0)	(0)	(0)	(192)
Yellow perch	0.3534	54,539	31,877	19,689	245,631	49,239	70,683	137,675	107,485	78,326	43,755	838,899
	(0.0663)	(13,857)	(3,487)	(1,939)	(115,983)	(42,002)	(40,696)	(47,820)	(34,459)	(41,251)	(13,937)	(149,834)
Walleye	0.0116	1,638	1,409	18	1,180	14,296	1,450	3,274	1,699	954	1,535	27,453
	(0.0041)	(499)	(127)	(36)	(1,012)	(9,238)	(880)	(2,004)	(1,075)	(481)	(821)	(9,669)
Freshwater drum	0.0003	0	0	0	0	62	454	200	65	0	3	784
	(0.0003)	(0)	(0)	(0)	(0)	(88)	(665)	(211)	(88)	(0)	(5)	(709)
Lake herring	0.0009	0	0	0	636	1,074	503	33	0	0	0	2,246
	(0.0006)	(0)	(0)	(0)	(946)	(1,068)	(368)	(32)	(0)	(0)	(0)	(1,474)

(Table 1.–continued.)

Species	Harvest per hour	Month										
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Season
Lake whitefish	0.0031	67	47	284	594	1,935	1,416	912	10	237	1,879	7,381
	(0.0010)	(29)	(13)	(328)	(353)	(1,313)	(1,018)	(671)	(19)	(459)	(1,506)	(2,434)
Round whitefish	0.0030	0	0	0	515	115	92	0	181	1,818	4,312	7,033
	(0.0016)	(0)	(0)	(0)	(438)	(117)	(112)	(0)	(282)	(2,858)	(2,339)	(3,733)
Other	0.0002	0	127	0	0	0	137	10	162	0	0	436
	(0.0001)	(0)	(33)	(0)	(0)	(0)	(99)	(17)	(267)	(0)	(0)	(287)
Angler hours		108,483	78,325	44,238	244,945	282,075	262,239	393,856	545,042	297,407	117,015	2,373,625
		(23,023)	(8,395)	(7,906)	(34,958)	(57,967)	(38,905)	(53,411)	(72,498)	(59,042)	(11,276)	(135,944)
Angler trips		23,388	18,242	11,711	64,445	64,342	62,447	95,013	122,037	73,463	34,519	569,607
		(5,198)	(2,942)	(2,310)	(8,570)	(12,321)	(8,340)	(11,938)	(15,531)	(13,180)	(3,242)	(30,063)
Angler days		22,436	16,382	11,388	60,488	57,391	56,729	85,603	106,299	65,099	27,936	509,751
		(5,046)	(2,820)	(2,278)	(8,373)	(11,477)	(7,640)	(10,974)	(13,337)	(12,281)	(2,695)	(27,481)

Table 2.–Estimated harvest per hour, number harvested, and effort (angler hours, trips, and days) for 16 Lake Huron survey sites combined, by all modes (non-charter) of sportfishing, 1999. Two standard errors of the mean are shown in parentheses.

Species	Harvest per hour	Month												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Season
Pink salmon	0.0006	0	0	0	0	201	297	510	38	16	0	0	0	1,062
	(0.0004)	(0)	(0)	(0)	(0)	(362)	(542)	(427)	(39)	(100)	(0)	(0)	(0)	(787)
Coho salmon	0.0025	0	0	0	521	1,969	618	1,087	228	169	18	8	0	4,618
	(0.0007)	(0)	(0)	(0)	(366)	(883)	(360)	(697)	(107)	(96)	(26)	(14)	(0)	(1,246)
Chinook salmon	0.0385	0	0	0	253	4,937	5,360	22,419	19,957	13,897	5,274	38	0	72,135
	(0.0053)	(0)	(0)	(0)	(196)	(2,490)	(1,737)	(5,475)	(4,422)	(3,636)	(3,061)	(29)	(0)	(9,022)
Rainbow trout	0.0047	0	0	453	1,221	673	998	2,955	794	342	408	713	238	8,795
	(0.0009)	(0)	(0)	(725)	(475)	(598)	(423)	(1,021)	(345)	(248)	(336)	(330)	(82)	(1,655)
Atlantic salmon	0.0001	0	0	14	13	30	6	34	0	20	0	0	0	117
	(0.0001)	(0)	(0)	(44)	(59)	(129)	(12)	(31)	(0)	(149)	(0)	(0)	(0)	(213)
Brown trout	0.0011	0	19	555	674	68	100	405	180	75	16	0	0	2,092
	(0.0008)	(0)	(58)	(1,261)	(435)	(156)	(121)	(531)	(311)	(117)	(26)	(0)	(0)	(1,488)
Brook trout	0.0000	0	0	0	0	0	0	0	9	0	0	0	0	9
	(0.0000)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(61)	(0)	(0)	(0)	(0)	(61)
Lake trout	0.0183	0	0	0	8	7,634	12,320	9,685	3,538	1,095	0	0	0	34,280
	(0.0042)	(0)	(0)	(0)	(15)	(4,575)	(4,790)	(3,311)	(1,866)	(887)	(0)	(0)	(0)	(7,688)
Northern pike	0.0005	206	131	101	2	74	73	43	278	47	17	0	0	972
	(0.0005)	(206)	(269)	(406)	(8)	(251)	(244)	(168)	(638)	(167)	(57)	(0)	(0)	(932)
Tiger Muksie	0.0000	0	0	19	0	0	11	0	38	0	0	0	0	68
	(0.0002)	(0)	(0)	(103)	(0)	(0)	(18)	(0)	(262)	(0)	(0)	(0)	(0)	(282)
White sucker	0.0001	0	0	0	87	0	39	0	74	0	0	0	0	200
	(0.0003)	(0)	(0)	(0)	(367)	(0)	(65)	(0)	(469)	(0)	(0)	(0)	(0)	(600)
Channel catfish	0.0020	0	9	21	0	719	1,314	648	695	333	41	0	0	3,780
	(0.0023)	(0)	(53)	(127)	(0)	(1,647)	(3,226)	(1,145)	(1,587)	(944)	(81)	(0)	(0)	(4,227)
White perch	0.0007	0	0	0	0	31	17	0	949	136	224	0	0	1,357
	(0.0036)	(0)	(0)	(0)	(0)	(56)	(104)	(0)	(6,631)	(478)	(1,058)	(0)	(0)	(6,732)

(Table 2.–continued.)

Species	Harvest per hour	Month												Season
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
White bass	0.0002	0	0	11	0	263	21	18	0	14	83	0	0	410
	(0.0004)	(0)	(0)	(64)	(0)	(506)	(146)	(140)	(0)	(89)	(472)	(0)	(0)	(729)
Rock bass	0.0004	0	0	4	361	127	117	54	18	22	6	0	0	709
	(0.0007)	(0)	(0)	(18)	(1,199)	(143)	(557)	(232)	(117)	(137)	(22)	(0)	(0)	(1,362)
Pumpkinseed	0.0002	0	0	254	0	54	0	0	0	4	0	0	0	312
	(0.0004)	(0)	(0)	(574)	(0)	(366)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(680)
Bluegill	0.0005	346	0	217	35	67	218	0	0	0	0	0	0	883
	(0.0013)	(1,911)	(0)	(521)	(221)	(457)	(1,378)	(0)	(0)	(0)	(0)	(0)	(0)	(2,466)
Smallmouth bass	0.0005	0	0	0	0	82	33	555	187	72	0	0	0	929
	(0.0005)	(0)	(0)	(0)	(0)	(390)	(63)	(491)	(629)	(142)	(0)	(0)	(0)	(901)
Largemouth bass	0.0007	0	0	0	284	262	770	0	15	0	45	0	0	1,376
	(0.0017)	(0)	(0)	(0)	(935)	(793)	(2,914)	(0)	(110)	(0)	(144)	(0)	(0)	(3,166)
Black crappie	0.0017	0	350	323	436	1,799	86	0	0	40	236	0	0	3,270
	(0.0027)	(0)	(736)	(601)	(988)	(4,821)	(562)	(0)	(0)	(203)	(556)	(0)	(0)	(5,078)
Yellow perch	0.6277	104,598	48,420	62,506	16,310	4,605	51,839	120,007	437,047	265,353	63,827	0	0	1,174,512
	(0.1273)	(47,628)	(25,462)	(34,660)	(20,388)	(6,491)	(34,183)	(87,901)	(164,391)	(97,202)	(46,100)	(0)	(0)	(228,186)
Walleye	0.0231	409	248	98	135	1,319	2,473	32,006	6,320	260	23	0	0	43,291
	(0.0092)	(745)	(472)	(244)	(235)	(1,092)	(3,216)	(15,241)	(6,464)	(587)	(54)	(0)	(0)	(16,937)
Freshwater drum	0.0007	0	0	0	0	88	390	285	279	276	0	0	0	1,318
	(0.0008)	(0)	(0)	(0)	(0)	(152)	(464)	(870)	(677)	(765)	(0)	(0)	(0)	(1,428)
Lake herring	0.0000	0	0	0	0	0	0	11	0	0	0	0	0	11
	(0.0000)	(0)	(0)	(0)	(0)	(0)	(0)	(21)	(0)	(0)	(0)	(0)	(0)	(21)
Lake whitefish	0.0009	0	13	7	33	0	14	0	0	0	0	1,611	73	1,751
	(0.0007)	(0)	(51)	(30)	(25)	(0)	(112)	(0)	(0)	(0)	(0)	(1,347)	(69)	(1,355)
Round whitefish	0.0005	15	15	34	0	65	7	0	125	0	372	265	0	898
	(0.0006)	(92)	(69)	(122)	(0)	(82)	(14)	(0)	(779)	(0)	(639)	(187)	(0)	(1,041)
Other	0.0005	0	0	19	5	148	761	0	0	0	0	0	0	933
	(0.0027)	(0)	(0)	(38)	(0)	(227)	(5,099)	(0)	(0)	(0)	(0)	(0)	(0)	(5,104)

(Table 2.–continued.)

Species	Harvest per hour	Month												Season
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Angler hours		100,774	61,373	62,239	74,601	176,910	207,998	470,007	402,598	241,183	62,907	9,208	1,421	1,871,219
		(15,159)	(11,856)	(11,988)	(13,551)	(41,287)	(35,063)	(65,031)	(51,033)	(34,575)	(12,863)	(1,465)	(346)	(108,758)
Angler trips		26,485	17,577	17,408	18,574	34,291	42,084	89,952	83,446	50,759	14,662	2,555	329	398,122
		(3,964)	(2,739)	(4,232)	(3,725)	(7,270)	(6,812)	(11,576)	(10,502)	(7,113)	(3,013)	(464)	(95)	(21,412)
Angler days		23,069	13,232	14,531	16,707	32,424	39,800	84,230	78,125	45,823	13,229	2,367	287	363,824
		(3,555)	(2,372)	(3,520)	(3,380)	(6,808)	(6,339)	(10,962)	(10,039)	(6,500)	(2,879)	(449)	(83)	(20,008)

Table 3.–Estimated harvest per hour, number harvested, and effort (angler hours, trips, and days) for the St. Mary's River system (Michigan and Ontario), by all modes (non-charter) of sportfishing, 1999. Two standard errors of the mean are shown in parentheses.

		Month						
Species	Harvest per hour	May	Jun	Jul	Aug	Sep	Oct	Season
Pink salmon	0.0040	0	0	0	890	1,308	9	2,207
	(0.0048)	(0)	(0)	(0)	(1,736)	(2,021)	(73)	(2,665)
Coho salmon	0.0008	23	11	0	0	404	10	448
	(0.0021)	(74)	(53)	(0)	(0)	(1,141)	(40)	(1,145)
Chinook salmon	0.0128	0	0	733	2,533	3,367	483	7,116
	(0.0172)	(0)	(0)	(4,149)	(2,311)	(8,192)	(893)	(9,511)
Rainbow trout	0.0007	148	110	54	0	74	14	400
	(0.0010)	(316)	(224)	(164)	(0)	(372)	(49)	(564)
Atlantic salmon	0.0010	0	21	466	0	86	3	576
	(0.0052)	(0)	(78)	(1,687)	(0)	(2,367)	(20)	(2,908)
Lake trout	0.0000	0	1	0	0	0	0	1
	(0.0000)	(0)	(2)	(0)	(0)	(0)	(0)	(2)
Northern pike	0.0131	1,072	1,827	2,242	1,573	551	0	7,265
	(0.0087)	(1,215)	(2,188)	(2,777)	(2,729)	(1,332)	(0)	(4,816)
Muskellunge	0.0001	0	0	40	0	0	0	40
	(0.0005)	(0)	(0)	(277)	(0)	(0)	(0)	(277)
Channel catfish	0.0002	41	0	0	94	0	0	135
	(0.0011)	(209)	(0)	(0)	(572)	(0)	(0)	(609)
Rock bass	0.0001	69	4	0	0	0	0	73
	(0.0004)	(227)	(15)	(0)	(0)	(0)	(0)	(228)
Pumpkinseed	0.0005	0	0	207	24	53	0	284
	(0.0022)	(0)	(0)	(1,202)	(160)	(289)	(0)	(1,247)
Bluegill	0.0002	0	0	134	0	0	0	134
	(0.0015)	(0)	(0)	(823)	(0)	(0)	(0)	(823)
Smallmouth bass	0.0027	93	500	86	189	623	0	1,491
	(0.0041)	(329)	(1,073)	(465)	(811)	(1,766)	(0)	(2,292)
Largemouth bass	0.0003	0	0	134	0	9	0	143
	(0.0015)	(0)	(0)	(855)	(0)	(17)	(0)	(855)
Yellow perch	0.1580	3,640	2,223	1,012	16,151	55,323	9,335	87,684
	(0.0934)	(5,978)	(4,010)	(2,363)	(38,003)	(32,664)	(8,562)	(51,399)
Walleye	0.0207	1,617	983	4,116	3,978	757	58	11,509
	(0.0169)	(2,216)	(1,682)	(5,574)	(6,231)	(3,003)	(274)	(9,313)
Lake herring	0.0670	0	9,025	28,176	0	0	1	37,202
	(0.0886)	(0)	(13,440)	(47,218)	(0)	(0)	(4)	(49,093)
Lake whitefish	0.0440	4,347	13,388	6,145	164	89	262	24,395
	(0.0423)	(7,002)	(14,490)	(16,962)	(664)	(539)	(893)	(23,414)
Round whitefish	0.0010	116	422	0	0	1	29	568
	(0.0032)	(605)	(1,669)	(0)	(0)	(2)	(228)	(1,789)
Other	0.0022	749	57	339	52	15	0	1,212
	(0.0063)	(3,243)	(194)	(1,350)	(253)	(63)	(0)	(3,528)

(Table 3.–continued.)

Species	Harvest per hour	Month						
		May	Jun	Jul	Aug	Sep	Oct	Season
Angler hours		57,238	82,864	158,661	133,139	102,921	20,221	555,044
		(15,214)	(13,837)	(26,285)	(19,905)	(16,596)	(6,273)	(42,718)
Angler trips		14,001	21,251	39,699	31,644	24,280	5,997	136,872
		(3,951)	(3,871)	(7,203)	(5,251)	(4,681)	(2,213)	(11,699)
Angler days		10,767	17,073	34,289	26,809	21,506	5,664	116,108
		(2,689)	(3,047)	(6,567)	(4,499)	(4,340)	(2,095)	(10,154)

Table 4.–Estimated harvest per hour, number harvested, and effort (angler hours, trips, and days) for the Lake Erie boat fishery (non-charter) in grids 701, 702, 703, 801 and 802 combined, 1999. Two standard errors of the mean are shown in parentheses.

Species	Harvest per hour	Month							Season
		Apr	May	Jun	Jul	Aug	Sep	Oct	
Rainbow trout	0.0001	0	0	64	10	0	0	0	74
	(0.0006)	(0)	(0)	(334)	(67)	(0)	(0)	(0)	(340)
Lake trout	0.0001	0	0	0	33	0	0	0	33
	(0.0004)	(0)	(0)	(0)	(240)	(0)	(0)	(0)	(240)
Muskellunge	0.0002	0	0	0	91	0	0	0	91
	(0.0012)	(0)	(0)	(0)	(634)	(0)	(0)	(0)	(634)
Channel catfish	0.0293	254	176	4,893	3,919	230	5,260	872	15,604
	(0.0384)	(573)	(365)	(10,185)	(12,052)	(902)	(12,701)	(1,664)	(20,356)
White perch	0.0035	0	242	169	112	60	1,145	132	1,860
	(0.0102)	(0)	(903)	(772)	(378)	(378)	(5,244)	(544)	(5,431)
White bass	0.0166	373	2,886	1,038	2,400	1,427	678	61	8,863
	(0.0246)	(1,079)	(4,500)	(2,593)	(8,620)	(7,837)	(2,697)	(243)	(13,084)
Rock bass	0.0001	0	20	0	0	0	0	18	38
	(0.0003)	(0)	(95)	(0)	(0)	(0)	(0)	(103)	(140)
Bluegill	0.0025	5	0	0	0	1,079	250	0	1,334
	(0.0147)	(34)	(0)	(0)	(0)	(7,686)	(1,563)	(0)	(7,843)
Smallmouth bass	0.0012	0	0	199	100	100	217	0	616
	(0.0027)	(0)	(0)	(667)	(412)	(387)	(1,112)	(0)	(1,414)
Largemouth bass	0.0007	0	0	155	235	0	0	0	390
	(0.0026)	(0)	(0)	(814)	(1,142)	(0)	(0)	(0)	(1,402)
Black crappie	0.0012	11	21	0	0	0	0	581	613
	(0.0044)	(67)	(104)	(0)	(0)	(0)	(0)	(2,363)	(2,367)
Yellow perch	0.6642	39	3,998	7,240	32,491	99,974	164,936	45,167	353,845
	(0.2554)	(123)	(6,111)	(12,069)	(61,121)	(71,113)	(82,669)	(31,107)	(129,528)
Walleye	0.1699	118	16,189	37,721	32,172	3,715	511	116	90,542
	(0.0632)	(210)	(9,485)	(23,156)	(19,181)	(4,923)	(1,094)	(413)	(31,933)
Freshwater drum	0.0082	23	590	2,044	644	1,017	33	12	4,363
	(0.0189)	(111)	(2,549)	(7,721)	(4,254)	(4,077)	(207)	(69)	(10,044)
Angler hours		6,317	71,373	152,442	118,817	74,805	87,270	21,738	532,762
		(4,310)	(27,888)	(36,168)	(29,667)	(20,098)	(21,878)	(8,761)	(62,800)
Angler trips		1,381	13,503	29,619	20,588	15,181	17,107	4,669	102,048
		(941)	(5,175)	(6,775)	(5,280)	(4,109)	(4,389)	(1,942)	(11,889)
Angler days		1,366	13,277	29,345	20,181	14,986	16,986	4,669	100,810
		(935)	(5,120)	(6,691)	(5,226)	(4,031)	(4,353)	(1,942)	(11,753)

Table 5.–Estimated harvest per hour, number harvested, and effort (angler hours, trips, and days) for five Lake Superior sites combined, by all modes (non-charter) of sportfishing, 1999. Two standard errors of the mean are shown in parentheses.

Species	Harvest per hour	Month										
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Season
Pink salmon	0.0003	0	0	0	0	0	0	0	0	50	0	50
	(0.0003)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(46)	(0)	(46)
Coho salmon	0.0408	37	254	1,275	2,828	890	132	117	362	665	235	6,795
	(0.0065)	(8)	(28)	(297)	(843)	(217)	(63)	(65)	(294)	(213)	(114)	(1,000)
Chinook salmon	0.0089	0	0	22	145	570	269	139	213	74	43	1,475
	(0.0020)	(0)	(0)	(15)	(55)	(196)	(149)	(91)	(159)	(77)	(41)	(324)
Rainbow trout	0.0029	0	19	39	217	41	23	13	13	78	36	479
	(0.0008)	(0)	(23)	(17)	(92)	(32)	(23)	(16)	(18)	(59)	(24)	(124)
Brown trout	0.0019	0	77	72	84	34	2	0	0	40	0	309
	(0.0006)	(0)	(58)	(55)	(14)	(27)	(3)	(0)	(0)	(53)	(0)	(101)
Lake trout	0.1021	77	126	306	714	1,956	4,351	3,463	2,975	2,309	724	17,001
	(0.0193)	(13)	(23)	(74)	(368)	(639)	(2,489)	(855)	(844)	(998)	(278)	(3,043)
Splake	0.0029	0	47	48	90	69	40	0	6	86	95	481
	(0.0013)	(0)	(61)	(41)	(83)	(48)	(37)	(0)	(12)	(144)	(76)	(207)
Siscowet	0.0143	0	4	238	107	245	399	213	768	377	35	2,386
	(0.0049)	(0)	(1)	(34)	(26)	(176)	(288)	(139)	(626)	(332)	(47)	(800)
Northern pike	0.0009	0	3	0	0	18	33	103	0	0	0	157
	(0.0008)	(0)	(1)	(0)	(0)	(26)	(42)	(117)	(0)	(0)	(0)	(127)
Rock bass	0.0003	0	35	0	0	0	0	0	13	0	0	48
	(0.0001)	(0)	(4)	(0)	(0)	(0)	(0)	(0)	(16)	(0)	(0)	(16)
Yellow perch	0.0301	882	1,988	768	0	8	343	996	26	0	0	5,011
	(0.0104)	(298)	(160)	(37)	(0)	(15)	(334)	(1,630)	(31)	(0)	(0)	(1,698)

(Table 5.–continued.)

Species	Harvest per hour	Month										
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Season
Lake herring	0.0290	189	1,960	2,675	0	2	0	0	0	10	0	4,836
	(0.0029)	(56)	(336)	(179)	(0)	(4)	(0)	(0)	(0)	(19)	(0)	(385)
Lake whitefish	0.0421	61	4,551	1,399	332	175	266	51	0	0	176	7,011
	(0.0084)	(10)	(1,156)	(478)	(249)	(188)	(266)	(106)	(0)	(0)	(123)	(1,326)
Round whitefish	0.0078	0	210	499	6	88	79	0	0	30	390	1,302
	(0.0038)	(0)	(149)	(517)	(8)	(99)	(95)	(0)	(0)	(35)	(275)	(621)
Other	0.0043	0	28	668	7	15	0	0	0	0	0	718
	(0.0032)	(0)	(22)	(530)	(10)	(25)	(0)	(0)	(0)	(0)	(0)	(531)
Angler hours		2,251	18,961	24,387	20,448	17,875	21,004	22,074	17,423	17,445	4,687	166,555
		(430)	(1,443)	(2,031)	(3,135)	(2,793)	(5,299)	(3,855)	(3,771)	(4,974)	(820)	(10,325)
Angler trips		542	5,634	8,119	6,432	4,300	4,982	5,085	4,157	4,672	1,692	45,615
		(104)	(431)	(725)	(1,148)	(697)	(1,189)	(1,087)	(944)	(1,250)	(323)	(2,771)
Angler days		538	5,503	7,922	6,369	4,285	4,977	5,085	4,157	4,571	1,692	45,099
		(104)	(426)	(702)	(1,147)	(697)	(1,189)	(1,087)	(944)	(1,217)	(323)	(2,749)