

Harvest of fishes in the St. Marys River, May, 1999 through March, 2000

St. Marys River Fisheries Task Group
Lake Huron Technical Committee
Lake Huron Committee
Great Lakes Fishery Commission

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Abstract.

The St. Marys River fisheries were surveyed and summarized between May and October, 1999. In addition, the ice fisheries in certain portions of the river were also surveyed during January through March of 2000. Virtually all the fisheries that exist in the St. Marys River were summarized for harvest by either estimates from a survey (sport fisheries and subsistence fisheries using sport gears) or by direct harvest reporting (subsistence fisheries using non-sport gears and neighboring commercial fisheries). Unlike past creel surveys, the 1999 open water creel survey spanned the entire length of the St. Marys and included interview data from both sides of the international boundary. The project was a joint multiagency effort by the St. Marys River Fisheries Task Group of the Great Lakes Fishery Commission. The open water sport fishing pressure in 1999 amounted to 556,399 angler hours, or 36% as much as all the other sport fishing pressure exerted that same year in the Michigan waters of Lake Huron. Fishing pressure was similar to past and recent surveys for the same season. The sport ice fisheries amounted to another 59,569 angler hours. Sport anglers fishing under Michigan and Ontario licenses accounted for 98% of the fishing pressure while tribal and First Nation fishers using sport gears accounted for 2%. The reported subsistence harvest by tribal and First Nation fishers using gillnets and other nonsport gears was very small relative to the sport harvest. An Ontario permitted commercial gillnet fishery that operates in part of Potagannissing Bay and neighboring North Channel waters, harvested an estimated 1/3 as many walleyes as taken by the sport fishery. Walleye harvest in the sport fishery amounted to an estimated 11,145 fish between the open water and ice fisheries. This represented a decline compared to past harvest estimates. Other species comprising a substantial portion of the sport harvest included northern pike, lake herring, and yellow perch. Less significant in terms of numbers were salmon and trout species which comprised a larger proportion of the harvest from the Rapids area. Despite the disproportion in harvest between coolwater and coldwater species, 44% of anglers reported specifically targeting salmon and trout in their fishing trip for the open water season. Biological data collected from sport harvested fish indicate some immature walleye are likely being harvested. Wide disparity exists between management agencies with regard to length limits, creel limits, fishing seasons, gear restrictions, and other harvest regulations. Recommended is the development of common fish community objectives and more uniform harvest regulations to help achieve those objectives. Needed is up-to-date fish population level data and regular repeating of this harvest survey to provide the necessary information to managers.

Introduction

A clear and up-to-date understanding of the extraction or harvest of fishes in a fishery is fundamental to the management of those resources (Nielsen 1999). Fishery statistics are necessary for gauging the sustainable yield of the fish community, gauging the health of fish populations, in designing harvest regulations, protecting from overharvest, and for providing parameters to enable modeling. Regular surveys of fish harvest supplement other surveys of the fish community and individual fish populations to provide a holistic understanding of the dynamic relationship between the resource and users.

The St. Marys River, as a connecting channel between Lakes Superior and Huron, follows the international boundary between the State of Michigan and the Province of Ontario. Within these areas, and in close proximity to the river, are several bands of Native American tribes and First Nations (FN). Included on the Michigan side are the Sault Ste. Marie Tribe of Chippewa Indians, and Bay Mills Indian Community. On the Ontario side are the Batchawana First Nation of Ojibways and the Garden River First Nation. Collectively, these various governmental units, provincial, state, tribal, and First Nation, field sport and subsistence fishers in the river. Some commercial fisheries also fish up to or just within the upstream and downstream boundaries of the river and may exploit some of the same fish populations.

Because of the multijurisdictional nature of the region, past attempts to quantify fish extractions have been fragmented either by reaches of the river or by individual fishery. The first published report on fish extractions was a creel survey and commercial fishery investigation of the 1937/1938 fishery (Westerman and Van Oosten 1937). The river was not surveyed again until Dupont (1986) surveyed the rapids fishery on the Ontario side of the river. That survey, however spanned only about 10 km of the river. The second attempt of a larger scale creel survey was conducted on the 1987 open water sport fishery (Rakoczy and Rogers 1988). A similar sport creel survey was also conducted in 1991 (Rakoczy 1992). Those surveys, however, omitted the areas above the locks and the St. Joseph Channel. Pressure counts included Ontario waters of the river but interviews were limited to the Michigan side, yielding harvest estimates that were reflective of much of the river but not its geographic entirety and not with the benefit of interview data from the entire angling population. Various summaries of commercial and subsistence harvests by Native American tribes have been prepared during these time spans. These summaries, however, were limited to those specific fisheries.

Despite the fragmented nature of these past surveys, it was made apparent that collectively, these fisheries constituted an enormous amount of fishing pressure and harvest. The 1987 sport creel survey estimated fishing pressure during the open water season alone amounted to nearly 600,000 angler hours, as much as 26% of all the sport fishing pressure in the Michigan waters of Lake Huron that year. No one could fully or accurately estimate or quantify the entire scale of the various fisheries operating in the region. It became apparent that a coordinated, joint survey of all river reaches and all fisheries should be conducted simultaneously.

The St. Marys River Fisheries Task Group was formed under the auspices of the Lake Huron Technical Committee of the Great Lakes Fishery Commission in 1997 for the purpose of developing an Assessment Plan for the monitoring of the fishery resources of the river. The St. Marys River Fish Harvest survey was an outgrowth of that effort and took place in May through October of 1999 and again in January through March of 2000. It was designed to include all reaches of the river and all fisheries. The effort was conducted jointly by the Michigan Department of Natural Resources (MDNR), Ontario Ministry of Natural Resources (OMNR), Garden River First Nation (GRFN), Batchawana First Nation of the Ojibways (BFN), Bay Mills Indian

Community (BMIC), and the Chippewa Ottawa Treaty Fisheries Management Authority (now the Chippewa Ottawa Resource Authority; CORA).

Methods

A dual approach was taken to the quantification of the various fisheries operating in the St. Marys River. Commercial extractions were conducted by licensed or permitted persons by BMIC, CORA, BFN, and OMNR. Reporting of harvest totals were already a provision of their licensing and provided the simplest means to quantify those extractions. Similar reporting is required of all Michigan licensed charter fishing operations. Ontario charter operations are not required to report and were included in sport interviews. Harvest for subsistence purposes was permitted by all the Tribes and First Nations. Subsistence harvest using nets and spears were routinely reported for tribal fisheries. Subsistence harvest using sport gears, however, was not. Similarly, sport harvest by nontribal or non-First Nation persons was not reported. It was decided to depend on the routine reporting of the commercial and nonsport gear subsistence fisheries and to use a creel survey to estimate the harvest of the sport fishery and the subsistence fishery using sport gears. Table 1 summarizes the fish harvest assessment strategy.

Table 1. Fisheries of the St. Marys River and the methods used to quantify them in the Fish Harvest Survey of 1999 / 2000.

Fishery	Method for Quantification	Form of Quantification
Sport	Creel Survey	Estimate
Subsistence with sport gears	Creel Survey	Estimate
Subsistence with nonsport gears	Direct Reporting	Count
Commercial	Direct Reporting	Count
Sport Charter (MI side only)	Direct Reporting	Count

Commercial, nonsport gear subsistence, and Michigan sport charter reporting

Quantification of commercial, nonsport gear subsistence extractions, and Michigan sport charter harvest was left to the various licensing and permitting agencies or governmental entities. It was expected that they would follow their customary report collection procedures for the same time period in question. Number of fish by species was the preferred format for reporting, however, some reporting protocols allowed the reporting of yield (total weight) instead of numbers by species. In these instances, an averaged weight for the same species derived from the creel survey interview data was used to extrapolate the numbers of that species taken. While not ideal, the approach does allow an estimate of total harvest by numbers of all fisheries combined.

Sport and sport gear subsistence harvest estimation

Because there was no direct reporting, quantification of extractions by the sport fishery and the subsistence fishery using sport gears was more problematic than that of the other fisheries. The creel survey followed the basic design used in the past by the MDNR for the St. Marys River. This was a stratified design using simple random sampling within strata. Strata included location (7 different river reaches or sites; Figure 1), weekday versus weekends (including holidays), and mode of fishing. Previous surveys have shown that sport fisheries will often differ in their catch or in the amount of pressure according to these strata. Catch and effort estimates were generated for

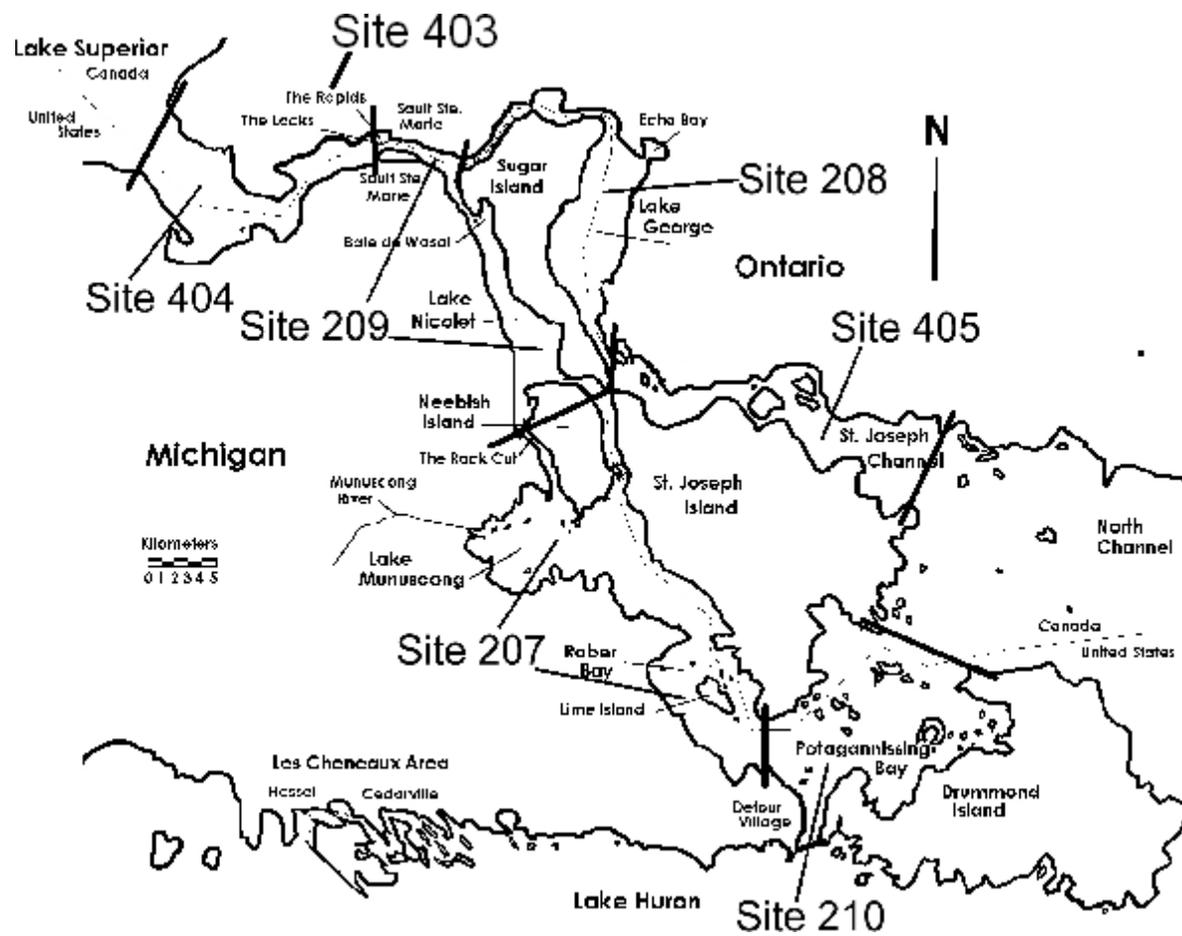


Figure 1. St. Marys River with creel survey sites.

each strata and then combined to give monthly and seasonal figures. Both weekend days and three randomly selected weekdays were selected for each week for sampling. The entire angling day from dawn to 1 hour past dusk was covered. This was accomplished by breaking each day into two 8-hour work shifts, then randomly selecting the actual shift to be worked by a creel clerk. Some clerks were responsible for sampling more than one area. In those instances, the area was randomly selected for each day.

Two types of data were collected for each area sampled: angler party interviews of harvest rates and angler (or boat) counts for effort. An angler party is defined as one or more anglers who fished together. Angler parties were interviewed by creel clerks at the completion of their fishing trip at boat ramps, marinas, piers, resorts, and along the shoreline. Anglers were queried as to their mode of fishing (i.e. boat, shore, wading, pier, open ice, or shanty ice), where they fished, how long they fished, what they fished for, the numbers by species they kept, and the number of fishing trips they made or intended to make that day. Additional data were collected on each angler in the party such as age, sex, zip code or county of residence, nationality, license type (i.e. Michigan sport, Ontario sport, or Tribal / First Nation member), and types of angling methods used (i.e. casting, still fishing, trolling, jigging, tip-up, spearing, etc.). Data was also recorded on number of lines fished. The creel clerks recorded these data on a computerized angler interview form. Interviews were not taken from tribal subsistence gill netters, commercial fishers, or charter boat operators, as they are inventoried by other means. Clerks were permitted to roam within their randomly selected survey site (river reach) to pursue interview opportunities. Clerks were instructed to randomly select fishing parties to interview.

Biological data was also collected from walleye, yellow perch, smallmouth bass, northern pike, lake herring, and all other salmonids in the catch when possible. Data collected included total length, weight, and scales for aging. Creel clerks were instructed to randomly obtain a minimum of 25 data records per month per river reach (site) for each species theoretically yielding a total of 175 records per month by species, river wide.

Instantaneous counts were made to quantify fishing effort. These counts were made from airplanes. Five flights were made each week at randomly selected starting times - one on each weekend day and one on each of three randomly selected weekdays. Flights alternated their flight path between upstream and down stream. Pilots recorded all effort counts on computerized forms.

Standard mathematical formulas for creel survey (Ryckman 1981) were used to generate all estimates. Three measures of fishing effort were made; angler hours, angler trips, and angler days. An angler trip is composed of one or more fishing excursions during a 24-hour period. All effort estimates were derived as the product of boats fishing (from counts and proportion vs. boats not fishing obtained from interviews) and length of a completed trip (from interviews). Means were used to derive estimates within strata including days not surveyed (extrapolation). Error bounds for all catch and effort estimates were defined as two standard errors of the mean (2 times the square root of the variance, divided by the number of observations for an estimate) and approximate true 70-95% confidence limits, depending on sample size. Error bounds for all mean length, weight, and age data were 95% confidence limits. Statistical significance in the analysis comparing estimates to previous surveys was based on two standard error limits.

A total of at least six creel clerks were employed full time during May through October for conducting interviews. Two creel clerks were employed during January through March for conducting interviews for the ice fishery creel survey. All clerks were given on-site training by permanent agency personnel at the beginning and reviewed throughout the field season. Survey

data analysis software performed range checks on various data fields for each count and interview from the scanned data forms to minimize any erroneous data entry.

Results

Creel Survey

Between May 1, and October 31, 1999, a total of 3,081 interviews were conducted with anglers across the seven study sites. The various interview and pressure counts combined to estimate that a total of 555,044 hours (2SEM 42,718) of angling effort with sport gears took place (Table 2). Clerk availability problems forced the omission of the month of June from the creel survey portion for the St. Marys River rapids (Site 403). More than 19 species of fish were represented in the sport catch in this time period (May – October). Survey statistics by site appear in Appendix 1.

Analysis of a subsample of 2,500 interviews indicated that 62% of the interviewees reported fishing under the authority of a MDNR issued fishing license, 31% reported fishing under the authority of an OMNR issued fishing license, Ontario First Nations and Michigan Tribes each accounted for 1% of the interviews, and 4% were of unknown origin.

Interview effort, however was not uniform between the two sides of the international boundary with three clerks on the Michigan side and two clerks operating on the Ontario side. Assuming equal work effort among clerks, the proportions of interview by license type would be corrected to; 47.2% MDNR, 46.5% OMNR, 1.5% Michigan Tribes, 0.8% Ontario First Nations, and 4% unknown.

Table 2. 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 sites and all modes (non-charter) of sportfishing including subsistence fishing with sport gears, 1999. Two standard errors of the mean in parentheses.

Species	Harvest per hour	Month						Season
		May	Jun	Jul	Aug	Sep	Oct	
Pink salmon	0.0037 (0.0043)	0 (0)	0 (0)	0 (0)	818 (1,574)	1,246 (1,760)	9 (56)	2,073 (2,361)
Coho salmon	0.0007 (0.0017)	19 (62)	11 (53)	0 (0)	0 (0)	342 (940)	9 (31)	381 (944)
Chinook salmon	0.0112 (0.0086)	0 (0)	0 (0)	594 (3,314)	2,355 (2,103)	2,940 (2,651)	360 (634)	6,249 (4,778)
Rainbow trout	0.0007 (0.0009)	142 (267)	108 (219)	55 (164)	0 (0)	64 (308)	11 (38)	380 (492)
Atlantic salmon	0.0009 (0.0026)	0 (0)	21 (78)	399 (1,367)	0 (0)	86 (418)	3 (15)	509 (1,432)
Lake trout	0.0000 (0.0000)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	1 (2)
Northern pike	0.0097 (0.0093)	1,017 (1,148)	1,038 (1,271)	1,770 (4,363)	1,165 (1,923)	418 (1,031)	0 (0)	5,408 (5,170)
Muskellunge	0.0001 (0.0004)	0 (0)	0 (0)	34 (234)	0 (0)	0 (0)	0 (0)	34 (234)

Channel catfish	0.0002	37	0	0	72	0	0	109
	(0.0008)	(186)	(0)	(0)	(430)	(0)	(0)	(468)
Rock bass	0.0001	67	3	0	0	0	0	70
	(0.0003)	(191)	(11)	(0)	(0)	(0)	(0)	(191)
Pumpkinseed	0.0003	0	0	97	24	40	0	161
	(0.0011)	(0)	(0)	(559)	(157)	(215)	(0)	(619)
Bluegill	0.0002	0	0	107	0	0	0	107
	(0.0012)	(0)	(0)	(657)	(0)	(0)	(0)	(657)
Smallmouth bass	0.0021	88	412	80	143	465	0	1,188
	(0.0032)	(303)	(900)	(431)	(606)	(1,332)	(0)	(1,797)
Largemouth bass	0.0002	0	0	107	0	7	0	114
	(0.0012)	(0)	(0)	(677)	(0)	(14)	(0)	(678)
Yellow perch	0.1126	3,082	1,740	806	10,078	42,156	4,784	62,646
	(0.0586)	(5,206)	(3,083)	(1,834)	(17,731)	(25,553)	(5,858)	(32,274)
Walleye	0.0178	1,599	806	3,620	3,198	648	19	9,890
	(0.0149)	(1,840)	(1,331)	(6,274)	(4,653)	(1,406)	(91)	(8,255)
Lake herring	0.0562	0	8,156	23,101	0	0	1	31,258
	(0.0721)	(0)	(12,171)	(38,145)	(0)	(0)	(3)	(40,040)
Lake whitefish	0.0355	4,249	10,835	4,312	164	89	120	19,769
	(0.0273)	(5,829)	(11,356)	(8,088)	(664)	(539)	(372)	(15,140)
Round whitefish	0.0009	116	372	0	0	1	27	516
	(0.0028)	(465)	(1,456)	(0)	(0)	(2)	(173)	(1,539)
Other	0.0020	740	45	278	46	15	0	1,124
	(0.0063)	(3,243)	(194)	(1,350)	(253)	(63)	(0)	(3,528)

Pressure parameter	May	Jun	Jul	Aug	Sep	Oct	Season
Angler hours	57,316	83,298	158,684	133,139	103,741	20,221	556,399
	(15,340)	(13,522)	(27,114)	(19,567)	(16,187)	(5,944)	(42,820)
Angler trips	14,035	21,251	39,715	31,644	24,571	5,997	137,213
	(3,962)	(3,731)	(7,120)	(5,023)	(4,063)	(1,968)	(11,222)
Angler days	10,803	17,409	35,446	26,996	22,017	5,664	118,335
	(2,712)	(2,932)	(6,537)	(4,290)	(3,708)	(1,843)	(9,707)

The sport ice fishery and winter subsistence fishery using sport gears harvested seven species and amounted to 59,569 angler hours (2SEM 8,191) (Table 3). Appendix 2 presents the winter survey results by site.

Table 3. Estimated harvest per hour, number harvested, and effort (angler hours, trips, and days) for the winter ice fishery at various locations (sites 207, 208, 404, and 405 combined) on the St. Mary's River, 2000. Two standard errors of the mean in parentheses.

Species	Harvest per hour	Month			Season
		Jan	Feb	Mar	
Rainbow trout	0.0004 (0.0005)	0 (0)	23 (28)	0 (0)	23 (28)
Brown trout	0.0004 (0.0006)	26 (34)	0 (0)	0 (0)	26 (34)
Northern pike	0.0141 (0.0068)	265 (131)	524 (360)	53 (42)	842 (385)
Yellow perch	0.2107 (0.0552)	4,197 (1,394)	3,398 (1,118)	4,959 (2,155)	12,554 (2,799)
Walleye	0.0211 (0.0101)	382 (200)	873 (542)	0 (0)	1,255 (578)
Lake whitefish	0.0359 (0.0171)	1,587 (956)	554 (193)	0 (0)	2,141 (975)
Round whitefish	0.0266 (0.0158)	1,059 (891)	526 (203)	0 (0)	1,585 (914)
Angler hours		19,788 (4,307)	34,291 (6,894)	5,490 (1,007)	59,569 (8,191)
Angler trips		4,728 (1,165)	8,052 (1,831)	865 (241)	13,645 (2,184)
Angler days		4,676 (1,164)	7,919 (1,817)	865 (241)	13,460 (2,171)

Charter sport fishing (Michigan side only)

There were no Michigan charter based sport fishing activities in the St. Marys River in 1999/2000.

Commercial fish harvest

Commercial harvest by licensed Ontario commercial fishers was conducted east of St. Joseph Island. The western boundary for this activity extends just within Potagannissing Bay (Figure 1). Commercial fishers target lake whitefish in the open waters of the North Channel of Lake Huron. In early summer walleye are taken by gillnets set in shallow waters along the North Channel's western commercial fishing zone boundary with the St. Marys River. In 1999 targeted species harvested and reported included lake herring, lake whitefish, and walleye. Twelve incidental species were also reported. The most significant of these was common sucker (Table 4). Winter commercial harvest was limited to lake whitefish and lake trout (Table 5).

Table 4: Commercial harvest and effort in the 1999 open water fishing season from Ontario waters immediately east of St. Joseph Island. (The effort indicated by species, is effort expended in which those species were caught.)

Species	Harvest (Kg)	gillnet effort (m)
Burbot	30.8	30,358
Chinook salmon	13.6	15,911
Common carp	4.5	6,401
Gizzard shad	38.1	34,747
Lake herring	537.0	180,045
Lake sturgeon	19.0	10,516
Lake trout	37.2	69,220
Lake whitefish	16,641.4	239,116
Northern pike	10.9	23,774
Pink salmon	7.2	19,202
Rainbow smelt	8.2	41,422
Rainbow trout	2.7	4,572
Round whitefish	10.4	21,580
Suckers	5,191.4	195,316
Walleye	2,557.4	64,008
White bass	1.4	4,115

Table 5: Commercial harvest of fish from the nearest locations in the North Channel of Lake Huron to the St. Marys River outlet and St. Joseph Island between January 1, 2000 and March 31, 2000. Fishing occurred several kilometers east of St. Joseph Island.

Species	Harvest (Kg)	gillnet effort (m)
Lake whitefish	3036.5	unknown
Lake trout	98.9	unknown

The commercial ice fishery is dependent upon good ice conditions and generally does not start until late January, lasting as long as ice conditions permit. In 2000, fishing under the ice with gill nets did not occur in close proximity to the St. Marys River outlets. Commercial fishers were targeting lake whitefish in the more open waters of the North Channel. Commercial ice fishing in Whitefish Bay of Lake Superior below Gros Cap (upper boundary for St. Marys River) did not occur due to poor ice conditions.

Subsistence fish harvest using nonsport gears

First Nations in Ontario have varying ability and interest in collecting subsistence harvest information from members. Compliance is easier to achieve with members living on reserve. The reported subsistence harvest was associated with an early spring walleye food fishery. Other species were incidental to this effort.

Table 6: Subsistence gill net harvest by First Nations in 1999.

Species	Number
Walleye	184
Northern pike	27
Muskellunge	1
Carp	53
Bowfin	6

There is limited information available on Ontario First Nation subsistence fishing but it is generally believed to vary by group. Batchawana First Nation subsistence harvest is considered negligible by comparison to Ontario sport fishing harvest. Garden River First Nation is thought to be somewhat greater than Batchawana First Nation harvest but is also thought to be negligible compared to other fisheries in the St. Marys River (OMNR unpublished data). Garden River First Nation fisheries often focus on walleye from February through late April in Lake George. Typical gear used in that fishery is 102mm and 114mm stretch measure gill net mesh. Subsistence harvest by CORA member tribes using nonsport gears harvested 283.2 kg representing 9 different species in 1999 (Table 7). The gear used in that fishery is large and small mesh gill nets.

Table 7. Subsistence harvest in round pounds as reported by CORA subsistence fishers using nonsport gears in the St. Marys River, 1999.

Area	Whitefish	Walleye	Lake herring	Yellow perch	Suckers	Northern pike	Carp	Coho salmon	Pink salmon
Barbeau	---	1.4	---	---	3.2	---	---	---	---
Brassar Point	---	---	---	---	4.5	11.3	---	---	---
Drummond Island (north shore)	---	5.9	---	---	1.8	---	29.0	---	1.4
Sault Ste. Marie	6.4	19.0	---	---	---	---	---	---	---
North Shore	---	---	---	---	4.5	9.1	---	---	---
N. end of Sugar Island	---	3.6	---	---	0.9	---	4.5	---	---
Upper St. Marys	13.2	39.9	4.5	5.4	36.2	---	---	---	---
St. Marys (general)	19.5	9.5	8.2	3.2	18.1	14.1	4.5	0.4	---
Total	39.1	79.3	12.7	8.6	69.2	34.5	38.0	0.4	1.4

Biological summary of the sport catch

Biological information was collected on a total of 1,428 fish from 15 different species from May 1999 through March 2000. Data were collected on 1,228 fish from 15 species from May 1 to October 31 during the open water fishery (Table 8) and 200 fish from 6 species from January 1 to March 31 during the sport ice and winter subsistence fishery (Table 9).

Walleye harvest from the sport and sport-gear subsistence fisheries spanned 12 year classes ranging from age 2 through 15 during the open water season (Figure 2). Age-5 yellow perch were the most common in the harvest for the same time period. Age frequency from the harvest for additional species is depicted in Figure 2. Yellow perch, northern pike, and walleye harvest exhibited similar age structures in the winter sport and sport-gear subsistence fisheries (Figure 3). Length and age composition tables for select species are presented in Appendix 3. Appendix 4 presents length frequencies from the sport and sport-gear subsistence fisheries.

Angling target species, method, mode, and party size

Anglers interviewed for the open water sport fishery reported targeting a large variety of species (Table 10). The single largest proportion was tied between walleye (14%) and chinook salmon (14%). Other commonly sought species included lake whitefish (10%), a generic “salmon and trout” reply (9%), northern pike (7%), a generic “salmon and lake trout” reply (7%), and yellow perch (7%) (Table 10). Of those respondents that specified a target species (other than “any”), coldwater salmon and trout species accounted for 48% and coolwater species for the remainder.

Species targeted by the open water sport anglers varied by river reach with the biggest divergence coming between anglers fishing the rapids and those fishing all other reaches (Table 10). As expected, anglers fishing the rapids reported a higher frequency of targeting salmon and trout species than other river reaches. Similarly, target species for the rapids evolved over the open water season probably reflecting the seasonal usage of the area by migrating and spawning fishes (Table 11). There was a notable disparity between anglers fishing under an Ontario license and those fishing under a Michigan license for the river reaches outside the rapids. Of the Ontario anglers reporting a target (other than any species), 79% indicated trout and salmon species compared to just 24% for the same group in Michigan (Table 12).

Table 8. Summary of biological data collected from the St. Marys River during the open water sport fishery and tribal subsistence fishery using sport gears from May 1 to October 31, 1999. N = sample size and appears in parentheses if different than reported.

Species	N	Mean Age	Mean Len (cm)	Mean Wt (g)	Total Wt (g)
Atlantic salmon	15	3.2 (14)	73.0	4,810.0	72149.5
Chinook salmon	214	3.0 (205)	84.0	6,697.7 (206)	1,379,724.6 (206)
Coho salmon	18	2.7 (16)	60.2	2,694.1	48,493.3
Lake trout	1	3.0	54.0	1,750.0	1,750.0
Lake herring	138	4.2	33.8	539.5 (110)	59,348.6 (110)
Lake whitefish	157	4.6 (154)	41.5	614.2 (156)	95,807.5 (156)
Northern pike	88	4.6 (87)	66.8 (87)	1,852.0 (87)	161,121.0 (87)
Pink salmon	82	2.0 (56)	52.1	1,398.4 (77)	107,679.6 (77)
Pink X chinook	8	2.3	68.2	3,116.0	24,928.2
Rainbow trout	29	2.5 (28)	50.3	1,594.5 (28)	446,44.6 (28)
Rock bass	4	6.3	19.4	150.0	600.0
Round whitefish	1	5.0	43.2	619.4	619.4
Smallmouth bass	10	6.3	36.5	809.0	8,090.2
Walleye	205	5.4 (203)	47.1	1,041.8	213,573.6
Yellow perch	258	5.5 (255)	21.9 (257)	150.6 (250)	37,660.8 (250)
Total	1228				

Table 9. Summary of biological data collected from the St. Marys River during the winter ice sport fishery and tribal subsistence fishery using sport gears from January 1 to March 31, 2000.

Species	N	Mean Age	Mean Len (cm)	Mean Wt (g)
Lake whitefish	56	5.5	37.0	476.5
Northern pike	21	4.3	56.9	1,231.2
Rainbow trout	6	3.5	68.8	3,150.0
Round whitefish	35	4.8	29.8	214.8
Walleye	12	7.4	52.5	1,665.1
Yellow perch	70	5.3	21.1	196.8
Total	200			

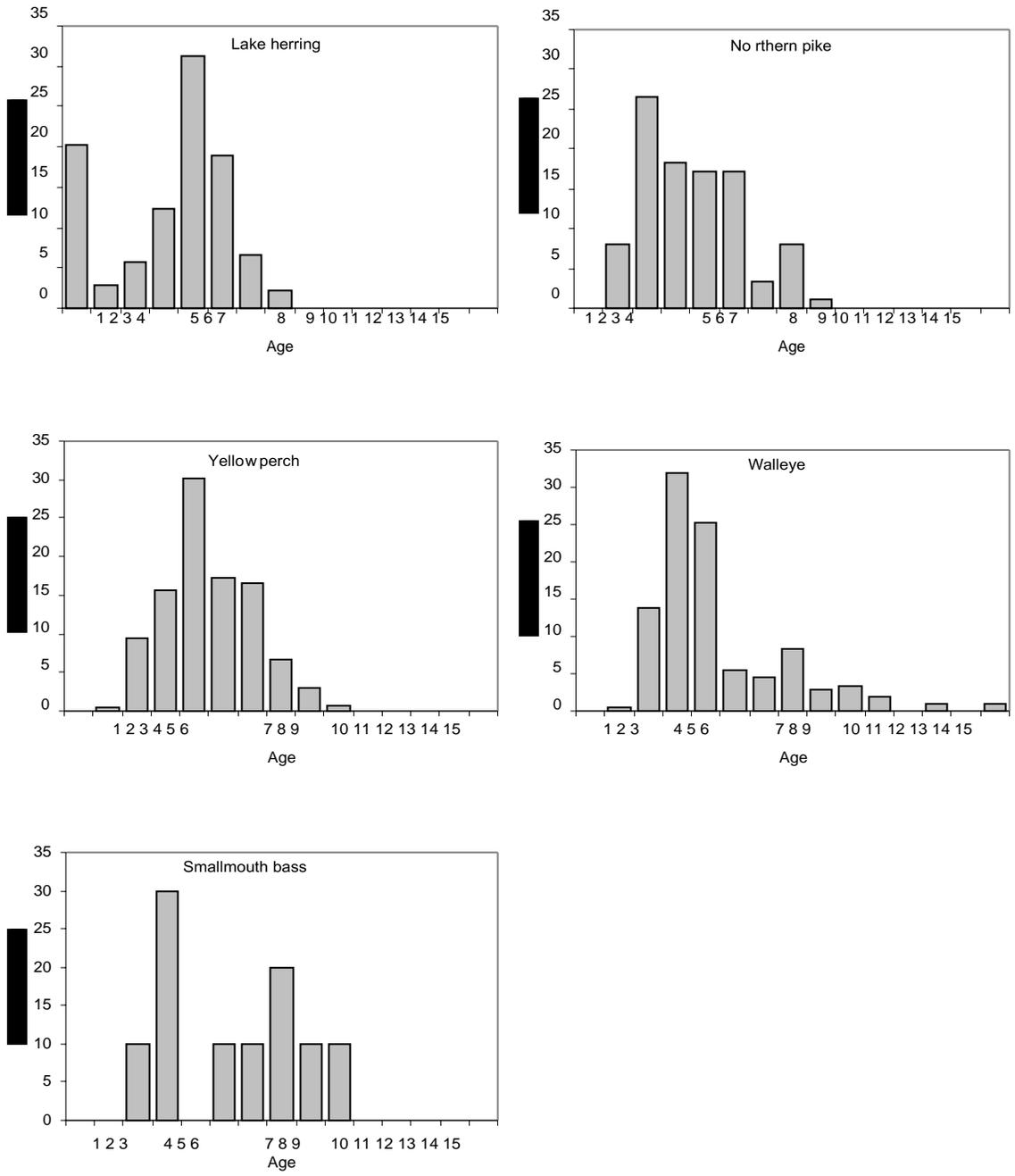


Figure 2. Age (years) composition of primary species harvested from the St. Marys River sport and sport-gear subsistence fisheries from May to October, 1999.

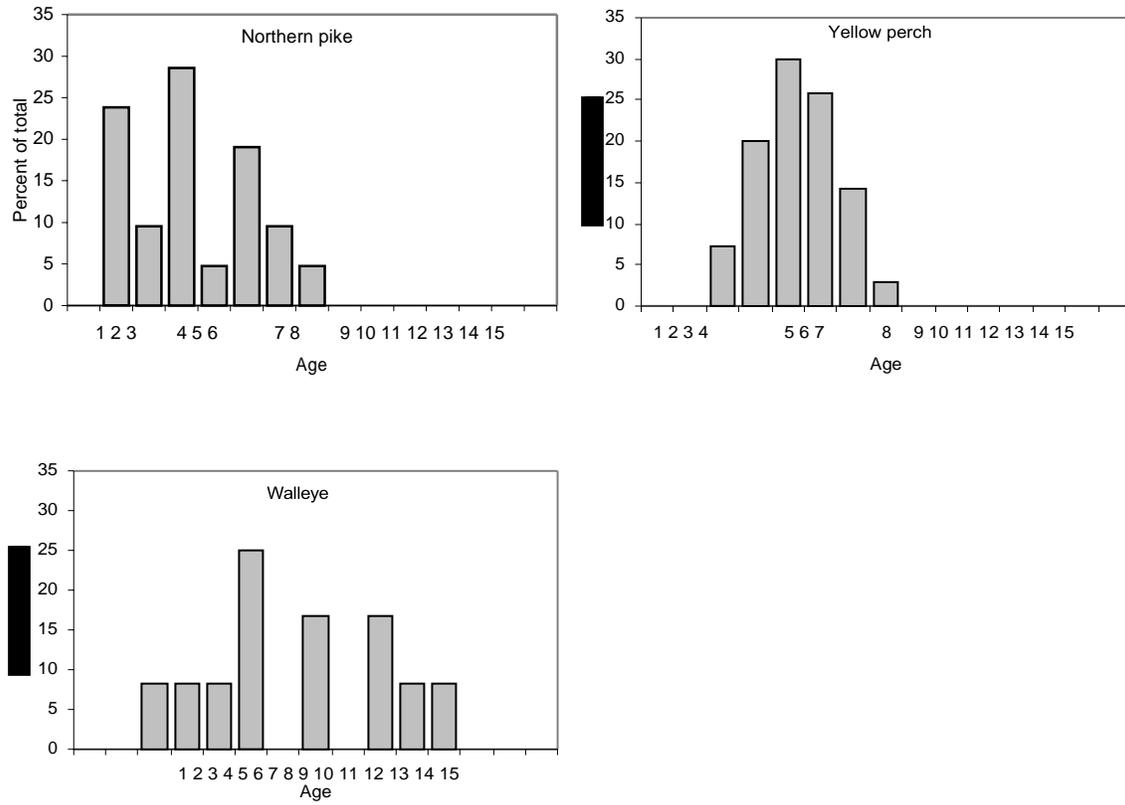


Figure 3. Age (years) composition of primary species harvested from the St. Marys River sport and sport-gear subsistence fisheries from January to March, 2000.

Table 10. Percent of angling parties in the St. Marys River open water (May – Oct.) sport fishery and subsistence fishery using sport gears, reporting target species, by location as reported during angler interviews. N denotes number of respondents.

Species	Location							
	Above locks (404)	Rapids (403)	Lake Nicolet (209)	Lake George (208)	Munuscong Bay (207)	St. Joseph Ch. (405)	Potagannissing Bay (210)	River wide (total)
Any	21.3	10.7	6.4	10.4	3.3	39.8	5.7	9.2
Atlantic salmon		15.5	4.0	0.3		1.1	0.9	3.4
Chinook salmon		16.7	15.0	42.9	2.0	3.4	2.1	14.2
Coho salmon		0.4	0.4					0.2
Lake herring			2.1	0.3	15.0		10.5	4.0
Lake whitefish	40.6	6.0	14.3	0.3				9.6
Muskellunge					1.7			0.2
Northern pike	8.3		2.0	16.7	9.0	30.7	13.2	7.5
Pan fish	0.5		0.1					0.1
Pink salmon	1.0	24.6	7.7	0.3				5.7
Rainbow trout		23.4	4.2	0.6				4.1
Salmon & Lake Trout	0.5	1.6	11.8	15.8	0.7		0.3	7.4
Salmon & Trout			19.3	4.0	0.7			8.7
Smallmouth bass	1.0	0.4		2.3	2.3	4.5	3.6	1.3
Trout	3.1		0.5					0.4
Walleye	10.9		10.5	2.9	40.8	12.5	26.6	14.1
Walleye & Perch		0.4	0.5	0.6	12.0		8.4	2.8
Yellow perch	12.5	0.4	1.2	2.6	12.4	8.0	28.7	7.2
N	192	252	1,085	347	299	88	334	2,597

Table 11. Percent of angler parties reporting species targeted in the St. Marys River rapids sport fishery (Site 403) by month in 1999. N denotes sample size. No June data available.

Species	Month				
	May	July	August	September	October
Any	5.9	14.6	12.3	9.8	11.4
Atlantic salmon		47.9	28.1		
Chinook salmon		8.3	26.3	6.6	54.3
Coho salmon					2.9
Lake whitefish	3.9	27.1			
Pink salmon			28.1	75.4	
Rainbow trout	84.3	2.1		6.6	31.4
Salmon & Lake Trout			5.3	1.6	
Smallmouth bass	2.0				
Walleye & Perch	2.0				
Yellow perch	2.0				
N	51	48	57	61	35

Table 12. Percent of anglers reporting species targeted in the open water sport fishery of the St. Marys River 1999, by licensed location, omitting the rapids anglers (Site 403). N denotes sample size.

Species	Location	
	Michigan	Ontario
Any	8.8	9.3
Atlantic Salmon	1.0	3.9
Chinook Salmon	5.3	29.3
Coho Salmon	0.1	0.4
Lake Herring	6.2	1.3
Lake Whitefish	15.0	1.2
Muskellunge	0.3	
Northern Pike	10.2	4.8
Pan fish	0.1	
Pink Salmon	2.7	5.5
Rainbow Trout	0.1	5.5
Salmon & Lake Trout	12.4	0.2
Salmon & Trout	0.3	26.0
Smallmouth Bass	0.5	1.2
Trout	0.4	0.6
Walleye	20.8	6.4
Walleye & Perch	3.6	2.0
Yellow Perch	11.2	2.2
N	1,496	849

Fishing mode and method also varied by river reach during the open water fishery. River wide, the majority of anglers fished from boats and the most common method was stationary fishing with trolling second (Appendix 5). As expected, mode and methods were very different for the rapids fishery where casting and fly fishing from shore (probably wading) comprised the vast majority of effort (Appendix 5). Open water sport fishery party size ranged from a low of 1 to a high of 9 with a two person party being most common (Appendix 6). The vast majority of parties interviewed reported making only a single fishing trip during their day.

Discussion

The collective fishing pressure exerted in the St. Marys River in 1999 was substantial. Fishing pressure from May through October was 36% as much as all of the sport fishing pressure exerted in the Michigan waters of Lake Huron for the same time period (Michigan DNR, unpublished data). This proportion continues an increasing trend in popularity as a fishing destination compared to values reported for 1987 at 19% (Rakoczy and Rogers 1988), and 1991 at 26% (Rakoczy 1992).

Despite the increasing proportion of overall Lake Huron fishing pressure, the 1999 open water sport and sport-gear subsistence fishing pressure was not as large as the 1987 fishery (556,399 hours versus 752,238 hours respectively). That year (1987) was a high year of fishing pressure across Michigan. The 1999 St. Marys River fishing pressure was very similar to the 1992 amount (596,493 hours). The fishing pressure in the Rapids area in 1999 was not as great as that reported by Dupont (1985) for the 1985 fishery (14,330 hours versus 81,540 hours) although the areas

defined as the Rapids were not exactly the same between two surveys and June was unsurveyed in 1999.

Angling pressure in the St. Marys River in 1999 open water fishery was substantial when expressed in terms of pressure per area at 8.09 angler hours per hectare of surface area. Fishing pressure expressed by area places the 1999 open water St. Marys River fishery third in ranking when compared to other notable coolwater fisheries in the Michigan waters of the Great Lakes that were surveyed that year (Figure 4).

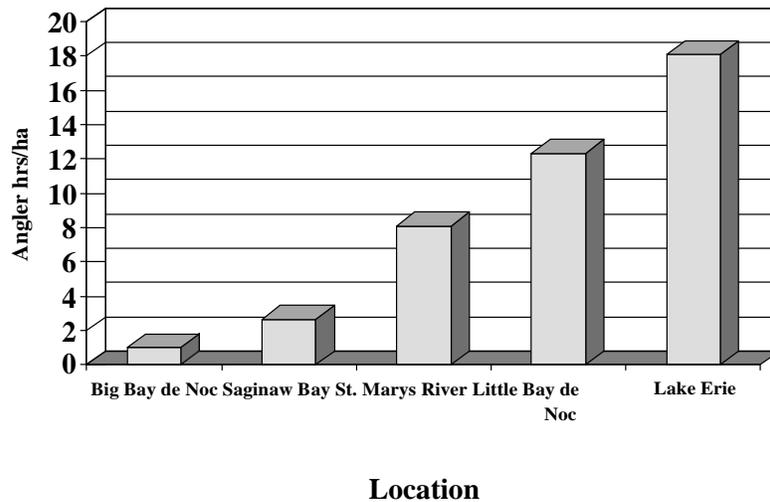


Figure 4. May through October, 1999, angler fishing pressure(hours) per hectare of surface area for the Michigan waters of five notable coolwater fisheries.

Clearly, the vast majority (98%) of angling pressure is a result of state and provincial licensed anglers. The amount of harvest that can be apportioned among user groups in 1999/2000 is more elusive. Harvest from Tribal and First Nation subsistence fishers using sport gears for example can not be isolated or independently estimated from this data. Given the lack of length and creel limits, it is likely that their harvest rate is greater than other anglers. It is probable, though, that with their small overall proportion of the angling population (~2%) that their resulting proportion of the harvest is very small relative to the other angler groups. Because the adjusted proportion of anglers fishing under Michigan and Ontario licenses is so similar (47.2% vs. 46.5% respectively), it is very probable that both licensing authorities account for about the same proportion of the harvest during the open water fishing season.

Estimating proportions of effort and harvest during the winter ice fishery was less certain as the entire river was not covered. The four areas that were covered were thought to comprise the majority of winter fishing in the river system. The Munuscong site accounted for 66% of the winter fishing pressure and was likely a blend of Michigan licensed anglers and Tribal subsistence anglers using sport gears (Appendix 2, table 1). The Lake George and St. Joseph Channel pressure estimates are entirely Ontario fishing pressure and amounted to 15% of the winter total (Appendix 2, tables 2 & 4). That fishing pressure also could represent a mix of Provincial licensed anglers and First Nation subsistence anglers using sport gears. The reach of the St. Marys above the locks amounted to a significant proportion of winter fishing pressure at 19% of the total (Appendix 2, table 3). Based on these estimates, the Michigan side accounted for 85% of the winter fishing pressure as estimated in 2000.

The Ontario permitted commercial fishery may exploit some of the same stocks of fishes as the other St. Marys River fisheries even though they operate in an area designated by OMNR to be in the North Channel. Some walleyes tagged in the Munuscong River, for example, have been harvested by the Ontario commercial gillnet fishery (OMNR, unpublished data). The commercial fishery often targets walleyes in the Seine Islands area of northern Potagannissing Bay in the spring. Because the commercial landings are reported in kilograms and the sport fishery harvest is estimated in individual fish, it is difficult to compare the two. The mean weight of walleye harvested by anglers in the open water fishery in the St. Marys River was 0.8 kg. Using this value, the commercial landing in 1999 of 2,557.4 kg (Table 4) equates to 3,170 walleye. This is 28% as much as all the sport gear harvest for all the St. Marys River, year-round (Tables 2 & 3). Using the same approach, the CORA permitted subsistence take of walleye in 1999 (Table 7) would equate to 98 fish. First Nation walleye take was conservatively reported to be 184 (Table 6). Collectively Michigan and Ontario aboriginal fishers using nonsport gears harvested an estimated 2.5% as much walleye as the fisheries using sport gears year-round. That same amount equates to 8.9% as much as the Ontario permitted commercial gillnet fishery.

The assemblage of the harvest taken by all species reflects the fish community composition of the St. Marys and the preferences of anglers. By number, the top species harvested in the open water sport gear fishery were yellow perch (1st), lake herring (2nd), lake whitefish (3rd), walleye (4th), chinook salmon (5th), and then northern pike (6th) (Table 2). The CORA permitted subsistence fishery with gillnets had a different ranking of harvest that included some rough-fish species; walleye (1st), suckers (2nd), lake whitefish (3rd), carp (4th), northern pike (5th), and then lake herring (6th) (Table 7). The Ontario permitted gillnet commercial fishery had some commonality with the others but still differed; lake whitefish (1st), suckers (2nd), walleye (3rd), lake herring (4th), gizzard shad (5th), and then lake trout (6th) (Table 4).

Fishing pressure has remained strong in the St. Marys River compared to the neighboring Les Cheneaux Islands where fishing pressure, yellow perch harvest, and perch harvest rate collapsed after a 15 year decline in 2000 (Michigan DNR, Unpublished data). The exact causes of the Les Cheneaux collapse are not known and are under investigation. Whatever forces are at work in the Les Cheneaux Islands area, are apparently not affecting the St. Marys River fish community or fishery, or at least not to the same extent.

The walleye harvest and corresponding harvest rate in the open water sport fishery in 1999 represented a large decline compared to the estimated values in 1987 and 1991, which were very similar (Table 13). The drop in harvest rate in 1999 suggests a genuine decline in fishing quality. The ice fishery in 1999 also represented a decline from the value reported in 1988 (Rakoczy and Rogers 1988). The 1938 sport walleye harvest was much smaller due to less fishing pressure but the harvest rate was virtually identical to that reported in 1987 and 1991. Thus, in terms of walleye

harvest rate, the 1999 sport fishery represents the lowest level recorded since 1938. Walleye tied with chinook salmon as the most sought after species in the 1999 open water fishery (Table 10).

The majority of female walleye in the St. Marys River are reported to not reach sexual maturity until age 4 (Fielder and Waybrant 1998). Yet biological data collected from the 1999 open water fishery indicate that age 4 is the most commonly harvested age of walleye that year, with some age 3 and age 2 fish taken as well (Figure 2). Michigan licensed anglers must abide by a 381 mm minimum length limit which may expose walleye as young as age 2 to harvest (Appendix 3; table 1). Insufficient biological data was collected on the Ontario side in 1999 to fully determine at what age and size they recruit to the open water sport fishery. Fielder and Waybrant (1998) reported walleye total annual mortality to be high in the St. Marys River in 1995. This fish harvest information by its self cannot determine if walleye are being over harvested. A careful review of recruitment to the fishery by age, sexual maturity, and a review of harvest regulations is needed. Up-to-date walleye population assessment is needed to facilitate this process. That information coupled with the findings of this work should be used to craft uniform walleye harvest regulations for both Ontario and Michigan waters. Border water regulations should be designed to address common management objectives including target total annual mortality levels.

Lake herring are common in the St. Marys River and one of the few places they still can be found inhabiting Michigan waters outside of Lake Superior. Lake herring both spawn in the river (Fielder 2000) and provide for a fishery. The sport fishery primarily exploits lake herring in June and July when they are vulnerable as a result of feeding on emergent mayflies. At that time, many anglers target lake herring especially in Munuscong Bay and Potagannissing Bay (Table 10). The lake herring harvest of 1999 was about twice the value reported by the 1991 survey. The 1991 survey, however, only included interview data from the Michigan fishery where anglers were subject to a 12 lake herring creel limit. There was no creel limit for lake herring on the Ontario sport fishery in 1999 and possibly a higher harvest rate by Ontario anglers accounts for the increased estimate in 1999. Both estimates are much less than the 1987 estimate of 141,386. Since the 1999 survey, lake herring harvest has grown substantially (Table 13). The high harvest of 1987 and observations of wanton waste on the Michigan side prompted the establishment of the 12 lake herring creel limit. The presence of a Michigan creel limit may partially account for the lower lake herring harvest in 1991 and 1999. No lake herring creel limit was in place on the Ontario side. It is suspected that some Michigan anglers are fishing under an Ontario license at this time to by-pass the lower creel limit. Fielder and Waybrant (1998) reported lake herring to exhibit an intermediate total annual mortality rate. Needed is updated lake herring population information including new estimates of total annual mortality rate. Likely, reasons for continued regulation of this fishery via creel limits will be driven over concerns of wanton waste when the fish are very vulnerable in the summer fishery. Needed are common management objectives among all the SMRFTG agencies and more uniform sport harvest regulations.

Northern Pike harvest and harvest rate declined in 1999 compared to estimates generated from the previous surveys (Table 13). Northern pike are popular with St. Marys River sport anglers (Table 10), especially in the St. Joseph Channel. Fielder and Waybrant (1998) reported northern pike abundance to be stable. When coupled with more recent data (Table 13). It appears that the northern pike harvest is also stable although at a level lower than reported for the late 1980s and early 1990s. Anglers fishing under a Michigan license were subject to a 610 mm minimum length limit.

Yellow perch harvest and harvest rate has been reasonably constant across years surveyed with the exception of higher 1987 levels. Yellow perch were a common target species by sport anglers especially in Potagannissing Bay (Table 10). Total annual mortality of yellow perch in 1995 was

Table 13. Harvest and harvest rates (in parentheses) for select species from open water sport fisheries in the St. Marys River (including Potagannissing Bay) 1938 to 2001.

Species	Year					
	1938 ¹	1987 ²	1991 ³	1999 ⁴	2000 ⁵	2001 ⁶
Walleye	102 (0.05)	25,602 (0.0340)	26,435 (0.0443)	9,890 (0.0178)	8,973 (0.0258)	23,847 (0.0556)
Northern Pike	184 (0.09)	20,965 (0.0279)	26,116 (0.0438)	5,408 (0.0097)	5,453 (0.1566)	6,170 (0.0144)
Lake Herring	289 (0.15)	141,386 (0.1880)	14,528 (0.0244)	31,258 (0.0562)	103,145 (0.2963)	122,925 (0.2547)
Yellow Perch	2,465 (1.25)	316,436 (0.4207)	91,019 (0.1526)	62,646 (0.1126)	63,869 (0.1835)	68,199 (0.1591)
Smallmouth Bass	3 (0.002)	2,779 (0.0036)	9,497 (0.0159)	1,188 (0.0021)	2,421 (0.0069)	3,017 (0.0070)
Rock Bass	166 (0.08)	13,708 (0.0182)	19,718 (0.0311)	70 (0.0001)	91 (0.0003)	0 (0.0000)
Lake Whitefish	16 (0.008)	25,187 (0.0335)	204 (0.0003)	19,769 (0.0355)	2,315 (0.0066)	4,038 (0.0094)
Pink Salmon	0 (0.00)	5,699 (0.0076)	17,573 (0.0295)	2,073 (0.0037)	1,486 (0.0043)	4,132 (0.0096)
Chinook Salmon	0 (0.00)	4,662 (0.0062)	469 (0.0008)	6,249 (0.0112)	4,298 (0.0123)	4,988 (0.0116)
Rainbow Trout	13 (0.007)	1,990 (0.0026)	192 (0.0003)	380 (0.0007)	31 (<0.0001)	57 (0.0001)
Atlantic Salmon	0 (0.00)	6 (<0.0001)	64 (0.0001)	509 (0.0002)	81 (0.0002)	488 (0.0011)
Fishing Pressure (hrs.)	1,972	590,741	221,823	556,399	348,106	428,577

¹Exact months spanned is unclear but believed to include at least the open water months of May-Oct. Interviews and pressure counts likely limited to Michigan side. From Westerman and Van Oosten (1937).

²These estimates include fishing activity in April which was otherwise omitted for the other surveys. Aerial pressure counts included Ontario side but interviews were limited to Michigan anglers. This survey omitted the St. Joseph Channel and area above the locks. Interviews not considered representative of rapids fishery. From Rakoczy and Rogers (1988).

³Aerial pressure counts included Ontario side but interviews were limited to Michigan anglers. This survey omitted the St. Joseph Channel and area above the locks. Interviews not considered representative of rapids fishery. From Rakoczy (1992).

⁴From this study (see Table 2). Estimates include all river reaches. Aerial pressure counts and interviews included both Michigan and Ontario.

⁵Unpublished Michigan DNR data. Aerial pressure counts included Ontario side but interviews were limited to Michigan anglers. This survey omitted the St. Joseph Channel and area above the locks. Interviews not considered representative of rapids fishery.

⁶Unpublished Michigan DNR data. Aerial pressure counts included Ontario side but interviews were limited to Michigan anglers. This survey omitted the St. Joseph Channel and area above the locks. Interviews not considered representative of rapids fishery.

greatest in Potagannissing Bay at 60% (Fielder and Waybrant 1998). River-wide, total annual mortality rate of yellow perch in 1995 was considered moderate. Anglers fishing under a Michigan license were subject to a 178 mm minimum length limit.

The catch and overall significance of the salmon and trout species may have been underestimated by the Michigan DNR creel surveys that omitted interview data specific to the Rapids fishery. The 1999 survey that did include the Rapids was higher for fishing pressure and harvest for Atlantic salmon and Chinook salmon than other years surveyed (Tables 10, 12). There is, however, a dichotomy between the sport fishery harvest (where salmon and trout comprise just 6.7% by number) and the reported target species (where salmon and trout comprise 44.1%). Angler dissatisfaction in the St. Marys River is a long documented problem (Miller 1981; Westerman and Van Oosten 1937). The lack of parity between the species desired by anglers and those that are more abundant in the river may account for this lingering dissatisfaction. Regardless, the St. Marys River does offer very diverse fishing opportunities.

The design of the creel survey left certain elements of the sport fishery underrepresented. Considerable night fishing may occur in parts of the St. Marys River in certain months and anglers concluding their trip before dawn would typically be missed by both pressure counts and interviews. Probability of interviews also tended to favor anglers using public launches as opposed to anglers coming and going from private resorts or cottages. These anglers may have had higher catch rates if they were more experienced local anglers but would have been included in the pressure counts. Past investigation into these potentially errors sources has shown little impact on the overall estimates generated under the survey design employed in 1999 (G. Rakoczy, MDNR, personal communication). In addition, greatest utility of creel survey data is often in comparison among years for indication of trends and if surveyed consistently, the omission of minor elements of the fishery is inconsequential.

This study has revealed that the fish population resources of the St. Marys River support varied and sometimes substantial fisheries serving several different user groups. Trends of harvest and harvest rate suggest a relatively stable fishery. Sustainability, however, cannot be determined by this information alone. Needed is an updated examination of fish population dynamics for critical species and its interpretation in conjunction with the findings of this study.

Recommendations

1. Fishery management agencies should collaborate on the development of uniform fish community objectives, striving for sustainability, and maximum opportunity for all stakeholder groups. Agencies should then collaborate on establishing uniform fishing and harvest regulations to ensure progress towards the objectives.
2. Estimates of fish population parameters and dynamics need to be updated and interpreted in conjunction with the findings of this study.
3. This Fish harvest survey should be repeated at least every three years so as to maintain up-to-date trend information on the status of the fishery and progress towards fish community objectives.

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Appendix 1, table 1. Estimated harvest per hour, number harvested, and effort (angler hours, trips, and days) of sport fishing and subsistence fishing with sport gears for the area from Sweets Point to the Neebish Island Ferry (includes the Michigan and Ontario waters of Raber Bay, Munuscong Lake and Neebish Channel), by all modes (non-charter) in 1999. Two standard errors of the mean in parentheses.

Site 207.

Species	Harvest per hour	Month						Season
		May	Jun	Jul	Aug	Sep	Oct	
Chinook salmon	0.0025 (0.0084)	0 (0)	0 (0)	60 (307)	217 (893)	0 (0)	0 (0)	277 (944)
Northern pike	0.0108 (0.0172)	84 (204)	167 (637)	170 (787)	687 (1,560)	106 (408)	0 (0)	1,214 (1,915)
Muskellunge	0.0003 (0.0021)	0 (0)	0 (0)	34 (234)	0 (0)	0 (0)	0 (0)	34 (234)
Channel catfish	0.0006 (0.0038)	0 (0)	0 (0)	0 (0)	72 (430)	0 (0)	0 (0)	72 (430)
Rock bass	0.0004 (0.0013)	43 (142)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	43 (142)
Smallmouth bass	0.0044 (0.0118)	0 (0)	34 (198)	80 (431)	143 (606)	240 (1,077)	0 (0)	497 (1,324)
Yellow perch	0.1000 (0.1270)	203 (608)	861 (2,539)	160 (557)	4,426 (10,972)	5,036 (8,386)	542 (1,347)	11,228 (14,130)
Walleye	0.0355 (0.0465)	810 (1,164)	392 (836)	1,087 (2,572)	1,608 (4,232)	67 (379)	19 (91)	3,983 (5,170)
Lake herring	0.0803 (0.1327)	0 (0)	3,941 (10,065)	5,071 (10,868)	0 (0)	0 (0)	0 (0)	9,012 (14,813)
Lake whitefish	0.0008 (0.0040)	0 (0)	32 (179)	60 (411)	0 (0)	0 (0)	0 (0)	92 (448)
Other	0.0003 (0.0017)	0 (0)	34 (193)	0 (0)	0 (0)	0 (0)	0 (0)	34 (193)
Angler hours		13,687 (11,066)	20,669 (7,267)	31,728 (9,954)	27,609 (7,617)	16,674 (7,023)	1,916 (1,134)	112,283 (19,570)
Angler trips		3,352 (2,730)	5,291 (1,961)	6,423 (2,132)	6,939 (2,040)	4,149 (1,820)	417 (254)	26,571 (4,836)
Angler days		2,102 (1,721)	3,977 (1,500)	5,436 (1,851)	5,510 (1,713)	3,170 (1,449)	417 (254)	20,612 (3,706)

Appendix 1, table 2. Estimated harvest per hour, number harvested, and effort (angler hours, trips, and days) of sport fishing and subsistence fishing with sport gears for Lake George to Green Point (includes Little Lake George, and the area from Bellview Marina to Stribling Point in Ontario, Canada), by all modes (non-charter) in 1999. Two standard errors of the mean in parentheses.

Site 208.

Species	Harvest per hour	Month						Season
		May	Jun	Jul	Aug	Sep	Oct	
Pink salmon	0.0035 (0.0104)	0 (0)	0 (0)	0 (0)	336 (1,005)	0 (0)	0 (0)	336 (1,005)
Coho salmon	0.0031 (0.0096)	0 (0)	0 (0)	0 (0)	0 (0)	301 (928)	0 (0)	301 (928)
Chinook salmon	0.0373 (0.0298)	0 (0)	0 (0)	0 (0)	1,390 (1,412)	2,216 (2,437)	0 (0)	3,606 (2,816)
Rainbow trout	0.0005 (0.0031)	0 (1)	0 (0)	0 (0)	0 (0)	48 (302)	0 (0)	48 (302)
Northern pike	0.0164 (0.0215)	242 (519)	369 (734)	755 (1,624)	72 (261)	145 (865)	0 (0)	1,583 (2,064)
Pumpkinseed	0.0002 (0.0016)	0 (0)	0 (0)	0 (0)	24 (157)	0 (0)	0 (0)	24 (157)
Smallmouth bass	0.0021 (0.0076)	0 (0)	55 (306)	0 (0)	0 (0)	145 (664)	0 (0)	200 (731)
Yellow perch	0.0078 (0.0264)	0 (0)	0 (0)	227 (1,201)	0 (0)	530 (2,251)	0 (0)	757 (2,551)
Walleye	0.0005 (0.0032)	0 (0)	0 (0)	0 (0)	0 (0)	48 (306)	0 (0)	48 (306)
Lake whitefish	0.0007 (0.0030)	0 (0)	27 (155)	38 (248)	0 (0)	0 (0)	0 (0)	65 (292)
Angler hours		4,646 (2,169)	11,254 (4,637)	15,783 (4,131)	35,929 (10,780)	27,270 (10,110)	1,850 (1,599)	96,732 (16,256)
Angler trips		1,080 (498)	2,588 (1,129)	4,313 (1,205)	7,409 (2,288)	5,648 (2,134)	444 (384)	21,482 (3,593)
Angler days		1,064 (493)	2,588 (1,129)	4,208 (1,192)	7,247 (2,244)	5,501 (2,087)	444 (384)	21,052 (3,532)

Appendix 1, table 3. Estimated harvest per hour, number harvested, and effort (angler hours, trips, and days) of sport fishing and subsistence fishing with sport gears for the area from the Neebish Island Ferry to the rapids in Sault Ste. Marie (includes Lake Nicolet, the St. Mary's River below the rapids and the area from the rapids to Bellview Marina in Ontario, Canada), by all modes (non-charter) in 1999. Two standard errors of the mean in parentheses.

Site 209.

Species	Harvest per hour	Month						Season
		May	Jun	Jul	Aug	Sep	Oct	
Pink salmon	0.0143 (0.0246)	0 (0)	0 (0)	0 (0)	121 (366)	858 (1,639)	0 (0)	979 (1,680)
Coho salmon	0.0009 (0.0023)	19 (62)	11 (53)	0 (0)	0 (0)	28 (133)	5 (13)	63 (157)
Chinook salmon	0.0164 (0.0158)	0 (0)	0 (0)	0 (0)	306 (609)	501 (621)	317 (621)	1,124 (1,069)
Rainbow trout	0.0023 (0.0036)	44 (106)	108 (219)	0 (0)	0 (0)	7 (44)	0 (0)	159 (247)
Atlantic salmon	0.0016 (0.0041)	0 (0)	21 (78)	88 (272)	0 (0)	0 (0)	0 (0)	109 (283)
Lake trout	0.0000 (0.0000)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	1 (2)
Northern pike	0.0044 (0.0082)	180 (478)	95 (271)	0 (0)	24 (99)	1 (2)	0 (0)	300 (558)
Channel catfish	0.0005 (0.0027)	37 (186)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	37 (186)
Largemouth bass	0.0001 (0.0002)	0 (0)	0 (0)	0 (0)	0 (0)	7 (14)	0 (0)	7 (14)
Yellow perch	0.0118 (0.0330)	604 (2,165)	119 (550)	21 (89)	0 (0)	66 (293)	0 (0)	810 (2,255)
Walleye	0.0310 (0.0333)	12 (63)	1 (3)	477 (1,170)	1,190 (1,473)	444 (1,241)	0 (0)	2,124 (2,254)
Lake herring	0.0153 (0.0288)	0 (0)	0 (0)	1,045 (1,966)	0 (0)	0 (0)	1 (3)	1,046 (1,966)
Lake whitefish	0.0872 (0.0651)	696 (1,349)	3,237 (2,967)	1,676 (2,726)	164 (664)	89 (539)	104 (366)	5,966 (4,349)
Round whitefish	0.0004 (0.0013)	0 (0)	24 (88)	0 (0)	0 (0)	1 (2)	0 (0)	25 (88)
Other	0.0004 (0.0010)	0 (0)	11 (23)	0 (0)	0 (0)	15 (63)	0 (0)	26 (67)
Angler hours		3,745 (1,730)	9,376 (3,512)	14,611 (3,841)	20,441 (7,414)	16,847 (5,830)	3,421 (1,477)	68,441 (11,010)
Angler trips		957 (440)	2,355 (898)	3,692 (1,054)	4,468 (1,648)	4,128 (1,422)	907 (398)	16,507 (2,647)
Angler days		938 (430)	2,236 (854)	3,617 (1,038)	4,447 (1,640)	3,982 (1,376)	907 (398)	16,127 (2,595)

Appendix 1, table 4. Estimated harvest per hour, number harvested, and effort (angler hours, trips, and days) of sport fishing and subsistence fishing with sport gears for Potaganissing Bay (Michigan and Ontario), by all modes (non-charter) in 1999. Two standard errors of the mean in parentheses.

Site 210.

Species	Harvest per hour	Month						Season
		May	Jun	Jul	Aug	Sep	Oct	
Pink salmon	0.0024 (0.0082)	0 (0)	0 (0)	0 (0)	340 (1,154)	0 (0)	0 (0)	340 (1,154)
Chinook salmon	0.0072 (0.0249)	0 (0)	0 (0)	534 (3,299)	440 (1,123)	42 (221)	0 (0)	1,016 (3,492)
Atlantic salmon	0.0020 (0.0095)	0 (0)	0 (0)	278 (1,337)	0 (0)	0 (0)	0 (0)	278 (1,337)
Northern pike	0.0053 (0.0082)	163 (407)	242 (602)	0 (0)	238 (830)	101 (321)	0 (0)	744 (1,149)
Rock bass	0.0002 (0.0009)	24 (127)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	24 (127)
Pumpkinseed	0.0003 (0.0015)	0 (0)	0 (0)	0 (0)	0 (0)	40 (215)	0 (0)	40 (215)
Bluegill	0.0008 (0.0047)	0 (0)	0 (0)	107 (657)	0 (0)	0 (0)	0 (0)	107 (657)
Smallmouth bass	0.0032 (0.0068)	73 (287)	301 (811)	0 (0)	0 (0)	80 (417)	0 (0)	454 (956)
Largemouth bass	0.0008 (0.0048)	0 (0)	0 (0)	107 (677)	0 (0)	0 (0)	0 (0)	107 (677)
Yellow perch	0.3277 (0.2041)	1,720 (4,531)	229 (842)	278 (982)	4,171 (10,667)	35,702 (23,978)	4,024 (5,658)	46,124 (27,257)
Walleye	0.0138 (0.0278)	142 (309)	96 (360)	1,452 (3,737)	257 (993)	0 (0)	0 (0)	1,947 (3,896)
Lake herring	0.1506 (0.2656)	0 (0)	4,216 (6,842)	16,986 (36,511)	0 (0)	0 (0)	0 (0)	21,202 (37,147)
Lake whitefish	0.0030 (0.0084)	0 (0)	75 (390)	342 (1,106)	0 (0)	0 (0)	0 (0)	417 (1,173)
Other	0.0026 (0.0099)	45 (175)	0 (0)	278 (1,350)	46 (253)	0 (0)	0 (0)	369 (1,385)
Angler hours		17,034 (8,294)	18,755 (7,856)	49,405 (21,705)	28,790 (9,914)	16,559 (6,177)	10,200 (5,270)	140,743 (27,674)
Angler trips		4,816 (2,444)	5,511 (2,359)	13,994 (5,925)	8,328 (3,170)	4,121 (1,595)	3,317 (1,805)	40,087 (7,905)
Angler days		3,110 (1,529)	3,429 (1,462)	11,901 (5,435)	5,437 (2,169)	2,888 (1,155)	3,004 (1,668)	29,769 (6,545)

Appendix 1, table 5. Estimated harvest per hour, number harvested, and effort (angler hours, trips, and days) of sport fishing and subsistence fishing with sport gears for the Rapids in Sault Ste. Marie, Ontario, by all modes (non-charter) in 1999. Two standard errors of the mean in parentheses. June was not surveyed.

Site 403.

Species	Harvest per hour	Month						Season
		May	Jun	Jul	Aug	Sep	Oct	
Pink salmon	0.0292 (0.0453)	0 (0)		0 (0)	22 (50)	387 (640)	9 (56)	418 (644)
Coho salmon	0.0011 (0.0054)	0 (0)		0 (0)	0 (0)	12 (72)	4 (29)	16 (77)
Chinook salmon	0.0061 (0.0126)	0 (0)		0 (0)	1 (6)	44 (128)	43 (126)	88 (180)
Rainbow trout	0.0117 (0.0210)	97 (245)		54 (164)	0 (0)	8 (36)	9 (37)	168 (299)
Atlantic salmon	0.0026 (0.0055)	0 (0)		34 (77)	0 (0)	0 (0)	3 (15)	37 (78)
Smallmouth bass	0.0010 (0.0067)	15 (96)		0 (0)	0 (0)	0 (0)	0 (0)	15 (96)
Yellow perch	0.0024 (0.0137)	35 (196)		0 (0)	0 (0)	0 (0)	0 (0)	35 (196)
Lake whitefish	0.0046 (0.0156)	66 (223)		0 (0)	0 (0)	0 (0)	0 (0)	66 (223)
Round whitefish	0.0018 (0.0121)	0 (0)		0 (0)	0 (0)	0 (0)	26 (173)	26 (173)
Angler hours		3,707 (1,154)		2,230 (1,600)	493 (447)	6,382 (2,120)	1,518 (655)	14,330 (3,002)
Angler trips		651 (226)		459 (339)	107 (96)	1,367 (410)	355 (164)	2,939 (609)
Angler days		651 (226)		418 (312)	102 (90)	1,356 (406)	341 (159)	2,868 (589)

Appendix 1, table 6. Estimated harvest per hour, number harvested, and effort (angler hours, trips, and days) of sport fishing and subsistence fishing with sport gears for the Upper St. Mary's River (International Bridge in Sault Ste. Marie to a line running from Gros Cap, Ontario to Point Iroquois, Michigan), by all modes (non-charter) in 1999. Two standard errors of the mean in parentheses.

Site 404.

Species	Harvest per hour	Month						Season
		May	Jun	Jul	Aug	Sep	Oct	
Rainbow trout	0.0000 (0.0001)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (5)	2 (5)
Northern pike	0.0070 (0.0139)	346 (783)	0 (0)	0 (0)	0 (0)	66 (214)	0 (0)	412 (812)
Pumpkinseed	0.0017 (0.0096)	0 (0)	0 (0)	97 (559)	0 (0)	0 (0)	0 (0)	97 (559)
Yellow perch	0.0315 (0.0411)	520 (1,212)	285 (1,092)	0 (0)	0 (0)	821 (1,584)	218 (693)	1,844 (2,377)
Walleye	0.0151 (0.0286)	635 (1,391)	249 (916)	0 (0)	0 (0)	0 (0)	0 (0)	884 (1,665)
Lake whitefish	0.2248 (0.2505)	3,486 (5,666)	7,464 (10,952)	2,197 (7,519)	0 (0)	0 (0)	16 (68)	13,163 (14,442)
Round whitefish	0.0079 (0.0261)	116 (465)	348 (1,454)	0 (0)	0 (0)	0 (0)	1 (2)	465 (1,526)
Other	0.0119 (0.0554)	695 (3,239)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	695 (3,239)
Angler hours		14,319 (5,917)	17,823 (5,534)	19,374 (7,797)	2,414 (1,259)	3,315 (1,445)	1,316 (1,052)	58,561 (11,454)
Angler trips		3,110 (1,334)	4,131 (1,467)	6,003 (2,495)	557 (293)	984 (505)	557 (468)	15,342 (3,274)
Angler days		2,866 (1,255)	3,915 (1,399)	5,039 (2,242)	418 (240)	946 (497)	551 (467)	13,735 (3,013)

Appendix 1, table 7. Estimated harvest per hour, number harvested, and effort (angler hours, trips, and days) of sport fishing and subsistence fishing with sport gears for the St. Joseph Channel, Ontario, Canada, by all modes (non-charter) in 1999. Two standard errors of the mean in parentheses.

Site 405.

Species	Harvest per hour	Month					Season
		May	Jun	Jul	Aug	Sep	
Chinook salmon	0.0021 (0.0122)	0 (0)	0 (0)	0 (0)	0 (0)	138 (797)	138 (797)
Rainbow trout	0.0000 (0.0001)	0 (0)	0 (0)	2 (7)	0 (0)	0 (0)	2 (7)
Atlantic salmon	0.0013 (0.0064)	0 (0)	0 (0)	0 (0)	0 (0)	86 (418)	86 (418)
Northern pike	0.0177 (0.0623)	1 (3)	166 (485)	845 (3,972)	143 (703)	0 (0)	1,155 (4,063)
Rock bass	0.0000 (0.0002)	0 (0)	3 (11)	0 (0)	0 (0)	0 (0)	3 (11)
Smallmouth bass	0.0004 (0.0022)	0 (0)	23 (143)	0 (0)	0 (0)	1 (1)	24 (143)
Yellow perch	0.0283 (0.1385)	0 (0)	246 (925)	121 (800)	1,481 (8,957)	0 (0)	1,848 (9,040)
Walleye	0.0138 (0.0656)	0 (0)	69 (323)	603 (4,172)	143 (765)	88 (447)	903 (4,278)
Angler hours		177 (92)	5,422 (1,970)	25,553 (8,356)	17,463 (7,319)	16,692 (5,636)	65,307 (12,611)
Angler trips		70 (46)	1,376 (528)	4,829 (1,463)	3,835 (1,725)	4,174 (1,912)	14,284 (3,009)
Angler days		70 (46)	1,263 (500)	4,825 (1,463)	3,835 (1,725)	4,174 (1,912)	14,167 (3,004)

Appendix 2, table 1. Estimated harvest per hour, number harvested, and effort (angler hours, trips, and days) for the winter ice sport fishery and subsistence fishery using sport gears on Munuscong Bay, 2000. Two standard errors of the mean in parentheses.

Site 207.

Species	Harvest per hour	Month			Season
		Jan	Feb	Mar	
Northern pike	0.0156 (0.0098)	129 (64)	485 (359)	0 (0)	614 (364)
Yellow perch	0.1586 (0.0555)	3,129 (1,248)	2,173 (944)	947 (888)	6,249 (1,799)
Walleye	0.0319 (0.0160)	382 (200)	873 (542)	0 (0)	1,255 (578)
Lake whitefish	0.0005 (0.0005)	18 (19)	0 (0)	0 (0)	18 (19)
Angler hours		13,830 (4,024)	24,381 (6,705)	1,183 (384)	39,394 (7,829)
Angler trips		3,180 (1,082)	5,673 (1,786)	243 (104)	9,096 (2,091)
Angler days		3,180 (1,082)	5,552 (1,771)	243 (104)	8,975 (2,078)

Appendix 2, table 2. Estimated harvest per hour, number harvested, and effort (angler hours, trips, and days) for the winter ice sport fishery and subsistence fishery using sport gears for Lake George to Green Point (includes Little Lake George, and the area from Bellview Marina to Stribling Point in Ontario, Canada, 2000. Two standard errors of the mean in parentheses.

Site 208.

Species	Harvest per hour	Month			Season
		Jan	Feb	Mar	
Northern pike	0.0016 (0.0015)	0 (0)	0 (0)	6 (5)	6 (5)
Yellow perch	0.5944 (0.3928)	0 (0)	429 (328)	1,759 (1,186)	2,188 (1,231)
Angler hours		0 (0)	2,391 (1,125)	1,290 (606)	3,681 (1,277)
Angler trips		0 (0)	385 (180)	273 (143)	658 (230)
Angler days		0 (0)	385 (180)	273 (143)	658 (230)

Appendix 2, table 3. Estimated harvest per hour, number harvested, and effort (angler hours, trips, and days) for the winter ice sport fishery and subsistence fishery using sport gears on Upper St. Mary's River (International Bridge in Sault Ste. Marie to a line running from Gros Cap, Ontario to Point Iroquois, Michigan), 2000. Two standard errors of the mean in parentheses.

Site 404.

Species	Harvest per hour	Month			Season
		Jan	Feb	Mar	
Rainbow trout	0.0020 (0.0025)	0 (0)	23 (28)	0 (-)	23 (28)
Brown trout	0.0023 (0.0030)	26 (34)	0 (0)	0 (-)	26 (34)
Northern pike	0.0003 (0.0005)	0 (0)	3 (6)	0 (-)	3 (6)
Yellow perch	0.0023 (0.0030)	26 (34)	0 (0)	0 (-)	26 (34)
Lake whitefish	0.1869 (0.0884)	1,569 (956)	554 (193)	0 (-)	2,123 (975)
Round whitefish	0.1396 (0.0820)	1,059 (891)	526 (203)	0 (-)	1,585 (914)
Angler hours		4,170 (963)	5,560 (749)	1,626 (378)	11,356 (1,277)
Angler trips		1,167 (343)	1,496 (274)	15 (-)	2,678 (439)
Angler days		1,116 (337)	1,484 (273)	15 (-)	2,615 (434)

Appendix 2, table 4. Estimated harvest per hour, number harvested, and effort (angler hours, trips, and days) for the winter ice sport fishery and subsistence fishery using sport gears near the St. Joseph Channel, Ontario, Canada, 2000, Two standard errors of the mean in parentheses.

Site 405

Species	Harvest per hour	Month			Season
		Jan	Feb	Mar	
Northern pike	0.0424 (0.0277)	135 (115)	36 (29)	47 (41)	218 (125)
Yellow perch	0.7960 (0.4210)	1,041 (620)	796 (500)	2,253 (1,564)	4,090 (1,755)
Angler hours		1,788 (1,195)	1,959 (859)	1,391 (598)	5,138 (1,588)
Angler trips		381 (263)	498 (240)	334 (164)	1,213 (392)
Angler days		381 (263)	498 (240)	334 (164)	1,213 (392)

Appendix 3. Age composition and mean length at age for select species from the sport fishery and tribal subsistence fishery using sport gears in US and Canadian waters of the St. Marys River.

Appendix 3, table 1. – Walleye age composition (number and frequency) and average length at age based on biological information collected from the sport fishery and tribal subsistence fishery using sport gears in US and Canadian waters of the St. Marys River from May-October, 1999. All lengths in cm.

Parameters	AGE															Average length	Average age	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
Number N=203		1	28	65	51	11	9	17	6	7	4		2		2			
Frequency (%)		0.5	13.8	32.0	25.1	5.4	4.4	8.4	3.0	3.5	2.0		1.0		1.0			
Average length		38.1	40.5	43.0	46.5	52.9	52.4	54.7	58.0	57.6	57.3		63.9		63.5		47.1	5.36
MI State average	24.9	33.8	38.6	43.7	47.2	51.5	54.1	56.1	58.1									

Appendix 3, table 2. – Northern pike age composition (number and frequency) and average length at age based on biological information collected from the sport fishery and tribal subsistence fishery using sport gears in US and Canadian waters of the St. Marys River from May-October, 1999. All lengths in cm.

Parameters	AGE															Average length	Average age		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15				
Number N=87		7	23	16	15	15	3	7	1										
Frequency (%)		8.0	26.4	18.4	17.2	17.2	3.4	8.0	1.1										
Average length		56.4	60.7	64.1	68.7	71.6 (14)	72.9	82.4	99.1									66.8 (86)	4.57
MI State average	42.1	51.0	57.9	63.5	68.3	73.1	77.9												

N in parentheses if different from reported.

Appendix 3, table 3. – Yellow perch age composition (number and frequency) and average length at age based on biological information collected from the sport fishery and tribal subsistence fishery using sport gears in US and Canadian waters of the St. Marys River from May-October, 1999. All lengths in cm.

Parameters	AGE															Average length	Average age		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15				
Number N=255		1	24	40	77	44	42	17	8	2									
Frequency (%)		0.4	9.4	15.7	30.2	17.3	16.5	6.7	3.1	0.8									
Average length		18.5	18.3	19.7	21.0 (254)	22.5	23.9	26.3	28.6	29.0								21.9 (254)	5.5
MI State average	12.7	16.0	18.3	20.8	23.3	25.6	27.7	29.2	30.2										

N in parentheses if different from reported.

Appendix 3, table 4. – Lake herring age composition (number and frequency) and average length at age based on biological information collected from the sport fishery and tribal subsistence fishery using sport gears in US and Canadian waters of the St. Marys River from May-October, 1999. All lengths in cm.

Parameters	AGE															Average length	Average age			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15					
Number N=138	28	4	8	17	43	26	9	3												
Frequency (%)	20.3	2.9	5.8	12.3	31.2	18.8	6.5	2.2												
Average length	20.3	27.5	34.6	36.0	37.4	38.6	40.0	41.1											33.8	4.2
MI State average	21.3	24.1	26.6	29.4	32.0	34.8	37.3	40.1												

Appendix 3, table 5. – Smallmouth bass age composition (number and frequency) and average length at age based on biological information collected from the sport fishery and tribal subsistence fishery using sport gears in US and Canadian waters of the St. Marys River from May-October, 1999. All lengths in cm.

Parameters	AGE															Average length	Average age	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
Number N=10			1	3		1	1	2	1	1								
Frequency (%)			10.0	30.0		10.0	10.0	20.0	10.0	10.0								
Average length			28.0	31.7		38.6	39.9	39.9	42.7	41.5							36.5	6.3
MI State average	17.8	25.6	30.5	35.5	38.6	40.6	43.4	45.2	47.5									

Appendix 3, table 6. – Walleye age composition (number and frequency) and average length at age based on biological information collected from the sport fishery and tribal subsistence fishery using sport gears in US and Canadian waters of the St. Marys River from January – March, 2000. All lengths in cm.

Parameters	AGE															Average length	Average age		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15				
Number N=12			1	1	1	3		2		2	1	1							
Frequency (%)			8.3	8.3	8.3	25.0		16.7		16.7	8.3	8.3							
Average length			33.0	36.8	43.2	48.9		55.9		63.4	63.5	68.1						52.5	7.4
MI State average	24.9	33.8	38.6	43.7	47.2	51.5	54.1	56.1	58.1										

Appendix 3, table 7. – Northern pike age composition (number and frequency) and average length at age based on biological information collected from the sport fishery and tribal subsistence fishery using sport gears in US and Canadian waters of the St. Marys River from January – March, 2000. All lengths in cm.

Parameters	AGE															Average length	Average age	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
Number N=21		5	2	6	1	4	2	1										
Frequency (%)		23.8	9.5	28.6	4.8	19.0	9.5	4.8										
Average length		42.5	53.5	55.0	75.0	66.0	75.4	75.0									56.9	4.3
MI State average	42.1	51.0	57.9	63.5	68.3	73.1	77.9											

Appendix 3, table 8. – Yellow perch age composition (number and frequency) and average length at age based on biological information collected from the sport fishery and tribal subsistence fishery using sport gears in US and Canadian waters of the St. Marys River from May-October, 1999. All lengths in cm.

Parameters	AGE															Average length	Average age	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
Number N=70			5	14	21	18	10	2										
Frequency (%)			7.1	20.0	30.0	25.7	14.3	2.9										
Average length			16.6	19.3	19.4	23.0	24.6	27.0									21.1	5.3
State average	12.7	16.0	18.3	20.8	23.3	25.6	27.7	29.2	30.2									

Appendix 3, table 9. – Lake whitefish age composition (number and frequency) and average length at age based on biological information collected from the sport and tribal subsistence fishery using sport gears in US and Canadian waters of the St. Marys River from May-October, 1999. All lengths in cm.

Parameters	AGE															Average length	Average age	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
Number N=154		2	22	44	56	23	6	1										
Frequency (%)		1.3	14.3	28.6	36.4	14.9	3.9	0.6										
Average length		22.0	34.6	40.9	41.8	46.9	49.7	49.8									41.4	4.64
MI State average																		

Appendix 3, table 10. – Pink salmon age composition (number and frequency) and average length at age based on biological information collected from the sport and tribal subsistence fishery using sport gears in US and Canadian waters of the St. Marys River from May-October, 1999. All lengths in cm.

Parameters	AGE															Average length	Average age		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15				
Number N=56		55	1																
Frequency (%)		98.2	1.8																
Average length		51.8	58.4															51.9	2.02
MI State average																			

Appendix 3, table 11. – Rainbow trout age composition (number and frequency) and average length at age based on biological information collected from the sport and tribal subsistence fishery using sport gears in US and Canadian waters of the St. Marys River from May-October, 1999. All lengths in cm.

Parameters	AGE															Average length	Average age		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15				
Number N=28	8	10	6	2	1				1										
Frequency (%)	28.6	35.7	21.4	7.1	3.6				3.6										
Average length	49.3	44.2	56.7	56.7	72.5				64.3									50.9	2.43
MI State average																			

Appendix 3, table 12. – Chinook salmon age composition (number and frequency) and average length at age based on biological information collected from the sport and tribal subsistence fishery using sport gears in US and Canadian waters of the St. Marys River from May-October, 1999. All lengths in cm.

Parameters	AGE															Average length	Average age			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15					
Number N=205	5	33	116	51																
Frequency (%)	2.4	16.1	56.6	24.9																
Average length	49.8	76.9	85.3	88.2															83.8	3.04
MI State average																				

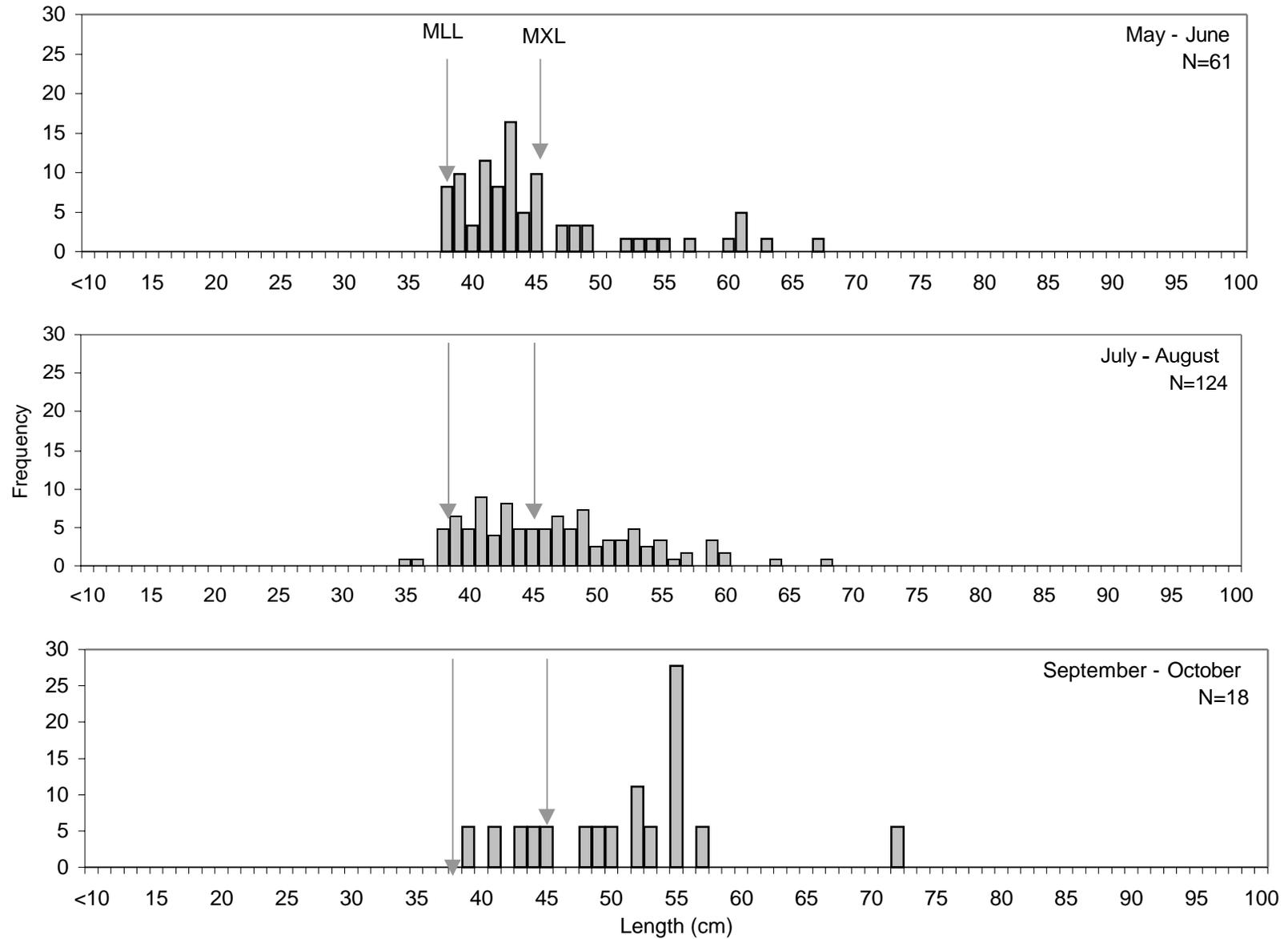
Appendix 3, table 13. – Lake whitefish age composition (number and frequency) and average length at age based on biological information collected from the sport and tribal subsistence fishery using sport gears in US and Canadian waters of the St. Marys River from January – March, 2000. All lengths in cm.

Parameters	AGE															Average length	Average age		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15				
Number N=56		2	3	11	12	13	9	3	2	1									
Frequency (%)		3.6	5.4	19.6	21.4	23.2	16.1	5.4	3.6	1.8									
Average length		28.5	32.6	33.0	36.1	37.0	42.1	45.3	41.1	44.4								37.0	5.54
MI State average																			

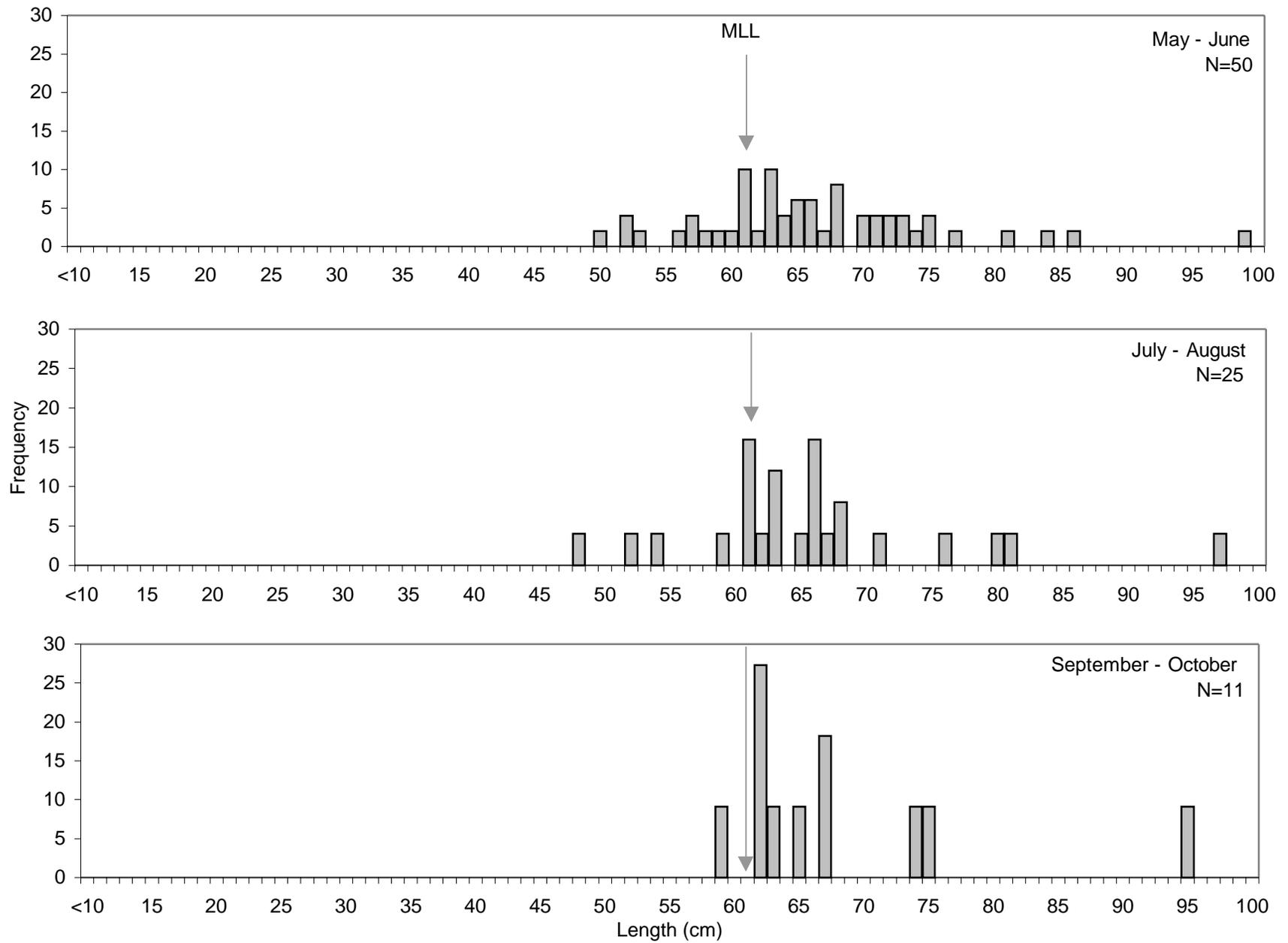
Appendix 3, table 14. – Round whitefish age composition (number and frequency) and average length at age based on biological information collected from the sport and tribal subsistence fishery using sport gears in US and Canadian waters of the St. Marys River from January – March, 2000. All lengths in cm.

Parameters	AGE															Average length	Average age				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15						
Number N=35		1	4	12	10	4	2		2												
Frequency (%)		2.9	11.4	34.3	28.6	11.4	5.7		5.7												
Average length		29.2	25.8	29.1	29.1	31.7	35.0		36.6											29.8	4.8
MI State average																					

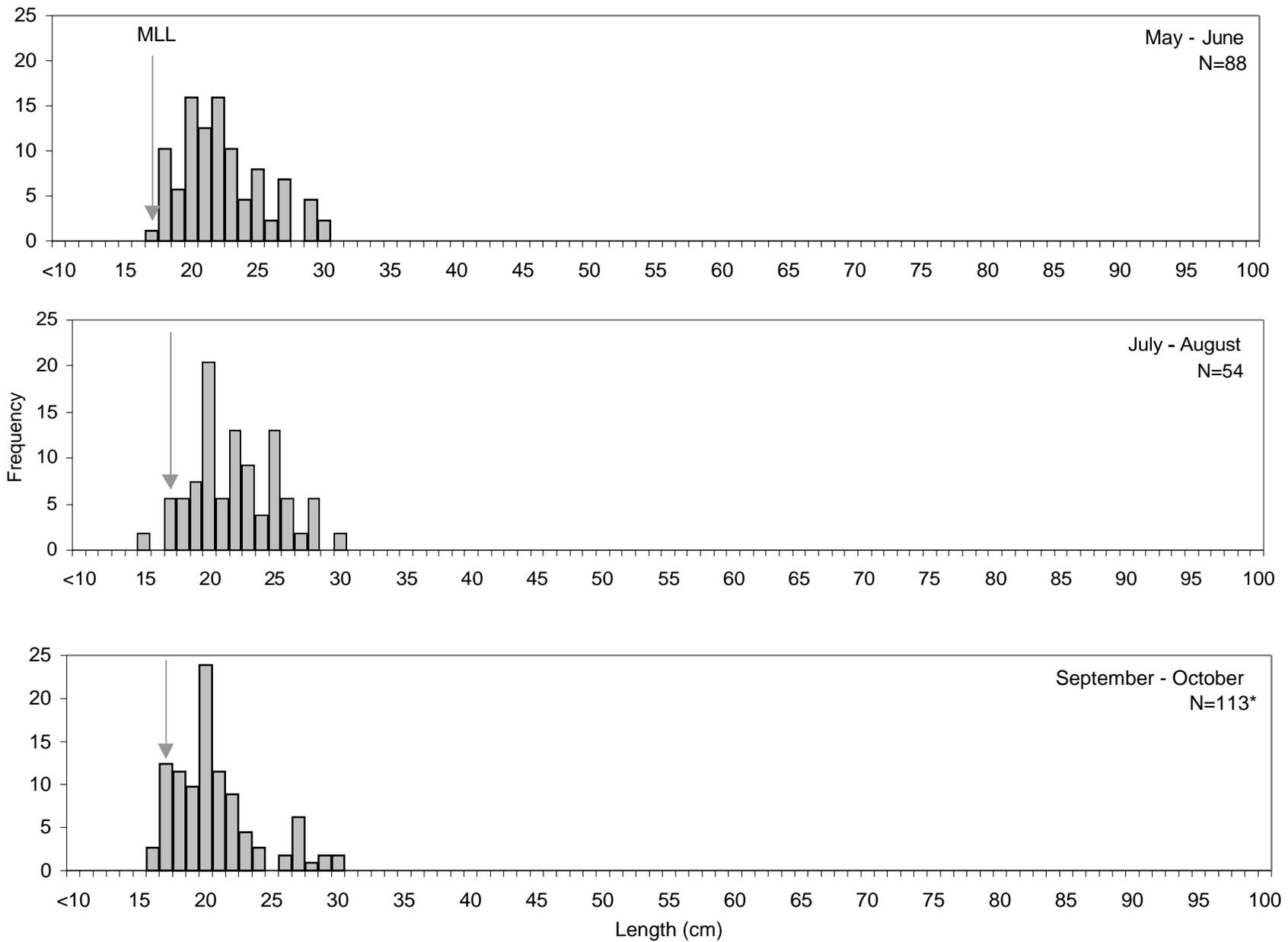
Appendix 4. Length frequency histograms for select species harvested in the sport and sport-gear subsistence fisheries, St. Marys River 1999.



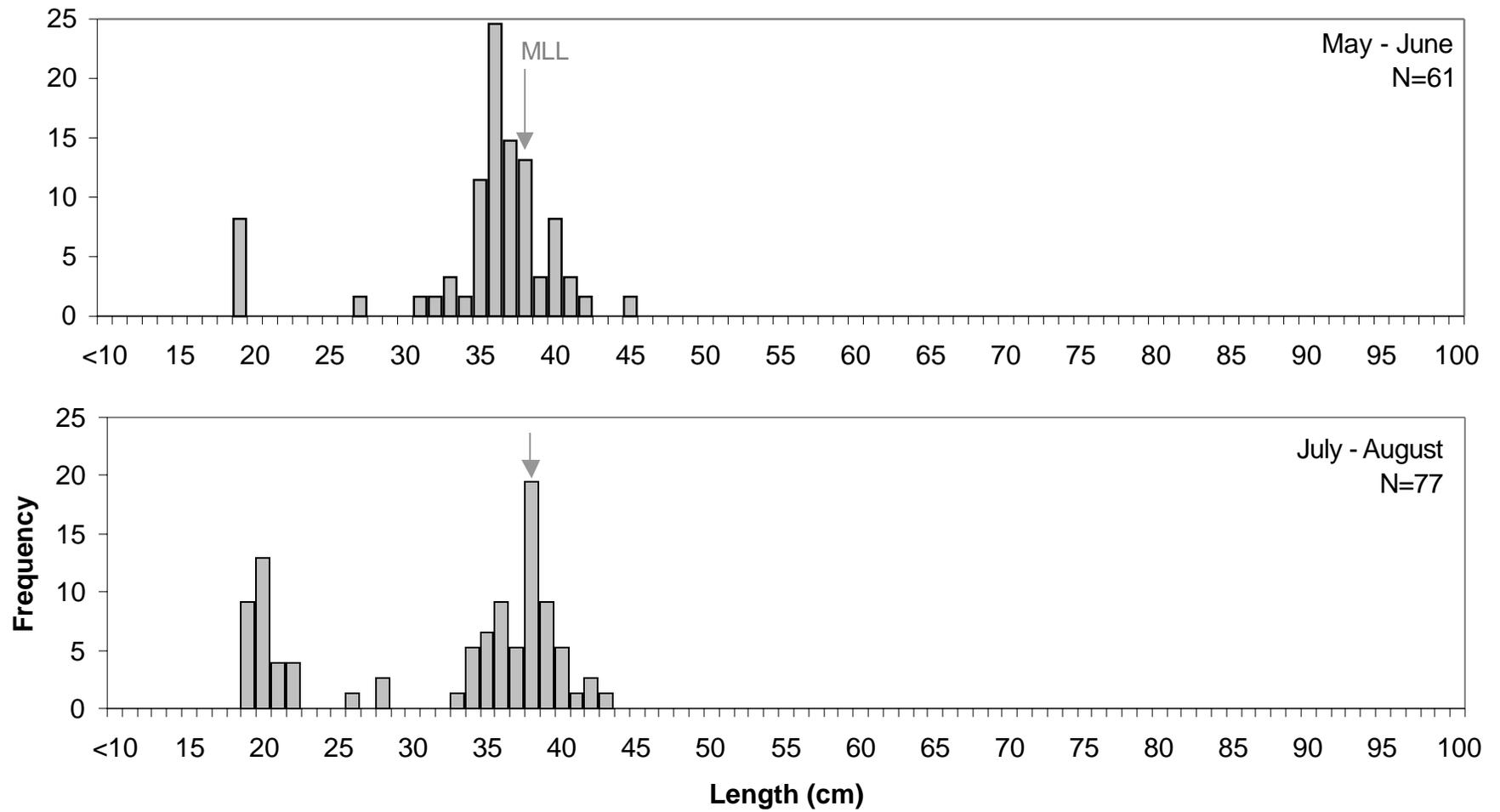
Appendix 4, figure 1. Walleye length frequencies (percent of total) during the open water sport and subsistence fisheries from May to October 1999 on the St. Marys River. MLL denotes minimum legal limit for Michigan sport fishing and MXL denotes maximum legal limit for Ontario sport fishing from the bottom of Lake George to the compensating works.



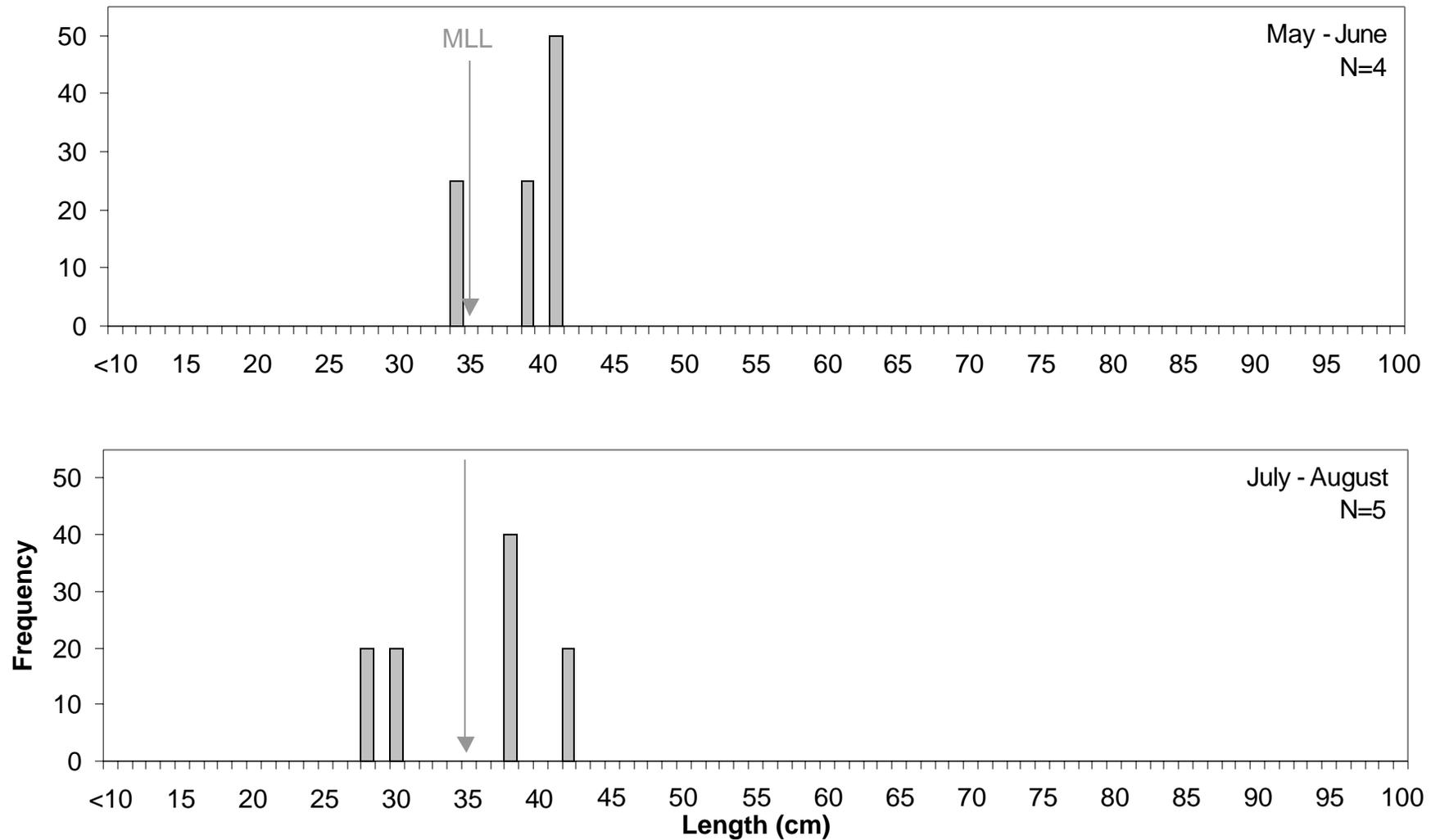
Appendix 4, figure 2. Northern pike length frequencies (percent of total) during the open water sport and subsistence fisheries from May to October 1999 on the St. Marys River. MLL denotes minimum legal limit for Michigan sport fishing.



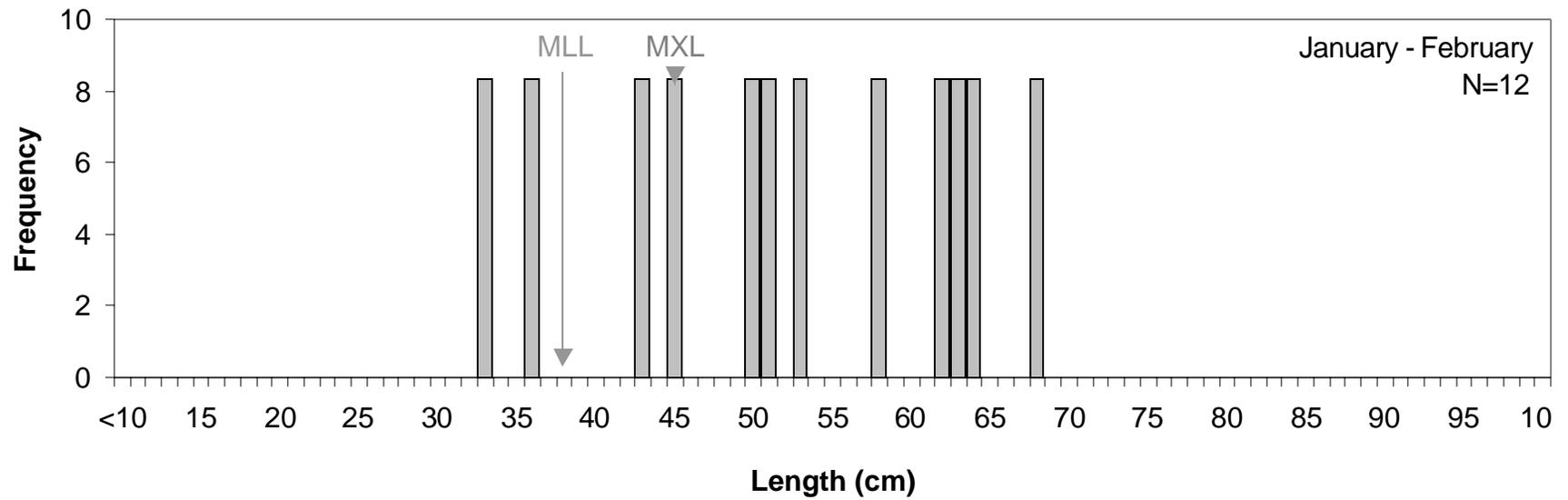
Appendix 4, figure 3. Yellow perch length frequencies (percent of total) during the open water sport and subsistence fisheries from May to October 1999 on the St. Marys River. MLL denotes minimum legal limit for Michigan sport fishing.



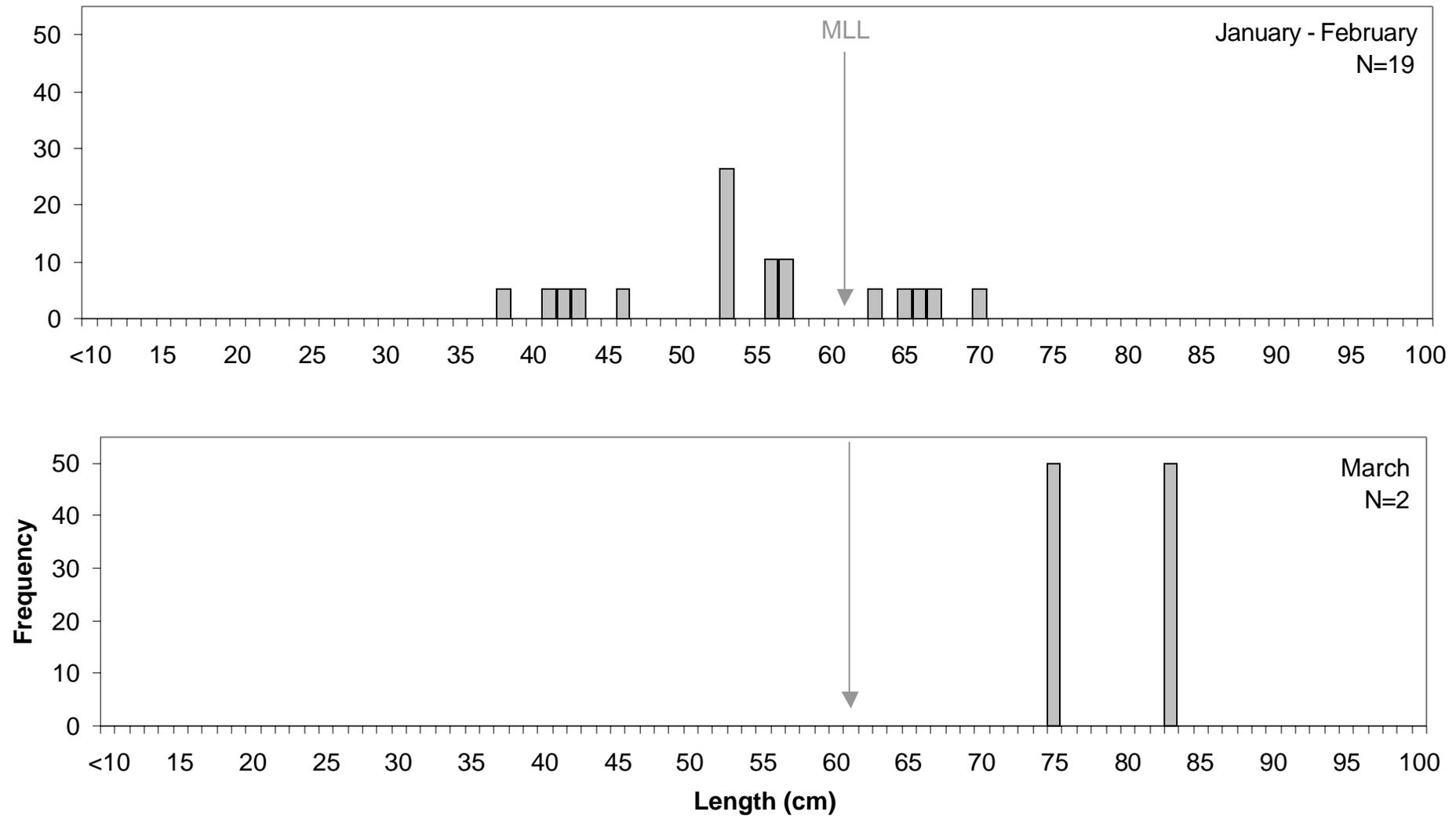
Appendix 4, figure 4. Lake herring length frequencies (percent of total) during the open water sport and subsistence fishery from May to October 1999 in waters of the St. Marys River. MLL denotes minimum legal limit for Michigan sport fishing.



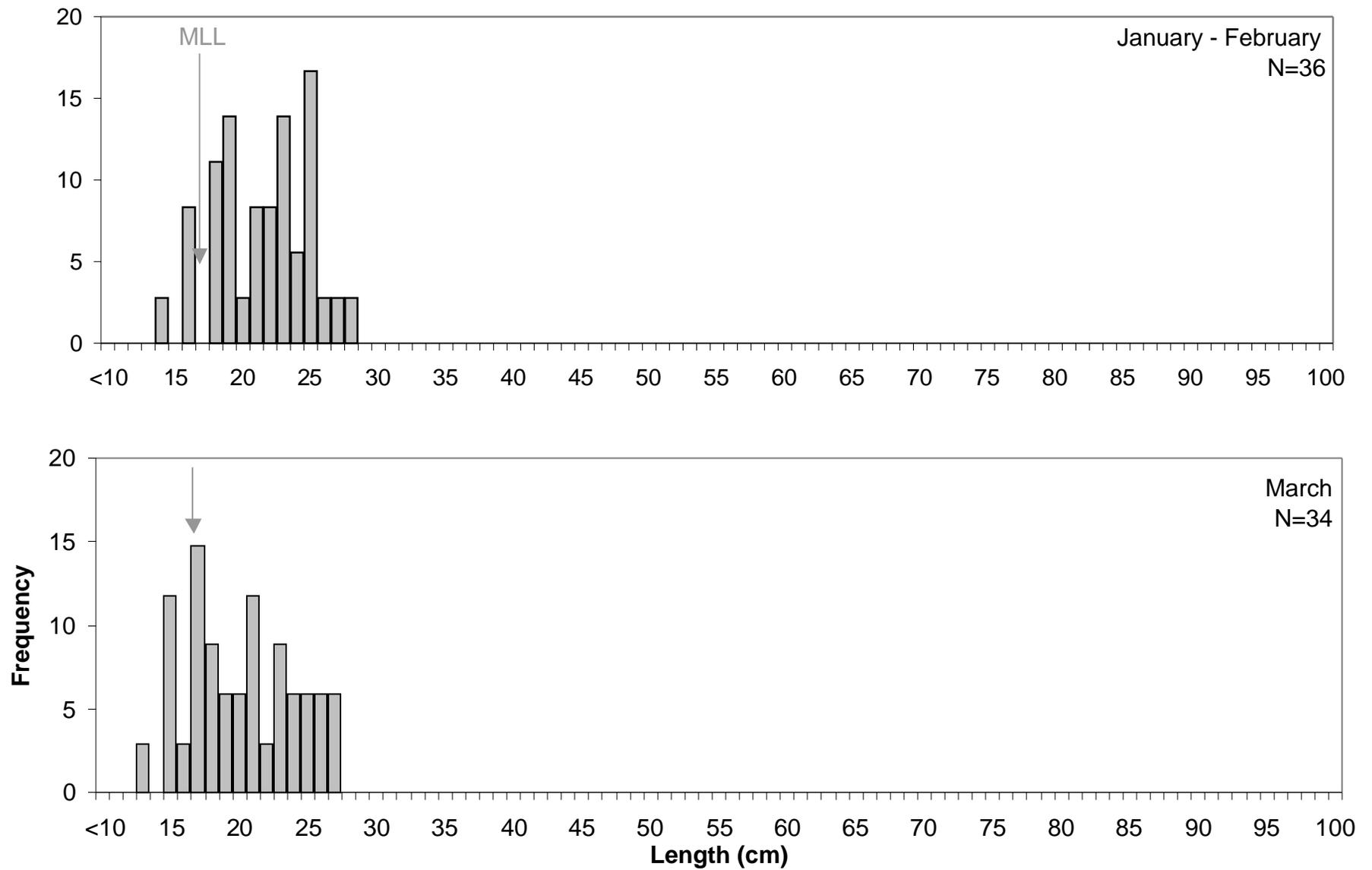
Appendix 4, figure 5. Smallmouth bass length frequencies (percent of total) during the open water sport and subsistence fisheries from May to October 1999 on the St. Marys River. MLL denotes minimum legal limit for Michigan sport fishing.



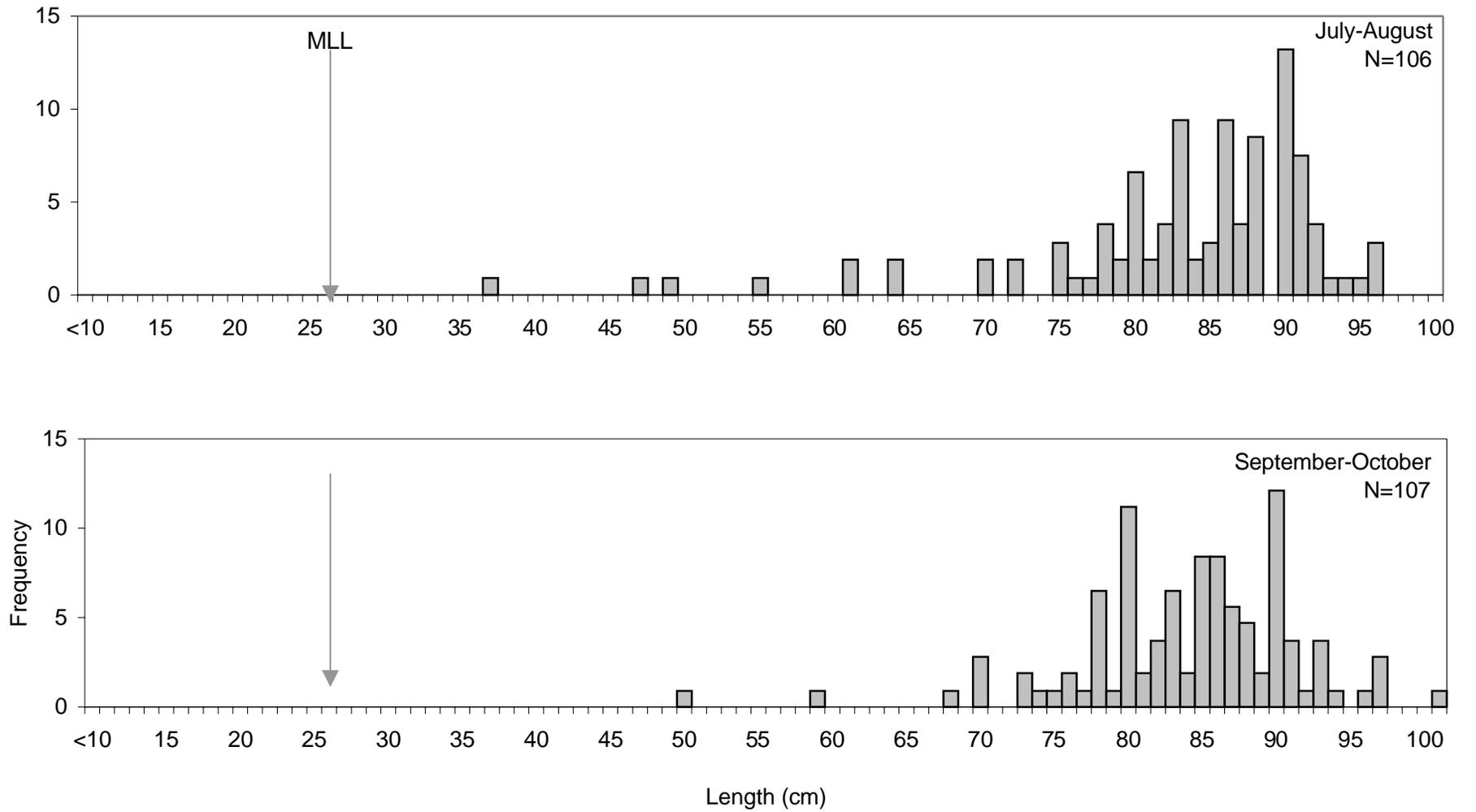
Appendix 4, figure 6. Walleye length frequency (percent of total) during the winter ice survey in January to March 2000 in the St. Marys River. MLL denotes minimum legal limit for Michigan sport fishing and MXL denotes maximum legal limit for Ontario sport fishing from the bottom of Lake George up to the compensating works.



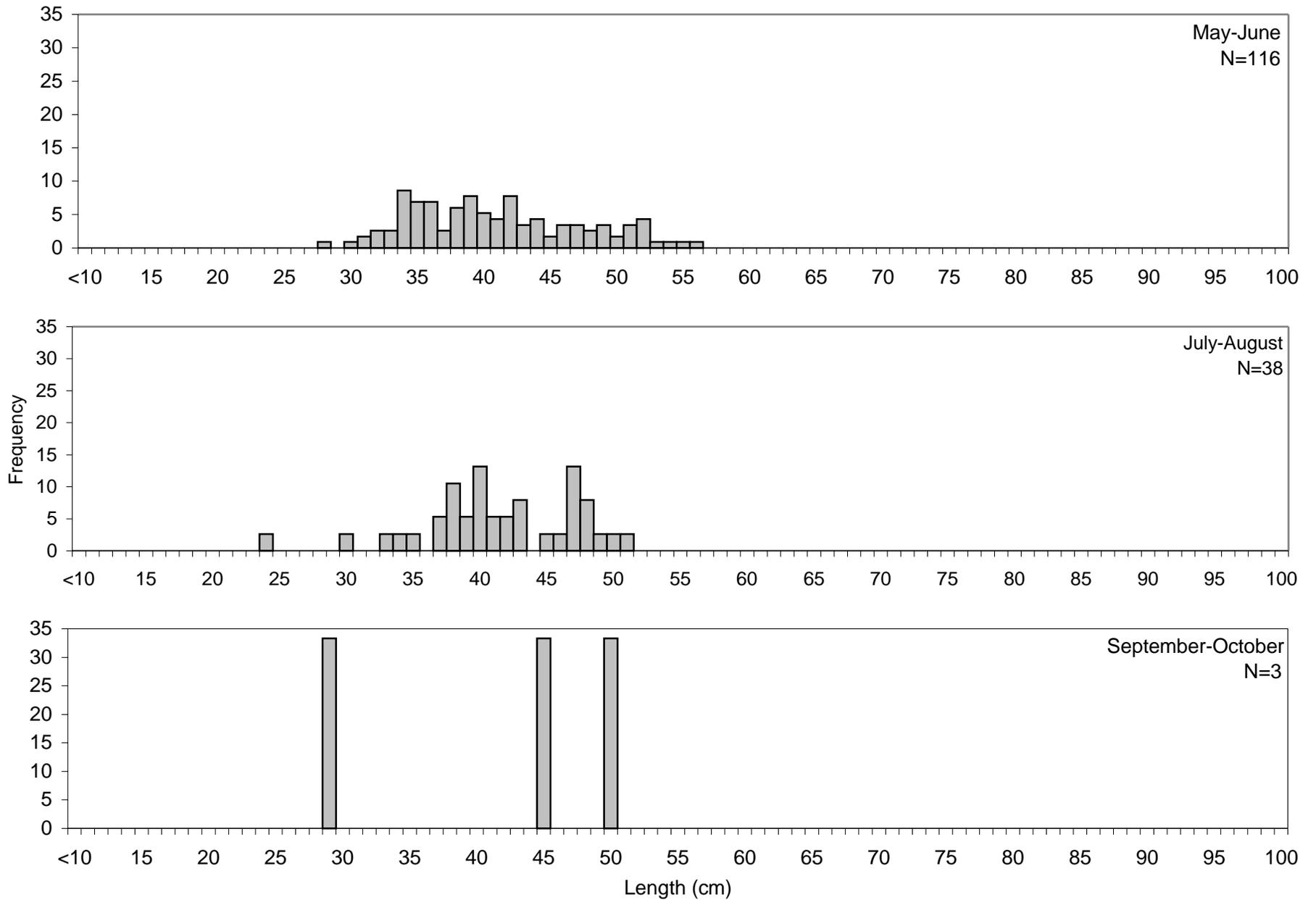
Appendix 4, figure 7. Northern pike length frequencies (percent of total) during the winter ice survey in January to March 2000 in the St. Marys River. MLL denotes minimum legal limit for Michigan sport fishing.



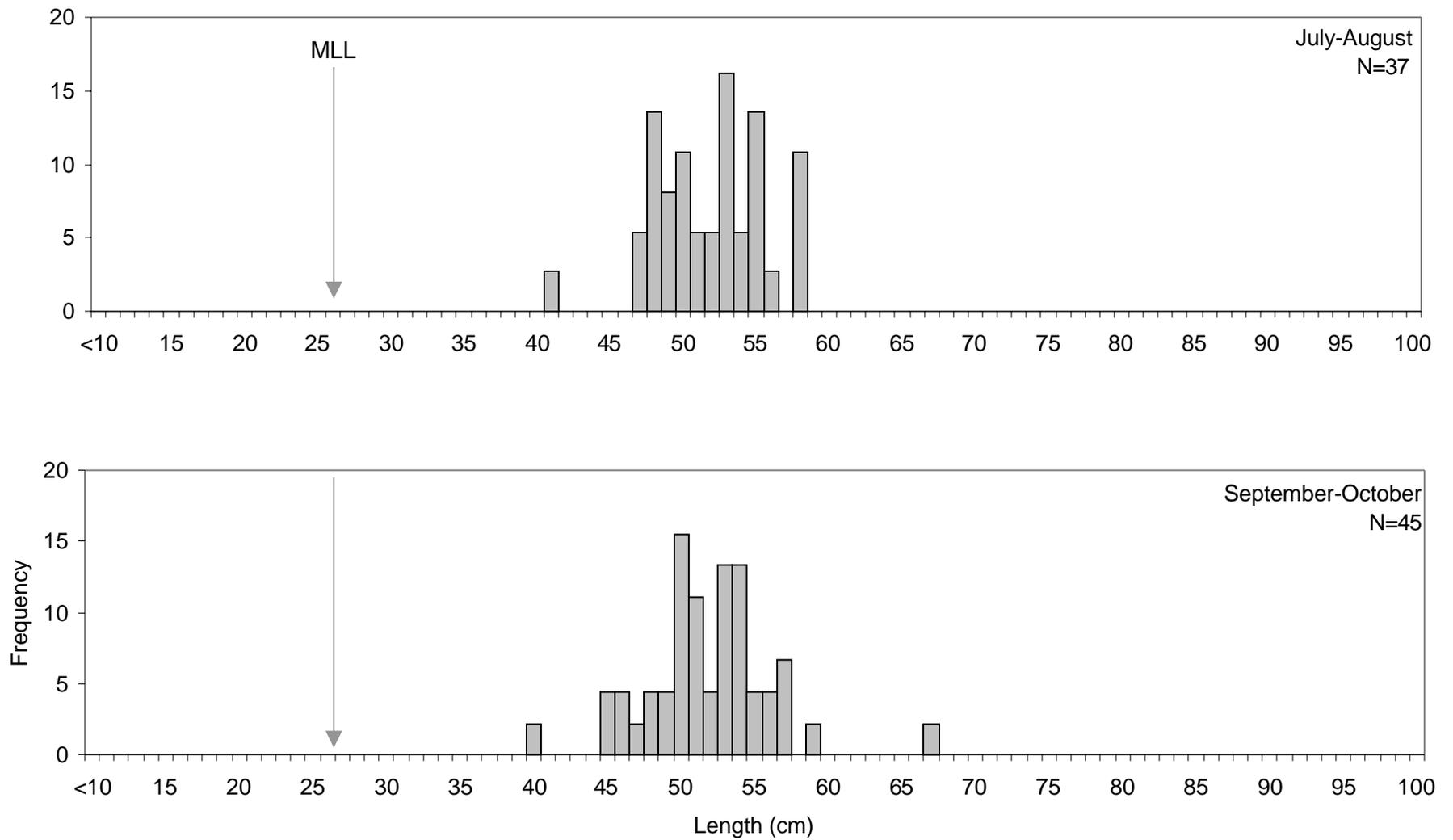
Appendix 4, figure 8. Yellow perch length frequencies (percent of total) during winter ice survey from January to March 2000 in the St. Marys River. MLL denotes minimum legal limit for Michigan sport fishing.



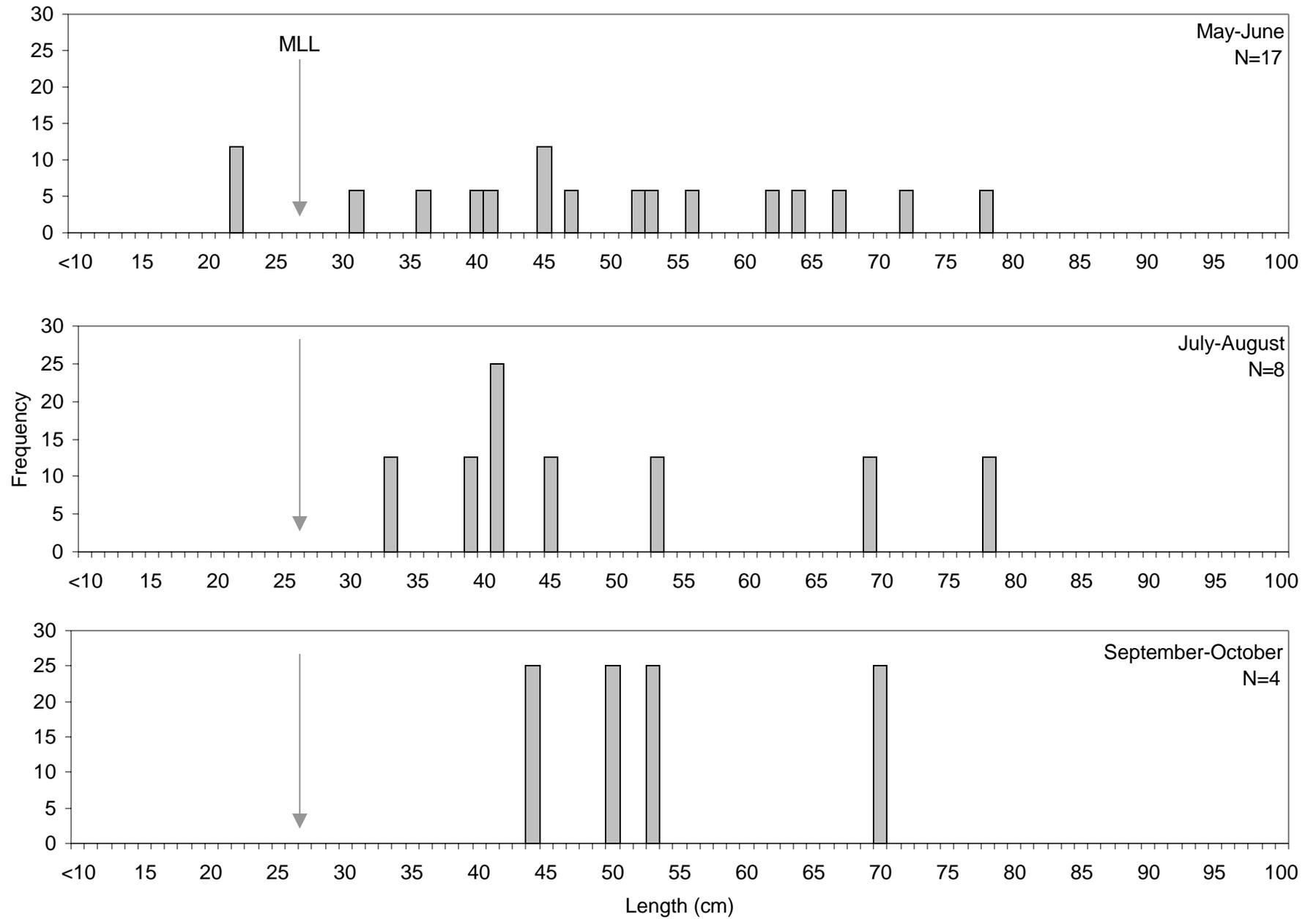
Appendix 4, figure 9. Chinook salmon length frequencies (percent of total) during the open water sport and subsistence fishery from May to October 1999 in waters of the St. Marys River. MLL denotes minimum legal limit for Michigan sport fishing.



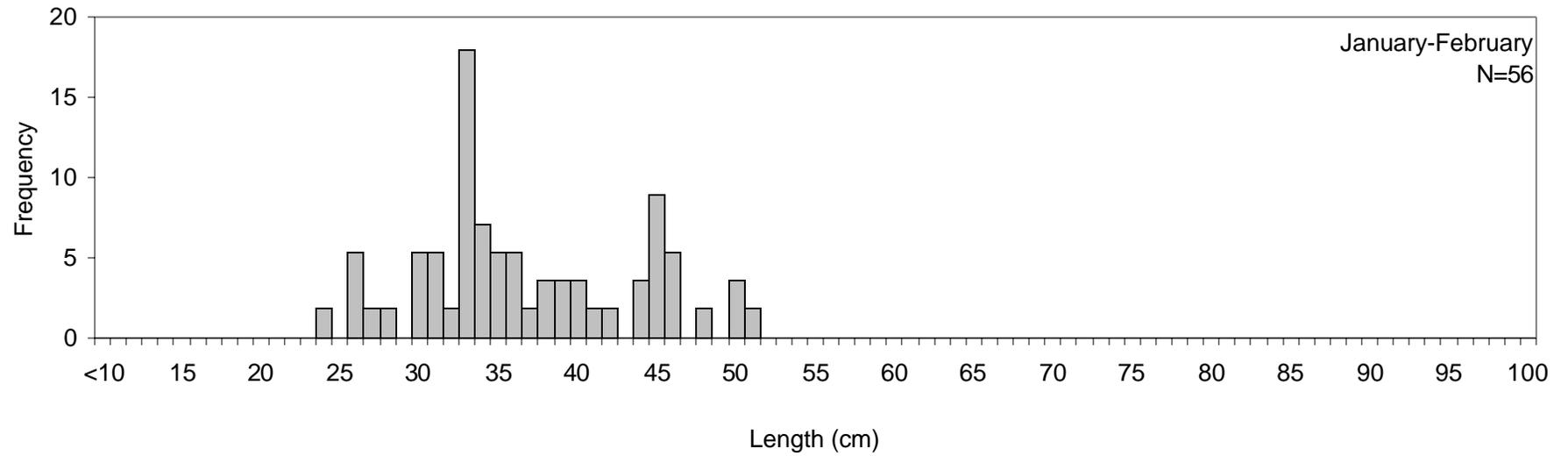
Appendix 4, figure 10. Lake whitefish length frequencies (percent of total) during the open water sport and subsistence fishery from May to October 1999 in waters of the St. Marys River.



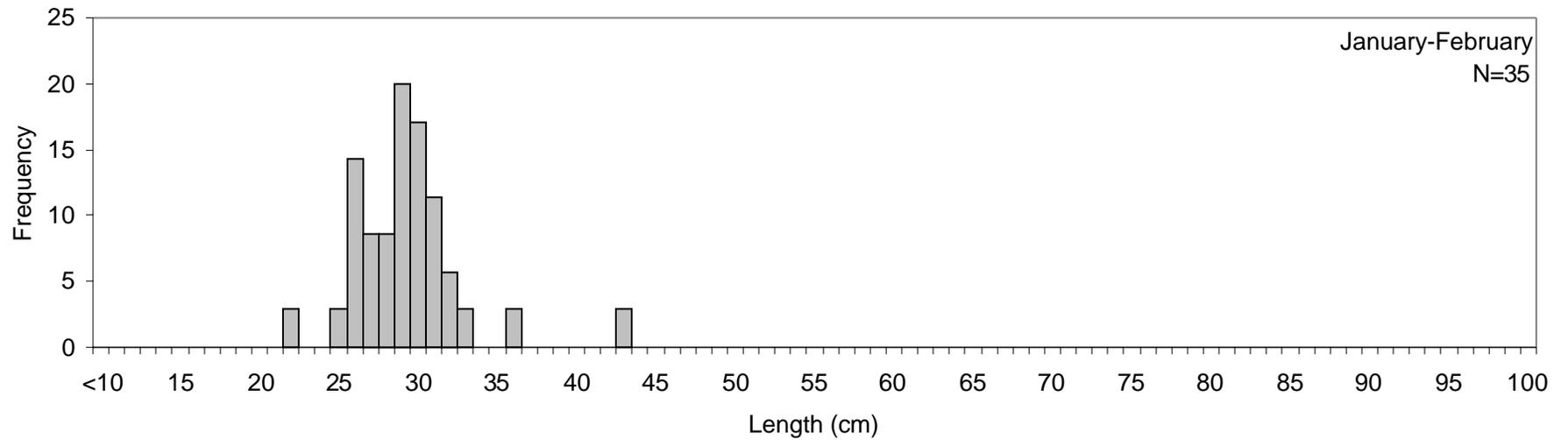
Appendix 4, figure 11. Pink salmon length frequencies (percent of total) during the open water sport and subsistence fishery from May to October 1999 in waters of the St. Marys River. MLL denotes minimum legal limit for Michigan sport fishing.



Appendix 4, figure 12. Rainbow trout length frequencies (percent of total) during the open water sport and subsistence fishery from May to October 1999 in waters of the St. Marys River. MLL denotes minimum legal limit for Michigan sport fishing.



Appendix 4, figure 13. Lake whitefish length frequencies (percent of total) during the winter ice survey in January to March 2000 in the St. Marys River.



Appendix 4, figure 14. Round whitefish length frequencies (percent of total) during the winter ice survey in January to March 2000 in the St. Marys River.

Appendix 5. Percent method and percent mode of sport anglers fishing the St. Marys River during the open water season (May – Oct.) 1999 by river reach. N denotes sample size.

Parameter	Location							
	Above locks (404)	Rapids (403)	Lake Nicolet (209)	Lake George (208)	Munuscong Bay (207)	St. Joseph Ch. (405)	Potagannissing Bay (210)	River wide (total)
Method								
Casting	7.9	29.8	16.6	10.1	2.3	40.7	5.7	14.1
Drifting	1.6	3.2	5.0	3.8	6.4	4.6	14.1	5.7
Fly Fishing	0.5	57.5	0.4					5.8
Jigging	0.5	4.8	1.0		4.3	2.3	2.1	1.8
Snagging			1.9					0.8
Spearing			0.1					<0.1
Still Fishing	68.4	4.8	50.9	9.0	30.1	4.5	41.6	38.3
Trolling	21.0		24.1	7.7	56.8	7.0	36.5	33.4
N	190	252	1,082	346	299	86	334	2,589
Mode								
Boat	73.6	1.2	41.9	77.5	88.3	22.9	83.5	54.8
Shore (or wade)	10.5	92.9	17.6	12.4	1.2	38.1	1.0	19.5
Pier/Dock	2.7		18.7		0.3	13.6	1.3	9.8
Nonboat	13.2	6.0	21.8	10.1	10.2	25.4	14.1	15.8
N	220	252	1,383	386	333	118	389	3,081

Appendix 6. Percent of party size and percent of number of trips per day made by sport anglers fishing the open water (May – Oct.) fishery in the St. Marys River, by location, 1999. N denotes sample size.

Parameter	Location							
	Above locks (404)	Rapids (403)	Lake Nicolet (209)	Lake George (208)	Munuscong Bay (207)	St. Joseph Ch. (405)	Potagannissing Bay (210)	River wide (total)
Party size								
1	34.4	38.9	49.4	15.3	13.0	33.0	18.6	34.0
2	43.2	41.7	37.7	62.8	59.2	35.2	55.1	46.5
3	14.6	13.5	10.0	16.4	19.1	19.3	15.9	13.6
4	5.2	3.6	2.2	4.0	7.4	12.5	8.1	4.5
5	2.6	1.6	0.5	1.2	1.0		1.8	1.0
6			0.3	0.3	0.3		0.3	0.2
7								
8		0.4						
9		0.4					0.3	0.1
Number of trips								
1	90.1	96.0	97.8	91.6	66.2	92.0	51.5	86.4
2	9.9	3.6	2.2	8.4	33.8	8.0	48.5	13.5
3		0.4						0.1
N	192	252	1,085	347	299	88	334	2,597