

STUDY PERFORMANCE REPORT

State: Michigan

Project No.: F-35-R-23

Study No.: 646

Title: Inland creel surveys

Period Covered: April 1, 1997 to March 31, 1998

Study Objective: To provide a consistent series of guidelines, data collection methods, and timely analysis to fisheries managers and research biologists conducting access point creel surveys on inland waters.

Summary: Creel surveys were conducted during the summer months of 1997 on Fletcher Floodwaters (Montmorency and Alpena Counties), Session Lake (Ionia County), Silver Lake (Oceana County), and two sites on the Clinton River (Macomb County). All three lakes and the river sites were surveyed to estimate angling pressure, harvest and catch by species. In addition, Fletcher Floodwaters was surveyed with particular regards towards northern pike; Sessions and Silver lakes for walleye; and the Clinton River sites for steelhead salmon.

Job 1. Title: Examine creel survey sites.

Findings: Creel surveys had been conducted at all 1997 sites during previous years. Fletcher Floodwaters was surveyed during winter 1995 (Lockwood 1996); the two Clinton River sites during spring 1996; and Sessions and Silver lakes during summer 1996 (Lockwood 1997). Consequently, these sites were not re-examined. Creel survey sites on the Clinton River were Ryan Road Bridge (T3N, R12E, Sec. 19 & 20) and Yates Dam (T3N, T12E, Sec. 18).

Approximately 60 miles of the Manistee River (Crawford and Kalkaska Counties) were examined for potential creel survey in summer, 1998. Canoeing times for 7 sections were determined (Table 1).

Flying times and techniques for a potential survey at Mullett Lake (Cheboygan County) were also determined. The lake was flown twice on June 26. The first flight was a single pass north-northwest in direction following the center line of the lake at approximately 800 ft altitude. This proved unsatisfactory as small fishing boats near east and west shores were difficult to see. Second flight followed a north-northeast direction along the center ½ of the lake, east side, at approximately 500 ft altitude. Circling near the mouth of the Cheboygan River, the return path followed a south-southwest path along the center ½ of the lake, west side, again at approximately 500 ft altitude. This second flight proved quite satisfactory as small fishing boats were easily spotted. Second flight took approximately 10 minutes to complete. Figure 1 shows counting grids for lake and approximate flight path.

Job 2. Title: Sampling intensity, techniques and proposed level of statistical significance.

Findings: Statistical significance of 75% or greater was considered appropriate by all district managers conducting surveys. Error bounds (2 SE) were calculated for each estimate and provided statistical significance, depending on distribution shape and $n \geq 10$, of 75% to 95% (Dixon and Massey 1957). Rates of precision (mean/2 SE) were not predetermined for any of the surveys. Unless otherwise noted, all estimates in this report are ± 2 SE.

Inland creel surveys conducted in 1997 depended heavily upon volunteers and volunteer data. With surveys and data of this nature certain sampling and bias concerns must be recognized. The assumption has been made that the sample of voluntarily completed interview forms represents the average fishing experience for all angling parties fishing a chosen location. To evaluate this assumption, in part, contact interviews were collected from anglers fishing Sessions Lake each Saturday during June, 1997; and from anglers fishing Silver Lake on randomly selected weekend days during April and May. Catch rates from volunteer interviews were compared with contact interviews for six species of fish (Tables 2-7). Differences in catch rate were considered significantly different when central 95% bootstrap differences (10,000) did not include 0 (Effron and Tibshirani 1993). Ten thousand iterations were selected to ensure accurate confidence limit coverage (Buckland 1984). From the 36 catch rate comparisons, voluntary interview catch rates were significantly greater 3 times (8.3%), less 1 time (2.8%) and not significantly different 32 times (88.9%). One of the major concerns with voluntary interviews is overestimation of catch rates. Significant differences $> 0.25\%$ of the time and $< 0.25\%$ of the time are expected simply by chance (assuming 95% confidence limits). Voluntary catch rates greater than contact interview catch rates 8.3% of the time indicates significant potential for catch and harvest overestimation. Catch and harvest estimates from surveys using volunteer data should be considered with this in mind.

The Clinton River sites were sampled and estimates calculated using methods quite different from traditional Michigan access site creel surveys described by Lockwood et al. (in press). Angling effort was estimated based on counts made at non-random times which were expanded by the frequency (probability) of angling parties being present (based on interviews). This method is described by McNeish and Trial (1991) and Parker (1956). The appropriateness of this method is currently being evaluated.

Beginning and ending dates, and daily times of each creel survey are given in Table 8.

Fletcher Floodwaters During sampling periods (Table 8), angling boats were counted, by airplane, once per day on each weekend day and holiday, and three randomly selected week days. All counts were recorded by grid and counting was done from approximately 500 ft altitude (Figure 2). No ordering of grid counts was done since total counting time was relatively short (< 10 min) and boat movement was not considered relevant. Fishing trip information (interviews) were voluntarily reported by anglers fishing Fletcher Floodwaters. Resort owners on Fletcher Floodwaters provided anglers residing at their respective resorts with interview forms and signs were posted at the public launch site requesting that anglers obtain interview forms at a nearby store. Caught-and-released fish as well as harvested fish were recorded. Estimated angling effort (hours and trips) and catch were calculated using the methods for multiple day estimates found in Lockwood et al. (in press). Angling effort was estimated by grid for each time period (day type within a month) and grid effort estimates

were then summed within each time period. Interview records were recorded by time period for the entire lake, rather than by grid. Catch and harvest was then estimated for entire lake by time period.

Sessions Lake^{3/4}This was a cooperative creel survey between Fisheries Division and Ionia Recreation Area (MDNR Parks Division). Park employees counted boat trailers (and any other vehicles which appeared to have transported water craft) at the launch site and shore anglers for the entire lake. Each day, within the beginning and ending survey dates (Table 8), was sampled and two counts were made each day. Interview post cards were made available at the launch site and cards were distributed to shore anglers. Cards could be dropped off at the Park office or in a drop box at the launch site. Also, an intern student from the University of Michigan interviewed anglers each Saturday during the month of June. Caught-and-released fish as well as harvested fish were recorded. Estimated angling effort (hours and trips) and catch were calculated using methods for multiple day estimates found in Lockwood et al. (in press).

Silver Lake^{3/4}Similar to Sessions Lake, this was a joint survey between Fisheries Division and Silver Lake State Park. Park employees counted fishing and non-fishing water craft twice each day between the beginning and ending survey dates (Table 8). Interview post cards were available to anglers at eight access locations around the lake. Cards could be dropped off at the Park office or in any of eight drop boxes at the access sites. Also, an intern student from Grand Valley State University interviewed anglers on randomly selected weekend days during April and May. Caught-and-released fish as well as harvested fish were recorded. Estimated angling effort (hours and trips) and catch were calculated using methods for multiple day estimates found in Lockwood et al. (in press).

Clinton River Sites^{3/4}The Clinton River creel survey was a cooperative survey between Fisheries Division and members of a local sportfishing club. Volunteers visited the two sites as often as possible during survey periods (Table 8), and counted vehicles at the access sites and placed post-paid interview cards on windshields of any vehicles present. Both number of harvested and released steelhead were voluntarily recorded on interview cards. Interviews and vehicle counts were recorded separately for each site, no pooling of data was done. Hourly counts were expanded by the probability of a vehicle being present. Probabilities were derived from the distribution of angler party interviews for a given time period. These methods follow those described by McNeish and Trial (1991) and Parker (1956).

Job 3. Title: Prepare stratified-random schedules.

Schedules were prepared and distributed to appropriate district personnel. Random numbers used in schedule preparation were derived from the dBase IV random number function or tables of random numbers found in Arkin and Colton (1962).

Sampling of Clinton River sites did not follow a schedule.

Job 4. Title: Train creel clerks.

Resort owners on Fletcher Floodwaters were given verbal and written instructions regarding interview forms and counting methods. Written instructions were prepared with information pertinent to each lake or river and distributed to appropriate personnel for Sessions and Silver Lakes, and Clinton River sites. Additional training was provided for the two interns collecting data on Sessions and Silver lakes.

Job 5. Title: Supervise count and interview data processing, and quality control.

Count and interview data were sent to the Institute for Fisheries Research bi-weekly. Each form was inspected, within two weeks of receipt, for completeness and possible coding errors (incorrect site code for example). Data were then entered onto computer media and randomly selected records were spot-checked for accuracy.

Clinton River count and interview data were entered onto computer media by District 14 personnel and sent to the Institute for Fisheries Research following the end of the survey period.

Job 6. Title: Calculate and distribute catch and pressure estimates.

Multiple-day estimates for each inland creel survey were calculated using the expansion factors given in Table 9, referred to as "F" by Lockwood et al (in press). These expansion factors are the product of hours sampled over multiple-day periods at each site or lake and number of days within that period.

Unless otherwise noted, catch estimates are estimated harvest.

Fletcher Floodwaters—Boat anglers on Fletcher Floodwaters fished 171,521 ($\pm 13,786$) hours and harvested 3,332 (± 660) northern pike (Table 10). An additional 14,203 ($\pm 1,808$) northern pike were caught and released. Planted northern pike made up 3.23% ($\pm 1.14\%$) of all pike caught (Table 11).

Sessions Lake—Total angling effort on Sessions Lake was 33,561 ($\pm 3,267$) hours (Table 12). Anglers harvested 939 (± 612) walleye and caught-and-released an additional 3,780 ($\pm 1,554$) walleye. Boat angling was the predominant fishing mode with 25,174 ($\pm 3,103$) hours of effort (Table 13). Shore anglers fished 8,387 ($\pm 1,021$) hours (Table 14).

Silver Lake—Boat anglers on Silver Lake fished 15,328 ($\pm 1,723$) hours, harvested 3,166 (± 860) walleye and caught-and-released an additional 1,188 (± 571) walleye (Table 15). Pleasure craft operators (non-fishing) spent 121,401 ($\pm 45,237$) hours on Silver Lake (Table 16). Total water craft activity during sample period was 136,729 ($\pm 45,270$) hours (Table 17).

Clinton River sites—Anglers at the Ryan Road site harvested 8 (± 16) steelhead salmon, caught-and-released an additional 485 (± 345) steelhead salmon and fished 6,808 ($\pm 1,557$) hours (Table 18). Anglers at the Yates Dam site harvested 237 (± 148) steelhead salmon,

caught-and-released an additional 967 (± 402) steelhead salmon and fished 14,343 ($\pm 2,416$) hours (Table 19).

Job 7. Title: Prepare annual report.

This report was prepared on schedule.

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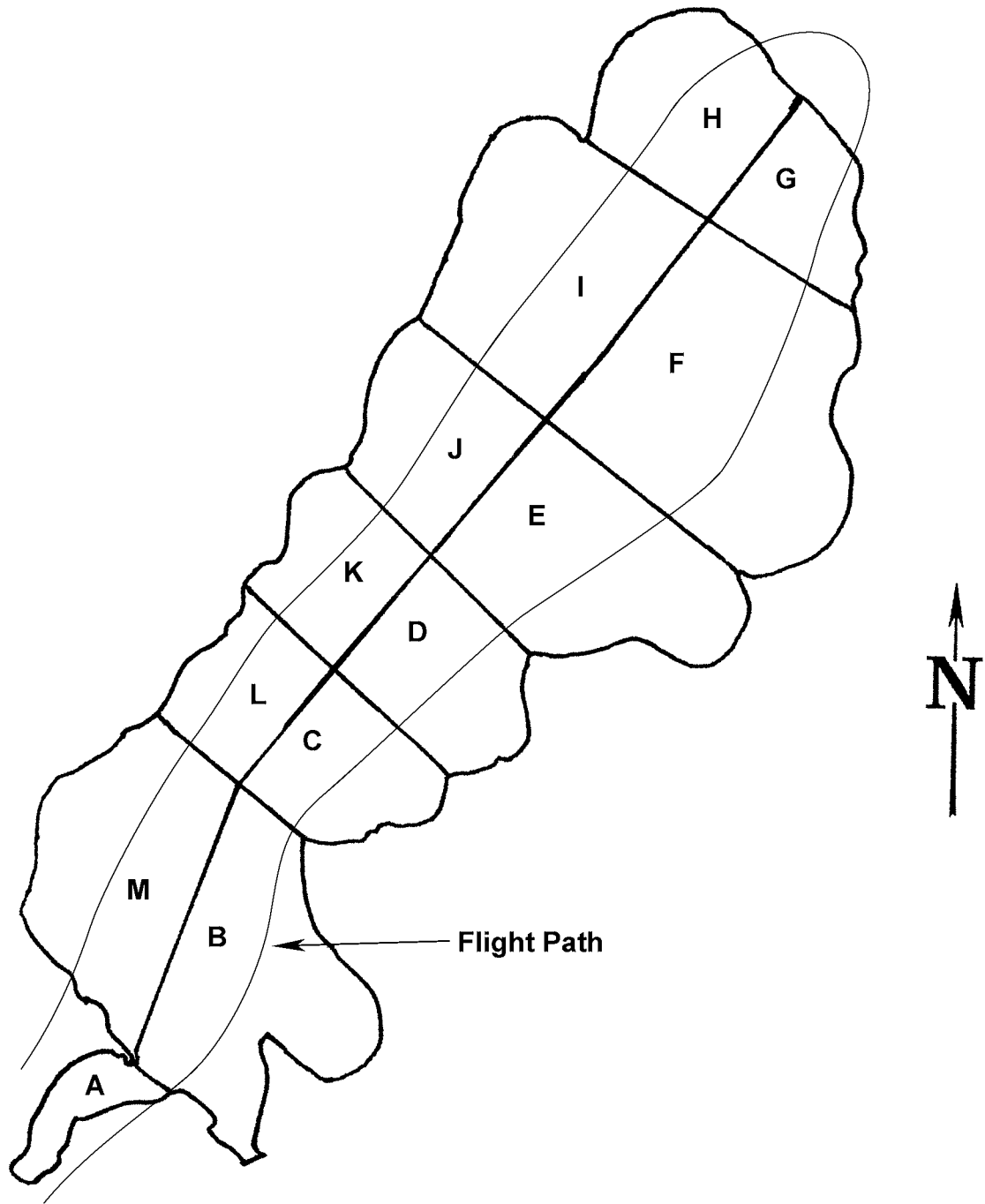


Figure 1. Mullett Lake grids (A-M, separated by solid lines) and flight path. Estimated angling pressure and catch will be estimated by grid. Fishing boats are counted within each grid from airplane flying at 500 ft elevation along flight path.

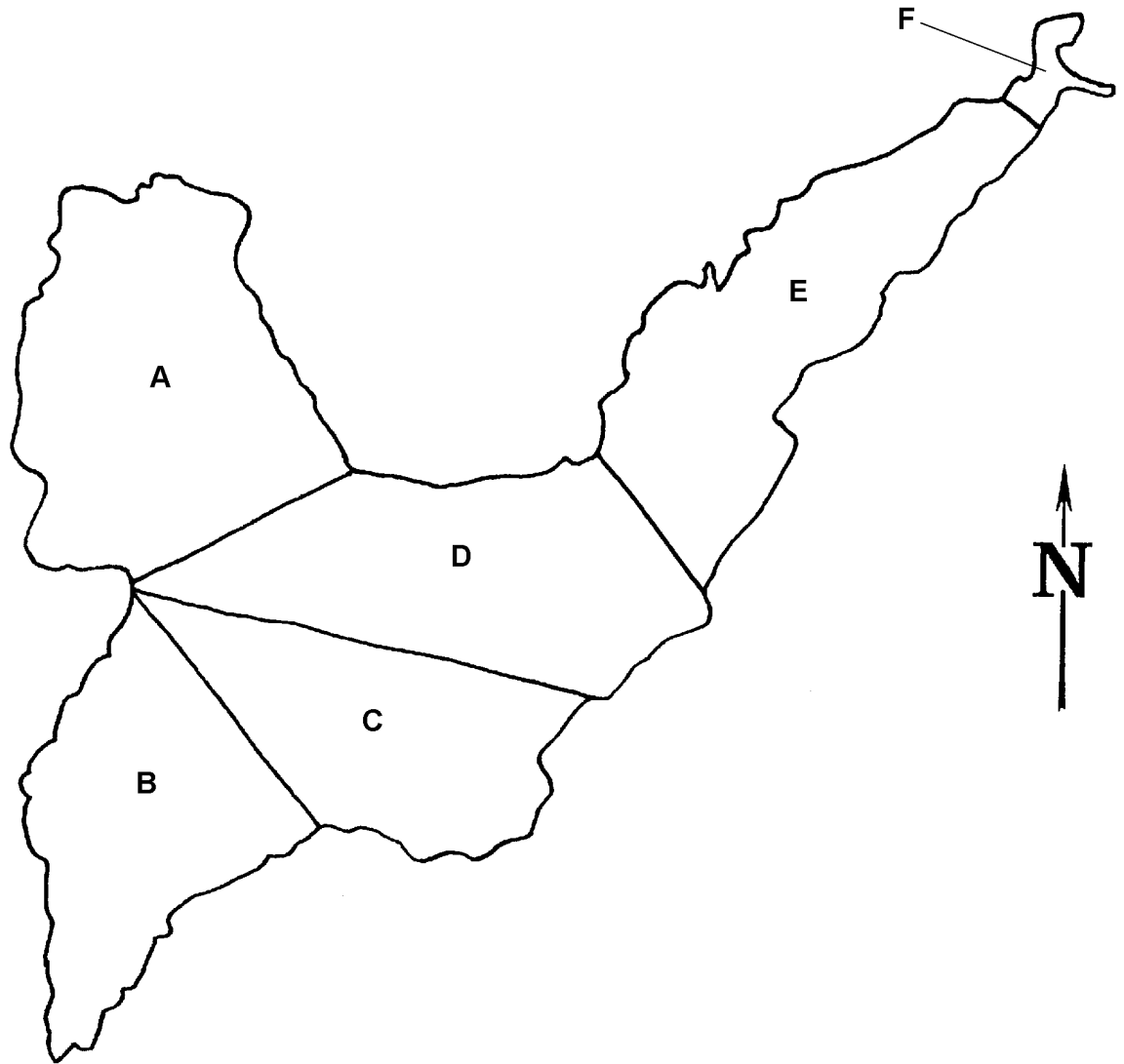


Figure 2. Fletcher Floodwaters grids (A-F), separated by solid lines, used for estimating angling effort. Estimated catch and harvest were product of catch rate (for entire lake) and angling effort summed for all grids.

Table 1.—Canoeing times for 7 sites on the upper Manistee River.

Section Description	Canoeing Time (h)
Deward to Cameron Bridge	2.0
Cameron Bridge to 612 Bridge	1.0
612 Bridge to Goose Creek	1.5
Goose Creek to M-72 Bridge	2.0
M-72 Bridge to Yellow Trees Landing	3.5
Yellow Trees Landing to CCC Bridge	2.5
CCC Bridge To Upper Sharon Bridge	3.0

Table 2.—Catch rates of fish (number/hour) released by boat anglers fishing at Silver Lake, April weekends, 1997. Differences in catch rates (Δ) significant at $\alpha=0.05$ are noted with “*”. Range represents 95% confidence limits from bootstrap percentiles.

Species	Clerk Contact	Voluntary	Δ	Δ Range	
				Min	Max
Bass sp	0.0119	0.0053	0.0066	-0.0168	0.0348
Crappie sp	0.0000	0.0211	-0.0211	-0.0886	0.0000
Panfish	0.0119	0.0579	-0.0460	-0.1731	0.0246
Walleye	0.0000	0.0579	-0.0579*	-0.1948	-0.0091
Yellow Perch	0.0000	0.0000	0.0000	—	
Northern Pike	0.0000	0.0790	-0.0790*	-0.1857	-0.0234

Table 3.—Catch rates of fish (number/hour) kept by boat anglers fishing at Silver Lake, April weekends, 1997. Differences in catch rates (Δ) significant at $\alpha=0.05$ are noted with “*”. Range represents 95% confidence limits from bootstrap percentiles.

Species	Clerk Contact	Voluntary	Δ	Δ Range	
				Min	Max
Bass sp	0.0000	0.0000	0.0000	—	
Crappie sp	0.0000	0.0000	0.0000	—	
Panfish	0.0000	0.0000	0.0000	—	
Walleye	0.0476	0.2320	-0.1844*	-0.4502	-0.0129
Yellow Perch	0.0000	0.0211	-0.0211	-0.0366	0.0000
Northern Pike	0.0000	0.0105	-0.0105	-0.0312	0.0000

Table 4.—Catch rates of fish (number/hour) released by boat anglers fishing at Silver Lake, May weekends, 1997. Range represents 95% confidence limits from bootstrap percentiles.

Species	Clerk Contact	Voluntary	Δ	Δ Range	
				Min	Max
Bass sp	0.0336	0.0195	0.0141	-0.0584	0.1169
Crappie sp	0.0000	0.0000	0.0000	—	
Panfish	0.0000	0.0454	-0.0454	-0.1344	0.0000
Walleye	0.0000	0.0195	-0.0195	-0.0769	0.0000
Yellow Perch	0.0000	0.0000	0.0000	—	
Northern Pike	0.0000	0.0390	-0.0390	-0.0845	0.0000

Table 5.—Catch rates of fish (number/hour) kept by boat anglers fishing at Silver Lake, May weekends, 1997. Range represents 95% confidence limits from bootstrap percentiles.

Species	Clerk Contact	Voluntary	Δ	Δ Range	
				Min	Max
Bass sp	0.0336	0.0000	0.0336	0.0000	0.0760
Crappie sp	0.0000	0.0185	-0.0185	-0.0112	0.0000
Panfish	0.0000	0.0779	-0.0779	-0.1863	0.0000
Walleye	0.0673	0.1560	-0.0887	-0.3955	0.1405
Yellow Perch	0.0000	0.0000	0.0000	—	
Northern Pike	0.0000	0.0000	0.0000	—	

Table 6.—Catch rates of fish (number/hour) released by boat anglers fishing at Sessions Lake, June weekends, 1997. Differences in catch rates (Δ) significant at $\alpha=0.05$ are noted with “*”. Range represents 95% confidence limits from bootstrap percentiles.

Species	Clerk Contact	Voluntary	Δ	Δ Range	
				Min	Max
Bass sp	0.0362	0.1150	-0.0788	-0.0114	0.1318
Crappie sp	0.0121	0.0096	0.0025	-0.0314	0.0313
Panfish	0.1960	0.0048	0.1912*	0.0285	0.5410
Walleye	0.0332	0.1390	-0.1058	-0.2122	0.0233
Yellow Perch	0.0211	0.0192	0.0019	-0.0387	0.0247
Northern Pike	0.0000	0.0048	-0.0048	-0.0140	0.0000

Table 7.—Catch rates of fish (number/hour) kept by boat anglers fishing at Sessions Lake, June weekends, 1997. Range represents 95% confidence limits from bootstrap percentiles.

Species	Clerk Contact	Voluntary	Δ	Δ Range	
				Min	Max
Bass sp	0.0091	0.0048	0.0043	-0.0142	0.0319
Crappie sp	0.0362	0.4030	-0.3668	-0.7718	0.0044
Panfish	0.0392	0.0528	-0.0136	-0.1131	0.1097
Walleye	0.0000	0.1010	-0.1010	-0.2365	0.0000
Yellow Perch	0.0302	0.0768	-0.0466	-0.1736	0.0579
Northern Pike	0.0000	0.0000	0.0000	—	

Table 8.—Dates and daily sampling times for angler surveys conducted in 1997. For months with differing week and weekend sampling times, week days are denoted as “wd” and weekend days as “we”.

Month	Survey dates/ times				
	Fletcher Floodwaters	Sessions Lake	Silver Lake	Clinton River	
				Ryan Road	Yates Dam
February					15-28 10a-6p wd 7a-12n we
March				1-31 7a-9p wd 7a-8p we	1-31 6a-8p wd 6a-7p we
April		26-30 8a-6p wd 8a-8p we	26-30 8a-7p	1-30 8a-8p wd 7a-9p we	1-30 6a-8p wd 5a-8p we
May	17-31 6a-9p	1-31 8a-8p	1-31 8a-9p		
June	1-30 5a-10p	1-30 8a-11p	1-30 8a-9p		
July	1-31 5a-10p	1-31 8a-11p	1-31 8a-9p		
August	1-31 6a-9p	1-31 8a-11p	1-31 8a-9p		
September	1 6a-9p	1 8a-11p	1 8a-9p		

Table 9.—Expansion factors used to calculate inland creel survey estimates in 1997. For months with differing week and weekend sampling times, week days are denoted as “wd” and weekend days as “we”.

Expansion Factor "F"			
Month	Fletcher Floodwaters	Sessions Lake	Silver Lake
April		33 wd 26 we	60
May	272	403	434
June	540	480	420
July	558	496	434
August	512	496	434
September	16	16	14

Table 10.—Estimated catch per hour, harvest, catch and release, angler hours, and angler trips by month and season for Fletcher Floodwaters, May 17 through September 1, 1997. Two standard errors are given in parenthesis.

Species	Catch/Hour	May	June	July	Aug+Sep	Season
Northern pike harvested	0.0194 (0.0041)	284 (131)	472 (143)	953 (276)	1,623 (567)	3,332 (660)
Northern pike released	0.0828 (0.0125)	936 (325)	3,432 (663)	4,283 (915)	5,552 (1,373)	14,203 (1,808)
Yellow perch harvested	0.2729 (0.0442)	2,126 (945)	12,533 (2,491)	15,240 (33,22)	16,914 (5,019)	46,813 (6,582)
Yellow perch released	1.1110 (0.1818)	4,605 (1,692)	45,774 (7,856)	67,119 (13,358)	73,059 (22,251)	190,557 (27,168)
Black crappie harvested	0.0180 (0.0071)	772 (1,012)	865 (334)	644 (244)	801 (482)	3,082 (1,195)
Black crappie released	0.0381 (0.0091)	380 (433)	1,706 (679)	2,329 (906)	2,120 (820)	6,535 (1463)
Bluegill harvested	0.2314 (0.0497)	1,831 (1,120)	9,007 (2,019)	13,607 (3,407)	15,241 (6,743)	39,686 (7,900)
Bluegill released	0.4647 (0.0736)	1,927 (889)	21,527 (4,056)	32,132 (6,614)	24,126 (7,565)	79,712 (10,873)
Sunfish sp harvested	0.0824 (0.0163)	588 (450)	3,910 (932)	5,442 (1,623)	4,194 (1,669)	14,134 (2,548)
Sunfish sp released	0.3042 (0.0515)	1,226 (587)	15,016 (2,926)	18,387 (4,458)	17,554 (5,631)	52,183 (7,777)
Rock bass harvested	0.0290 (0.0063)	73 (63)	2,154 (551)	1,620 (525)	1,129 (658)	4,976 (1,008)
Rock bass released	0.2140 (0.0324)	1,185 (700)	19,252 (3,748)	11,543 (2,332)	4,724 (1,456)	36,704 (4,701)
Smallmouth bass harvested	0.0043 (0.0023)	67 (92)	160 (145)	247 (212)	272 (284)	746 (394)
Smallmouth bass released	0.0135 (0.0029)	168 (100)	744 (230)	818 (236)	584 (293)	2,314 (452)

Table 10.—continued.

Species	Catch/Hour	May	June	July	Aug+Sep	Season
Largemouth bass harvested	0.0208 (0.0042)	327 (155)	1355 (344)	1,000 (305)	890 (456)	3,572 (666)
Largemouth bass released	0.0871 (0.0127)	1,039 (384)	6,178 (1,202)	4,629 (960)	3,093 (890)	14,939 (1,818)
White sucker harvested	0.0001 (0.0002)	0 (0)	0 (0)	21 (51)	0 (0)	21 (51)
White sucker released	0.0001 (0.0000)	0 (0)	0 (0)	9 (2)	0 (0)	9 (2)
Brown bullhead harvested	0.0101 (0.0059)	9 (2)	165 (102)	1,289 (974)	276 (239)	1,739 (1,008)
Brown Bullhead released	0.0059 (0.0019)	37 (51)	199 (89)	562 (241)	220 (185)	1,018 (321)
Total harvested	0.6886 (0.0838)	6,078 (1,852)	30,622 (3,425)	40,062 (5,174)	41,339 (8,647)	118,101 (10,803)
Total released	2.3214 (0.2589)	1,1504 (2,223)	113,828 (10,158)	141,810 (15,817)	131,033 (24,282)	398,175 (30,788)
Total catch	3.0100 (0.3078)	17,581 (2,893)	144,451 (10,720)	181,872 (16,642)	172,373 (25,776)	516,277 (32,629)
Angler hours		19,391 (5,325)	49,199 (6,605)	56,103 (7,584)	46,828 (7,782)	171,521 (13,786)
Angler trips		4,533 (1,258)	11,093 (1,532)	13,784 (1,963)	11,313 (2,104)	40,723 (3,494)
Percent of anglers interviewed		9.16% (2.54%)	6.93% (0.96%)	4.66% (0.66%)	2.51% (0.47%)	5.18% (0.44%)

Table 11.—Estimated catch per hour, total catch of all northern pike (feral and planted), planted northern pike, and percentage of planted northern pike in total pike catch by month and season for Fletcher Floodwaters, May 17 through September 1, 1997. Two standard errors are given in parenthesis.

	Catch/Hour	May	June	July	Aug+Sep	Season
All northern pike						
Harvested	0.0194 (0.0041)	284 (131)	472 (143)	953 (276)	1,623 (567)	3,332 (660)
Released	0.0828 (0.0125)	936 (325)	3432 (663)	4,283 (915)	5,552 (1,373)	14,203 (1,808)
Total	0.1022 (0.0139)	1,220 (350)	3,904 (678)	5,236 (956)	7,175 (1,485)	17,535 (1,925)
Planted northern pike						
Harvested	0.0001 (0.0002)	0 (0)	14 (20)	10 (20)	0 (0)	24 (28)
Released	0.0032 (0.0011)	9 (18)	193 (83)	76 (59)	264 (157)	542 (188)
Total	0.0033 (0.0011)	9 (18)	206 (86)	87 (62)	264 (157)	566 (190)
Percentage planted northern pike in catch						
Harvested		0.00% (0.00%)	2.97% (4.33%)	1.05% (2.12%)	0.00% (0.00%)	0.72% (0.85%)
Released		0.96% (1.95%)	5.62% (2.65%)	1.77% (1.43%)	4.76% (3.06%)	3.82% (1.41%)
Total		0.74% (1.49%)	5.28% (2.39%)	1.66% (1.22%)	3.68% (2.32%)	3.23% (1.14%)

Table 12.—Estimated catch per hour, total catch and angling effort by month and season for all modes of angling at Sessions Lake in 1997. Two standard errors are given in parenthesis.

Species	Catch/Hour	April	May	June	July	Aug+Sep	Season
Bass sp harvested	0.0079 (0.0064)	0 (0)	126 (152)	113 (141)	25 (54)	0 (0)	264 (214)
Bass sp released	0.1702 (0.1407)	215 (107)	514 (452)	564 (310)	195 (175)	4,224 (4,653)	5,712 (4,690)
Crappie sp harvested	0.1524 (0.0914)	0 (0)	3,115 (2,445)	1,555 (1,577)	444 (840)	0 (0)	5,114 (3,028)
Crappie sp released	0.0326 (0.0324)	0 (0)	602 (1,004)	170 (164)	184 (260)	138 (266)	1,094 (1,083)
Panfish harvested	0.1415 (0.0953)	0 (0)	925 (1,746)	3,002 (2,099)	753 (1,591)	69 (176)	4,749 (3,165)
Panfish released	0.1450 (0.1302)	0 (0)	891 (1,320)	1,632 (1,556)	559 (558)	1,786 (3,797)	4,868 (4,347)
Walleye harvested	0.0280 (0.0185)	212 (104)	244 (186)	351 (525)	73 (115)	59 (202)	939 (612)
Walleye released	0.1126 (0.0476)	222 (110)	807 (445)	2,038 (1,125)	160 (294)	553 (923)	3,780 (1,554)
Yellow perch harvested	0.1205 (0.1055)	0 (0)	278 (419)	3,348 (3,380)	73 (163)	346 (877)	4,045 (3,521)
Yellow perch released	0.0302 (0.0242)	0 (0)	33 (55)	684 (785)	112 (145)	185 (106)	1,014 (807)
Channel catfish harvested	0.0007 (0.0015)	0 (0)	0 (0)	0 (0)	25 (54)	0 (0)	25 (54)
Channel catfish released	0.0023 (0.0024)	0 (0)	0 (0)	28 (44)	49 (68)	0 (0)	77 (81)
Carp harvested	0.0115 (0.0188)	0 (0)	0 (0)	386 (631)	0 (0)	0 (0)	386 (631)
Carp released	0.0004 (0.0007)	4 (12)	10 (23)	0 (0)	0 (0)	0 (0)	14 (26)

Table 12.—continued.

	Catch/Hour	April	May	June	July	Aug+Sep	Season
Total released	0.4934 (0.2058)	441 (154)	2,857 (1,776)	5,115 (2,104)	1,260 (722)	6,886 (6,082)	16,559 (6,717)
Total harvested	0.4625 (0.1755)	212 (104)	4,688 (3,044)	8,755 (4,360)	1,392 (1,811)	474 (917)	15,521 (5,693)
Total catch	0.9559 (0.2784)	652 (186)	7,545 (3,523)	13,871 (4,842)	2,652 (1,950)	7,360 (6,151)	32,080 (8,805)
Angler hours		1,608 (324)	5,874 (1,120)	12,278 (2,261)	7,377 (1,613)	6,424 (1,265)	33,561 (3,267)
Angler trips		447 (114)	1,458 (323)	2,688 (694)	1,525 (534)	2,078 (1,019)	8,196 (1,387)

Table 13.—Estimated catch per hour, catch and angling effort by boat anglers fishing Sessions Lake in 1997. Two standard errors are given in parenthesis.

Species	Catch/Hour	April	May	June	July	Aug+Sep	Season
Bass sp harvested	0.0105 (0.0086)	0 (0)	126 (152)	113 (141)	25 (54)	0 (0)	264 (214)
Bass sp released	0.0797 (0.0535)	0 (0)	514 (452)	408 (228)	195 (175)	889 (1,210)	2,006 (1,323)
Crappie sp harvested	0.1581 (0.1037)	0 (0)	1,980 (1,837)	1,555 (1,577)	444 (840)	0 (0)	3,979 (2,563)
Crappie sp released	0.0390 (0.0426)	0 (0)	602 (1,004)	170 (164)	73 (181)	138 (266)	983 (1,067)
Panfish harvested	0.1064 (0.0883)	0 (0)	93 (216)	1,763 (1,489)	753 (1,591)	69 (176)	2,678 (2,197)
Panfish released	0.0900 (0.0673)	0 (0)	323 (449)	1,321 (1,469)	504 (550)	118 (362)	2,266 (1,671)
Walleye harvested	0.0274 (0.0240)	0 (0)	206 (166)	351 (525)	73 (115)	59 (202)	689 (598)
Walleye released	0.1321 (0.0612)	0 (0)	807 (445)	1,805 (1,032)	160 (294)	553 (923)	3,325 (1,484)
Yellow perch harvested	0.0487 (0.0438)	0 (0)	13 (28)	795 (630)	73 (163)	346 (877)	1,227 (1,092)
Yellow perch released	0.0144 (0.0088)	0 (0)	33 (55)	217 (150)	112 (145)	0 (0)	362 (216)
Channel catfish harvested	0.0010 (0.0022)	0 (0)	0 (0)	0 (0)	25 (54)	0 (0)	25 (54)
Channel catfish released	0.0031 (0.0033)	0 (0)	0 (0)	28 (44)	49 (68)	0 (0)	77 (81)
Carp released	0.0004 (0.0009)	0 (0)	10 (23)	0 (0)	0 (0)	0 (0)	10 (23)

Table 13.—continued.

	Catch/Hour	April	May	June	July	Aug+Sep	Season
Total released	0.3587 (0.1203)	0 (0)	2,289 (1,271)	3,949 (1,823)	1,093 (691)	1,698 (1,586)	9,029 (2,816)
Total harvested	0.3520 (0.1496)	0 (0)	2,418 (1,864)	4,578 (2,323)	1,392 (1,811)	474 (917)	8,862 (3,604)
Total catch	0.7107 (0.2017)	0 (0)	4,707 (2,255)	8,527 (2,953)	2,485 (1,939)	2,172 (1,833)	17,891 (4,574)
Angler hours		1,350 (306)	4,041 (997)	9,456 (2,169)	5,299 (1,529)	5,028 (1,225)	25,174 (3,103)
Angler trips		395 (106)	1,051 (280)	1,978 (498)	1,152 (412)	1,257 (457)	5,833 (846)

Table 14.—Estimated catch per hour, catch and angling effort by shore anglers fishing Sessions Lake in 1997. Two standard errors are given in parenthesis.

Species	Catch/Hour	April	May	June	July	Aug+Sep	Season
Bass sp released	0.4419 (0.5391)	215 (107)	0 (0)	156 (210)	0 (0)	3,335 (4,493)	3,706 (4,499)
Crappie sp harvested	0.1353 (0.1931)	0 (0)	1,135 (1,614)	0 (0)	0 (0)	0 (0)	1,135 (1,614)
Crappie sp released	0.0132 (0.0222)	0 (0)	0 (0)	0 (0)	111 (186)	0 (0)	111 (186)
Panfish sp harvested	0.2469 (0.2734)	0 (0)	832 (1,733)	1,239 (1,480)	0 (0)	0 (0)	2,071 (2,279)
Panfish sp released	0.3102 (0.4799)	0 (0)	568 (1,241)	311 (514)	55 (93)	1,668 (3,780)	2,602 (4,013)
Walleye harvested	0.0298 (0.0163)	212 (104)	38 (83)	0 (0)	0 (0)	0 (0)	250 (133)
Walleye released	0.0543 (0.0553)	222 (110)	0 (0)	233 (447)	0 (0)	0 (0)	455 (460)
Yellow perch harvested	0.3360 (0.4012)	0 (0)	265 (418)	2,553 (3,321)	0 (0)	0 (0)	2,818 (3,347)
Yellow perch released	0.0777 (0.0932)	0 (0)	0 (0)	467 (771)	0 (0)	185 (106)	652 (778)
Carp harvested	0.0460 (0.0754)	0 (0)	0 (0)	386 (631)	0 (0)	0 (0)	386 (631)
Carp released	0.0005 (0.0015)	4 (12)	0 (0)	0 (0)	0 (0)	0 (0)	4 (12)

Table 14.—continued.

	Catch/Hour	April	May	June	July	Aug+Sep	Season
Total released	0.8978 (0.7352)	441 (154)	568 (1,241)	1,166 (1,050)	167 (208)	5,188 (5,872)	7,530 (6,098)
Total harvested	0.7940 (0.5342)	212 (104)	2,270 (2,406)	4,177 (3,690)	0 (0)	0 (0)	6,659 (4,406)
Total catch	1.6918 (0.9204)	652 (186)	2,838 (2,707)	5,344 (3,837)	167 (208)	5,188 (5,872)	14,189 (7,524)
Angler hours		258 (106)	1,833 (510)	2,822 (638)	2,078 (515)	1,396 (314)	8,387 (1,021)
Angler trips		52 (41)	407 (162)	710 (484)	373 (339)	821 (911)	2,363 (1,099)

Table 15.—Estimated catch per hour, catch, harvest and angling effort for boat anglers on Silver Lake, 1997. Two standard errors are given in parenthesis.

Species	Catch/Hour	April	May	June	July	Aug+Sep	Season
Bass sp harvested	0.0063 (0.0056)	0 (0)	21 (24)	26 (41)	50 (71)	0 (0)	97 (85)
Bass sp released	0.0202 (0.0144)	9 (6)	39 (40)	99 (137)	126 (153)	37 (64)	310 (219)
Crappie sp harvested	0.0283 (0.0320)	0 (0)	32 (48)	136 (280)	229 (389)	37 (77)	434 (488)
Crappie sp released	0.0123 (0.0093)	18 (39)	45 (64)	86 (95)	40 (73)	0 (0)	189 (141)
Panfish sp harvested	0.0095 (0.0088)	0 (0)	107 (118)	19 (18)	19 (59)	0 (0)	145 (133)
Panfish sp released	0.0630 (0.0979)	55 (94)	60 (48)	63 (60)	103 (107)	684 (1487)	965 (1496)
Walleye harvested	0.2066 (0.0607)	220 (207)	824 (420)	385 (221)	1,177 (612)	560 (311)	3,166 (860)
Walleye released	0.0775 (0.0383)	50 (73)	209 (131)	643 (523)	135 (133)	151 (113)	1,188 (571)
Yellow perch harvested	0.0248 (0.0198)	5 (3)	23 (25)	43 (53)	252 (284)	57 (77)	380 (300)
Yellow perch released	0.0271 (0.0232)	0 (0)	0 (0)	12 (35)	196 (255)	208 (241)	416 (353)
Northern pike harvested	0.0143 (0.0110)	9 (6)	68 (116)	63 (52)	79 (108)	0 (0)	219 (167)
Northern pike released	0.0983 (0.0329)	69 (69)	620 (299)	609 (323)	209 (166)	0 (0)	1,507 (475)
Channel catfish harvested	0.0025 (0.0041)	0 (0)	0 (0)	19 (18)	19 (59)	0 (0)	38 (62)

Table 15.—continued.

Species	Catch/Hour	April	May	June	July	Aug+Sep	Season
Total harvested	0.2922 (0.0766)	234 (207)	1,075 (455)	691 (368)	1,825 (794)	654 (330)	4,479 (1,060)
Total released	0.2985 (0.1176)	201 (143)	973 (338)	1,512 (641)	809 (388)	1,080 (1,512)	4,575 (1,727)
Total catch	0.5907 (0.1479)	435 (252)	2,048 (567)	2,203 (739)	2,634 (884)	1,734 (1,547)	9,054 (2,026)
Angler hours		1,333 (696)	3,056 (744)	2,617 (608)	4,085 (842)	4,237 (924)	15,328 (1,723)
Angler trips		245 (133)	736 (231)	641 (181)	872 (217)	881 (331)	3,375 (510)
Fishing craft hours		558 (288)	1,904 (334)	1,456 (218)	1,918 (288)	1,883 (274)	7,719 (632)
Average count		9.3 (7.2)	4.4 (0.9)	3.5 (0.4)	4.4 (0.6)	4.0 (0.6)	4.3 (0.4)

Table 16.—Estimated pleasure craft (non-fishing) activity by month and season on Silver Lake, 1997. Two standard errors are given in parenthesis.

Pleasure craft effort	April	May	June	July	Aug+Sep	Season
Person hours	0 (0)	2,607 (1,866)	25,707 (17,858)	63,079 (37,866)	30,008 (17,035)	121,401 (45,237)
Craft hours	0 (0)	560 (270)	5,523 (2,487)	13,552 (3,847)	6,447 (1,329)	26,082 (4,777)
Average count	0.0 (0.0)	1.3 (1.1)	13.2 (10.0)	29.9 (13.9)	13.9 (4.3)	14.0 (4.4)

Table 17.—Estimated total craft (non-fishing plus fishing) activity by month and season on Silver Lake, 1997. Two standard errors are given in parenthesis.

Pleasure craft effort	April	May	June	July	Aug+Sep	Season
Person hours	1,333 (696)	5,663 (2,009)	28,324 (17,868)	67,164 (37,875)	34,245 (17,060)	136,729 (45,270)
Craft hours	558 (288)	2,464 (429)	6,979 (2,497)	15,470 (3,858)	8,330 (1,357)	33,801 (4,820)
Average count	9.3 (7.2)	5.7 (1.4)	16.7 (10.0)	34.3 (13.9)	17.9 (4.3)	18.3 (4.4)

Table 18.—Estimated catch per hour, catch, harvest and angling effort by month and season, at the Ryan Road survey site on the Clinton River, 1997. Two standard errors are given in parenthesis.

Species	Catch/Hour	March	April	Season
Steelhead harvested	0.0012 (0.0024)	8 (16)	0 (0)	8 (16)
Steelhead released	0.0712 (0.0532)	150 (107)	335 (328)	485 (345)
Steelhead total	0.0724 (0.0533)	158 (108)	335 (328)	493 (345)
Brown trout harvested	0.0637 (0.0865)	43 (71)	391 (577)	434 (581)
Northern pike harvested	0.0012 (0.0026)	8 (17)	0 (0)	8 (17)
Sucker sp harvested	0.0845 (0.1453)	42 (64)	533 (978)	575 (980)
Walleye harvested	0.0024 (0.0036)	16 (24)	0 (0)	16 (24)
Carp harvested	0.0013 (0.0026)	9 (18)	0 (0)	9 (18)
Rainbow trout harvested	0.0179 (0.0398)	0 (0)	122 (270)	122 (270)
Total catch	0.2434 (0.1878)	276 (148)	1,381 (1,212)	1,657 (1,221)
Angler hours		2,458 (630)	4,350 (1,424)	6,808 (1,557)
Angler trips		688 (193)	1,268 (488)	1,956 (525)

Table 19.—Estimated catch per hour, catch, harvest and angling effort by month and season, at the Yates Dam survey site on the Clinton River, 1997. Two standard errors are given in parenthesis.

Species	Catch/Hour	February	March	April	Season
Steelhead harvested	0.0165 (0.0107)	0 (0)	86 (78)	151 (126)	237 (148)
Steelhead released	0.0674 (0.0302)	8 (15)	490 (239)	469 (323)	967 (402)
Steelhead total	0.0839 (0.0330)	8 (18)	576 (251)	620 (347)	1,204 (428)
Brown trout harvested	0.0187 (0.0129)	16 (21)	135 (108)	117 (141)	268 (179)
Sucker sp harvested	0.0771 (0.0584)	16 (30)	330 (258)	760 (775)	1,106 (817)
Walleye harvested	0.0247 (0.0236)	0 (0)	46 (46)	308 (330)	354 (333)
Carp harvested	0.0009 (0.0019)	0 (0)	13 (27)	0 (0)	13 (27)
Rainbow trout harvested	0.0059 (0.0085)	0 (0)	26 (52)	58 (108)	84 (120)
Total catch	0.2112 (0.0786)	40 (40)	1,126 (383)	1,863 (928)	3,029 (1,005)
Angler hours		566 (321)	7,415 (1,643)	6,362 (1,742)	14,343 (2,416)
Angler trips		225 (150)	2,259 (557)	1,662 (456)	4,146 (735)

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