

2008 Muskegon River Angler Survey Report
Houghton Lake to Rogers Dam
Michigan Department of Natural Resources, Fisheries Division

by
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and
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Date

Introduction

The Muskegon River is part of the Lake Michigan watershed and is located in the west, central portion of Michigan's Lower Peninsula (Figure 1). Detailed information on the fisheries and management of this river can be found in the Muskegon River Watershed Assessment (O'Neal 1997).

During 2008, the Michigan Department of Natural Resources (MDNR), Fisheries Division conducted this angler survey to assess the level of angler-use, fish harvest, fish catch and non-fishing boating effort on the upper portion of the Muskegon River, between Houghton Lake and Rogers Dam. This report summarizes the results of that survey.

Methods

The angler survey, also referred to as a creel survey, was conducted from April 1 through October 31, 2008. The survey area included 144.7 miles of the Muskegon River. Three Michigan Department of Natural Resources creel clerks surveyed specific river sections and access points each survey day (Figure 1; Table 1).

Each creel clerk worked 40-hours per week to complete the survey using a progressive roving-access points design with a roving-progressive count method (Lockwood et al. 1999). Two weekend days and two randomly selected weekdays were sampled each week. No holidays were sampled. Both shore anglers (including those who were wading) and anglers fishing from boats were counted and interviewed. The non-fishing recreational boats were also interviewed and counted separately. Angler effort and fish catch was estimated from the angler interview and count information. Airplane counts of boats and shore anglers were conducted each survey day for the section of river from Temple downstream to Rogers Dam.

Fishing effort was determined through shore angler and boat counts made by the creel clerk or airplane. One count of boat and shore anglers was made each survey day

The starting point for counts and interviews were alternated daily following a randomized count and interview schedule. One ten-hour shift (between 6:00 am and 4:00 pm or between 10:30 am and 10:00 pm) was worked each sampling day, with starting and ending times varying each month with daylight period.

Clerks interviewed each individual angler or boat that returned to the access sites during the scheduled shift. Date, time and interview site were recorded for all interviews. When the boater did not fish, that was recorded on the form as a non-fishing party and the interview was ended. When fishing occurred, anglers were queried as to their mode of fishing (i.e., boat or shore), where they fished, how long they fished, what they fished for, the numbers (by species) of fish they caught and numbers kept, and the number of fishing trips they made or intended to make that day. Anglers were interviewed at the end of their fishing trip at 22 sites (Figures 2 – 4; Table 1).

The river was broken into four sections for analyses: 1) from Meads Landing to Reedsburg Dam (Reedsburg Impoundment), 2) from Reedsburg Dam to Dolph Road, 3) from Dolph Road to Temple Campground (just downstream of M61), and 4) from Temple Campground to Rogers Dam and this section included Rogers Impoundment (Figures 1-4). Reedsburg Impoundment had a surface area of 572.5 acres and a river distance of approximately 7.3 miles (Table 2). The section of river from Reedsburg Dam to Dolph Road was 22.8 miles long with an average gradient of 1.4 feet per mile and surface acreage of 60.0 acres. The river section from Dolph Road to Temple was 49.8 miles long with an average gradient of 1.5 feet per mile and surface area of 248.2 acres. The section of river from Temple to Rogers Dam was 64.8 miles long with a surface acreage of 1,052 acres. Rogers Impoundment accounted for 610 surface acres of this section and approximately 7.6 river miles. The riverine portion of this section had an average gradient of 2.8 feet per mile. Measures of river miles, acreage and elevation change were made using 1:24000 topographic maps and Arcview GIS with a 3 arc second digital elevation model.

Estimates of three measures of fishing effort: angler-hours, angler-trips and angler-days were generated from this angler survey. An angler-trip was one completed fishing excursion, with a minimum restriction of at least one hour spent fishing. An angler-day was composed of one or more angler-trips during a 24-hour period. Other estimates generated from this creel survey included: number of fish harvested (caught and kept by anglers), number of fish caught and released, and species-specific catch rates. Estimates were made for both boat and shore modes of fishing, for each month (Appendices 1-11). Estimates of fish released included fish that were legal (meeting minimum size regulations) and sub-legal fish. Standard mathematical formulas for creel surveys were used to calculate all estimates (Lockwood et al. 1999). Uncertainty estimates for all catch and effort estimates in this report are defined as two standard deviations of their mean estimates (2 times the square root of the variance for an estimate).

Non-fishing (recreational) boating hours were also estimated. However, because non-fishing boat interviews did not include a question for boat occupancy, a total effort estimate (every occupant multiplied by the number of hours each occupant spent boating) for non-fishing boat hours could not be generated. Therefore, direct comparisons between the total estimated angler-hours and non-fishing boating-hours are not applicable.

Using the results of the angler survey, we were also able to estimate the dollar value of fillets from harvested fish during the seven month period. Total harvested fish weight was estimated using the minimum legal harvest length (largemouth bass, smallmouth bass, northern pike, trout, and walleye) or the assumed minimum harvest size (panfish and bullheads) and standard length-weight equations (Schneider et al. 2000). Fillet weights were estimated at 30% of total weight for all species. The Food and Agriculture Organization of the United Nations (2014) estimated whole weight to fillet weight conversions of 11 species of fish from 30% to 50% (catfish were 35%). By using the minimum length and fillet conversion values we assume the total estimated fillet weight would be conservative for fish harvested in the Muskegon River. The value of all

fillets was assumed to be \$8.00 per pound based on current values listed in local Michigan grocery stores.

Results

Eighteen species or families of fish were captured by anglers during the seven month angler survey (Table 3). Bluegill dominated the total catch, followed by black crappie, smallmouth bass, largemouth bass, northern pike and yellow perch. Other species captured included walleye, rock bass, redhorses, rainbow trout, white sucker, channel catfish, bullheads, bowfin, brook trout, brown trout, carp and pumpkinseed. Bluegill and black crappie accounted for the greatest portion (88%) of fish harvest. Bluegill also accounted for a large portion (65%) of released fish. Other species frequently released were smallmouth bass, black crappie, largemouth bass, northern pike, walleye, rock bass and redhorses. The largest number of species was caught in the river section from Temple to Rogers Dam, and the lowest number of species was captured in the section from Dolph Road to Temple (Table 3).

The highest harvest and release rates occurred from Reedsburg Dam to Dolph Road and the lowest from Temple Campground to Rogers Dam (Tables 3 & 4). With the exception of the river section from Dolph Road to Temple that had a very low overall catch, the greatest number of fish were harvested and released from June through September, and the peak month was August (Table 4).

The catch rate of all fish from all sites averaged 1.5 fish per hour and 33% of this was harvested fish (Table 4). For every two hours of fishing that occurred on the river during 2008, an average of three fish would be caught and one of these would be harvested.

The greatest amount of angler effort occurred during August, and this was true for all river sections except Dolph Road to Temple Campground (Table 5). The number of angler-hours expended per acre of surface water averaged 29.0 for all river sections combined, and was highest for the section from Reedsburg Dam to Dolph Road and lowest for Dolph Road to Temple Campground. The number of angler-hours per acre for boat fishing was 19.3 per acre and 9.7 for shore fishing (Table 5). Boat fishing did not occur at the Reedsburg Dam to Dolph Road section and the Dolph Road to Temple Campground section.

Non-fishing (recreational) boat hours averaged 13.8 per acre and were the highest during August (Table 5). This estimate is a minimum value because it does not include more than one person per watercraft, but only the number of non-fishing watercraft on the river. Recreational boat effort per acre was the highest in the river section from Reedsburg dam to Dolph Road and lowest between Meads Landing and Reedsburg Dam. The combined angler and recreational hours for all river sections was 42.8 per acre (Table 5).

Discussion

Bluegill and black crappie accounted for a large portion of both fish catch and harvest in this 145 mile section of river. These species are not typical river species and the impoundments and lakes in the river system are the likely reason for this. Rogers Dam impounds a large portion of the lower section of river and Reedsburg Dam impounds the upper part of this river section. The largest portion of the bluegill catch occurred in the river section just downstream of Reedsburg Dam. Bluegills were likely migrating into this river segment from Reedsburg Impoundment and Houghton Lake (located just upstream of Reedsburg Impoundment). The section of river downstream of Reedsburg dam also had the highest rate of angling effort on the river. Observations by the creel clerk indicated that most of the angling effort in

in the Reedsburg Dam Campground was downstream of the dam in the river, and this location has a lot of public access along the river downstream to M55. Use of this river segment by non-fishing boaters was relatively high. The section of river from Reedsburg Dam to Dolph Road has low gradient and access is limited downstream of M55. Reedsburg Impoundment had relatively low use by anglers and very low use by recreational boaters

The Dolph Road to Temple Campground river section also has limited public access and stream is low gradient with warm water temperatures. The fish community is largely composed of suckers, minnows and chubs (O'Neal 2002). This section of river had very low angler-use that was likely related to the fish community composition, but relatively high non-fishing boat use.

The river section from Temple Campground to Rogers Dam was very long and the river had different characteristics. From Temple downstream to M66, the river has low gradient, warm water and access is limited. Downstream of M66, gradient increases, water temperatures cool and public access increases. The fish community becomes more diverse and includes smallmouth bass, walleye, rainbow trout and northern pike (O'Neal 2002). Rogers Impoundment contains largemouth bass and various panfish. The catch of fish was more diverse in this river section because of the more diverse fish community. The total catch rate of fish was low in this river section, and this possibly resulted from the low angler-use and fish densities in the upper portion of this river section. Angler and non-fishing use was moderate and this was also likely affected by river characteristics in the upper portion of this section.

The value of harvested fish fillets from the Muskegon River section between Meads Landing and Rogers Dam was estimated at \$16,450 (Table 6). This estimate is considered a minimum value because minimum lengths were used to estimated weight, and a conservative value was used to estimated fillet weight from whole fish weight. Most harvested fish are larger than the legal minimum size limit.

A total of ~~XXXX~~ angler-days were expended during the seven month period on the Muskegon River in 2008. The annual value of this fishery to the local economy is estimated at ~~\$XXXXX~~, based on the value of \$39 per angler-day estimated from the 2011 national survey of fishing (U.S. Department of the Interior 2013). Angling that occurred at night and during the remaining five months of the year (November – March) were not estimated in this survey, so this should be considered a minimum value.

The number of angler hours per acre expended on Reedsburg Impoundment (13.9) was low when compared to other lakes in Michigan (Figure 5). The average angler-hours per acre for Upper Peninsula lakes is 23.4 (Table 7), and is 73.1 on Lower Peninsula lakes (Table 4). The number of angler-hours per acre expended on Rogers Impoundment (30.2) was below average when compared to other Michigan lakes (Figure 5). Although the estimated level of angler-hours on Rogers Impoundment may have been affected by averaging with low angling effort in the upper portion of this site, it could not exceed 52 angler-hours per acre if all effort in this river section was attributed to fishing on Rogers Impoundment. Fifty-two angler-hours per acre are lower than the average of 73.1 for other Lower Peninsula lakes.

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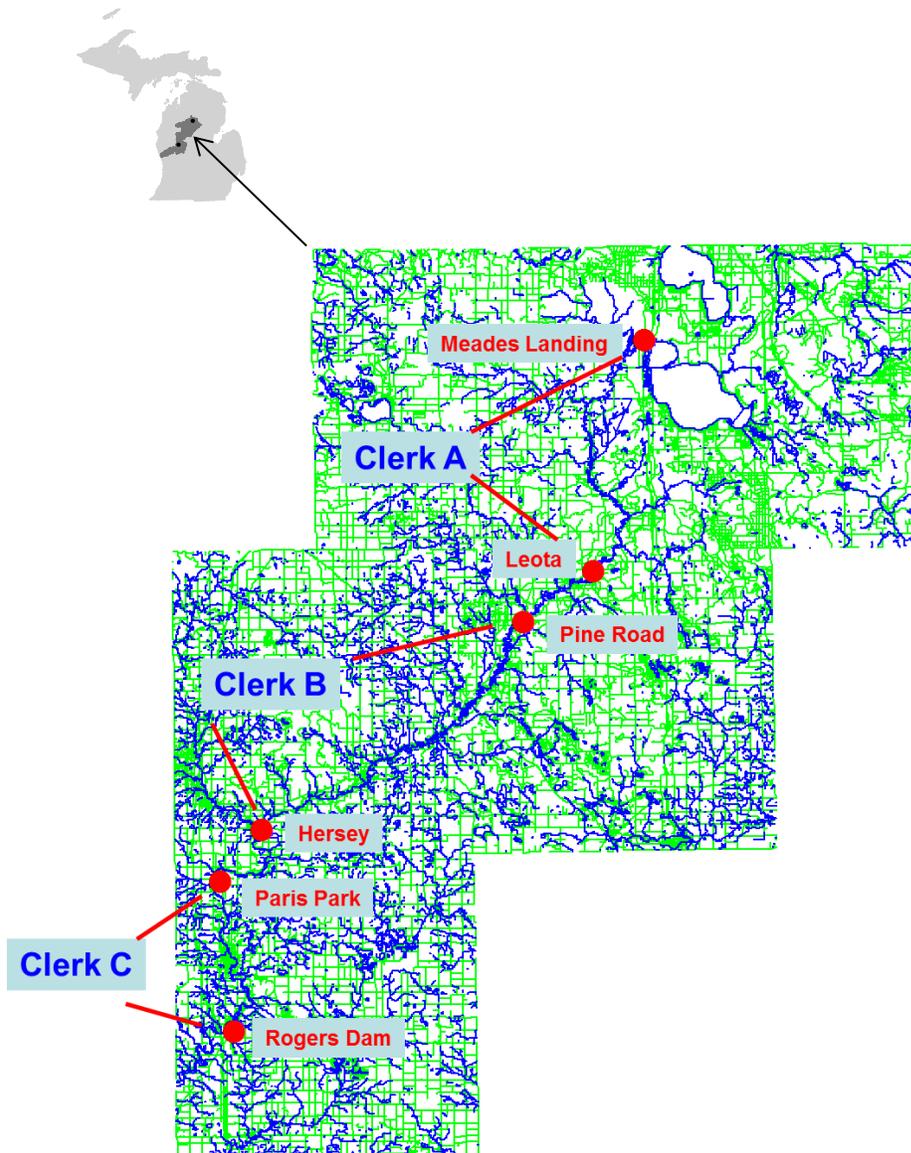


Figure 1. Map of the upper Muskegon River watershed showing the area sampled for the 2008 angler survey, and the river sections sampled by each creel clerk.

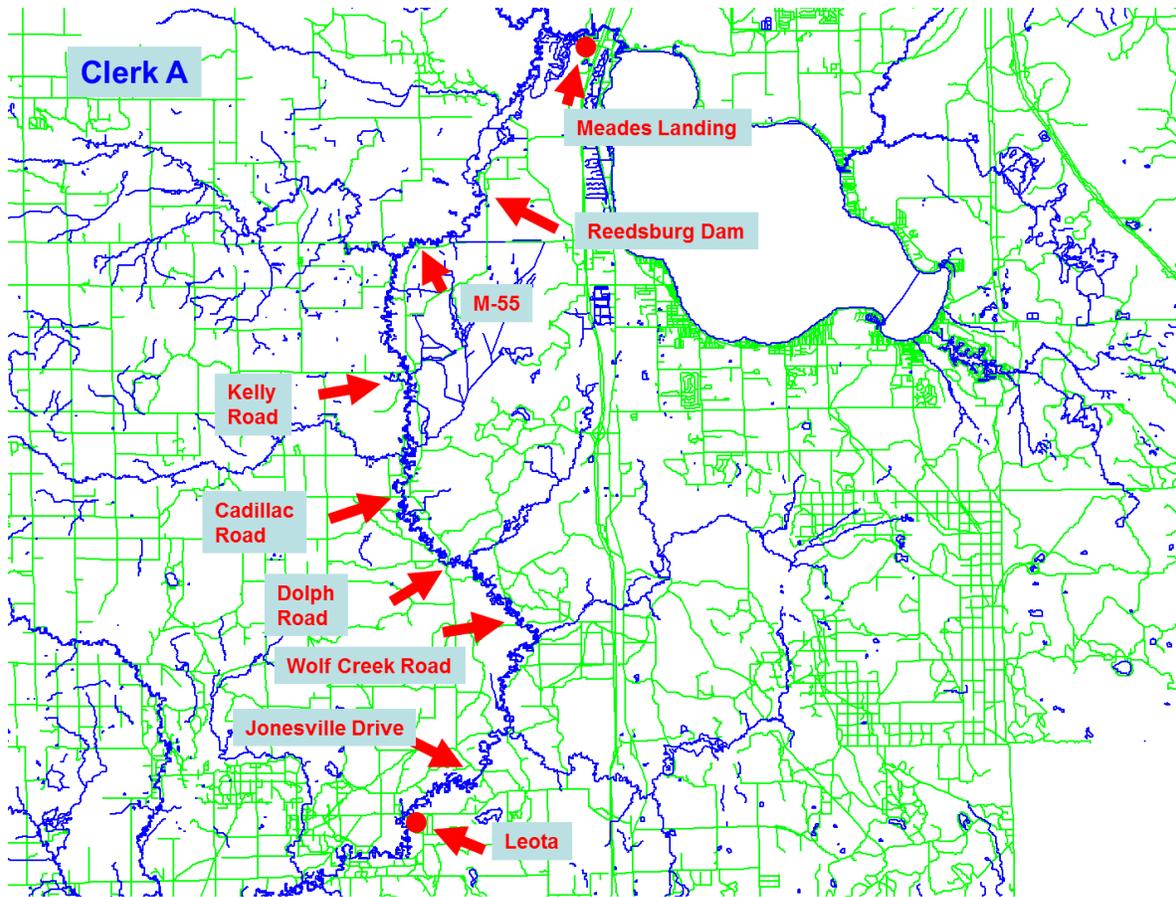


Figure 2. Map of the Muskegon River showing 2008 angler survey sites from Meads Landing downstream to Leota.

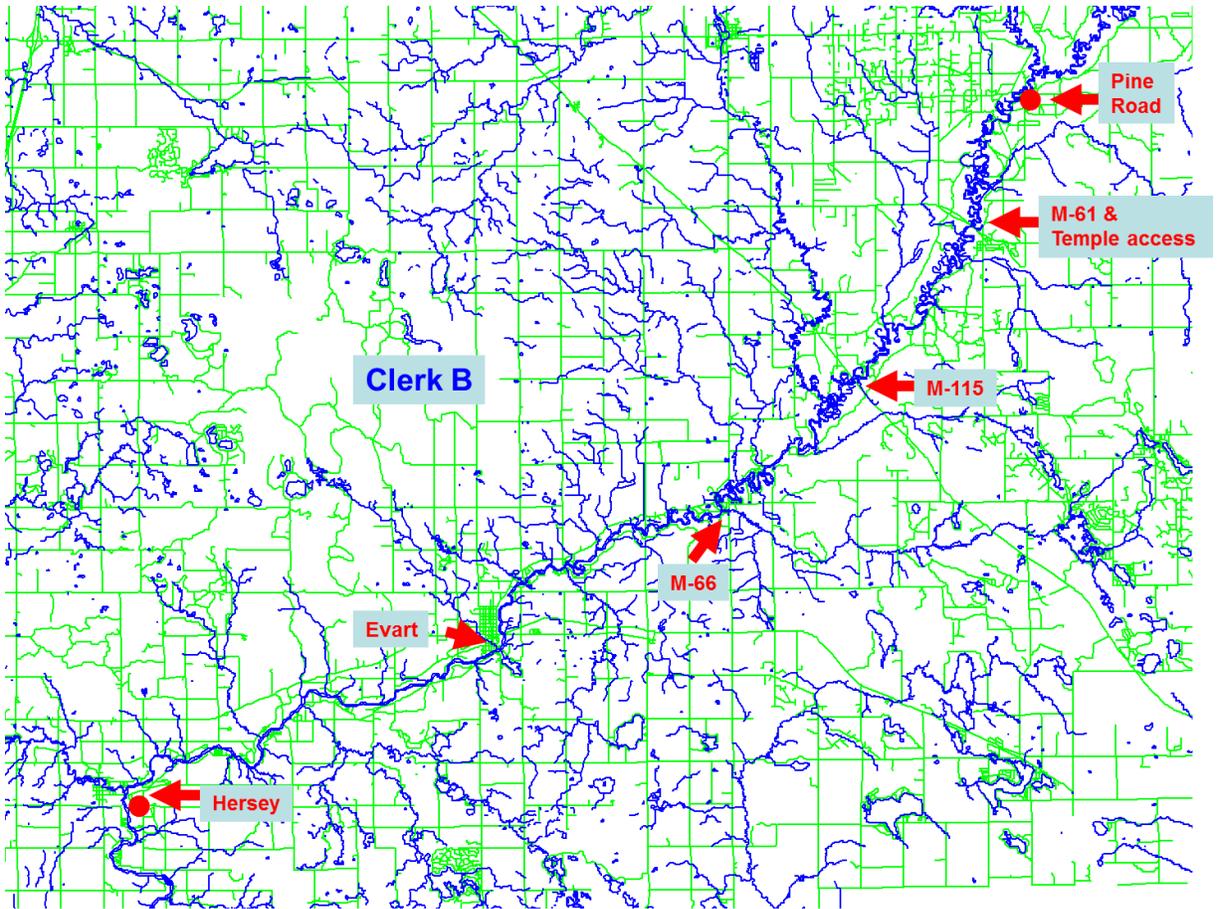


Figure 3. Map of the Muskegon River showing 2008 angler survey sites from Pine Road downstream to Hersey.

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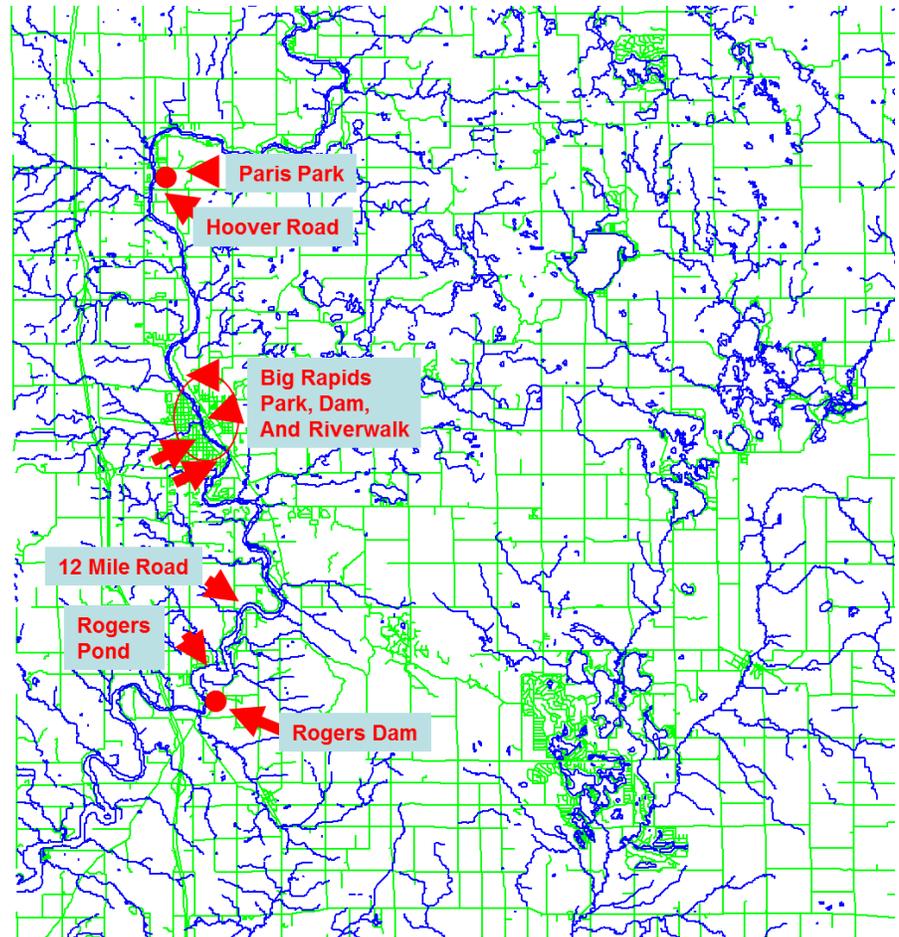


Figure 4. Map of the Muskegon River showing 2008 angler survey sites from Paris Park downstream to Rogers Dam.

Table 1. Interview locations for the 2008 Muskegon River angler survey.

County	Location	Site type	Count method
Roscommon	Meads Landing	Ramp	Shore
Roscommon	Reedsburg Dam & Impoundment	Ramp	Shore
Missaukee	M-55	Ramp	Shore
Missaukee	Kelly Road	Road	Shore
Missaukee	Cadillac Road	Road	Shore
Missaukee	Dolph Road	Road	Shore
Roscommon	Wolf Creek Road	Road	Shore
Missaukee	Jonesville Road	Road	Shore
Missaukee	Leota Park	Canoe	Shore
Clare	Pine road	Canoe	Shore
Clare	M-61	Road	Shore
Clare	Temple Campground	Canoe	Shore
Osceola	M-115	Canoe	Aerial
Osceola	M-66	Ramp	Aerial
Osceola	Evert Park	Ramp	Aerial
Osceola	Hersey	Canoe	Aerial
Mecosta	Paris Park	Ramp	Aerial
Mecosta	Hoover Road	Road	Aerial
Mecosta	Big Rapids Parks	Canoe/Road	Aerial
Mecosta	12 Mile road	Ramp	Aerial
Mecosta	Rogers Pond Ramp	Ramp	Aerial
Mecosta	Rogers Dam	Road	Aerial

Table 2. Distance, slope, width and area measurements for Muskegon River 2008 angler survey sites. Area (for impoundments), distance and gradient were measured using 1:24,000 topographic maps with ArcView GIS and a 3 arc-second digital elevation model. Average river width was determined in a 2009 habitat study (DNR Fisheries Division, unpublished data) of the Muskegon River, where n equals the number of transects used to measure width within each section. There were 10 width measurements within each transect.

River section	River miles	Gradient (ft./mi)	Average width (ft.)	Surface area (acres)
Reedsburg Impoundment	7.3			572.5
Reedsburg Dam to Dolph Road	22.8	1.4	25.0 (n=4)	69.0
Dolph Road to Temple Campground	49.8	1.5	41.1 (n=4)	248.2
Temple Campground to Rogers Impoundment	57.2	2.8	63.7(n=10)	442.0
Rogers Impoundment	7.6	5.8		610.0
Total	144.7			1941.7

Table 3. Estimated number of fish harvested and released, catch per hour (C/H), and angler-use for all fishing on the Muskegon River during 2008, from Meads Landing to Rogers Dam. River sections are indicated by 1) Meads Landing to Reedsburg Dam, 2) Reedsburg Dam to Dolph Road, 3) Dolph Road to Temple Campground, and 4) Temple Campground to Rogers Dam. Detailed data for each river section are provided in Appendices 1-11. Two standard errors are provided in parentheses.

Species	Harvest					Released					Total catch	Catch per hour
	1	2	3	4	Total	1	2	3	4	Total		
Walleye	-	12	313	344	356	-	7	-	934	941	1,297	0.0023
Northern pike	72	44	-	4	119	1,568	461	11	289	2,330	2,449	0.0435
Largemouth bass	819	57	-	1	877	2,192	766	-	74	3,031	3,908	0.0695
Smallmouth bass	-	-	-	454	454	108	102	56	5,069	5,334	5,788	0.1029
Yellow Perch	11	550	-	49	610	170	1,227	-	-	1,397	2,007	0.0356
Bluegill	2,633	14,554	-	797	17,984	7,286	29,671	11	1	36,970	54,954	0.9765
Pumpkinseed	-	-	-	-	-	-	-	-	1	1	1	0.0000
Rock bass	13	68	-	248	329	103	474	-	213	790	1,119	0.0198
Black crappie	83	1,421	-	3,743	5,247	79	4,106	-	1,050	5,234	10,481	0.1862
Rainbow trout	-	-	-	72	72	-	-	-	61	61	133	0.0024
Brown trout	-	-	-	-	-	-	-	-	8	8	8	0.0001
White sucker	-	-	-	23	23	-	6	-	91	97	114	0.0005
Redhorse	-	-	-	8	321	-	36	156	588	780	1,101	0.0196
Brook trout	-	-	-	10	10	-	-	-	7	7	17	0.0003
Bullhead	-	-	-	-	-	-	-	73	-	73	73	0.0013
Channel catfish	-	-	-	18	18	-	-	6	55	61	79	0.0014
Carp	-	-	-	-	-	-	-	6	-	6	6	0.0001
Bowfin	-	-	-	-	-	49	8	-	-	57	57	0.0010
Total	3,632 (1,329)	16,706 (5,774)	313 (307)	5,770 (4,592)	26,420 (7,468)	11,555 (3,382)	36,863 (11,307)	319 (174)	8,442 (4,038)	57,179 (12,475)	83,599 (14,539)	1.4855 (0.3465)
Total per acre	6.3 (2.3)	242.1 (83.7)	1.3 (1.2)	5.5 (4.4)	13.6 (3.8)	20.2 (5.9)	534.2 (163.9)	1.3 (0.7)	8.0 (3.8)	29.4 (6.4)	43.1 (7.5)	

Table 4. Estimated fish catch per hour (C/H), number harvested and number released for the Muskegon River during 2008, Meads Landing to Rogers Dam. Detailed data for each river section and method are provided in Appendices 1-11.

Species	C/H	April-May	June	July	August	September	October	Season
Meads Landing to Reedsburg Dam (Reedsburg Impoundment)								
Harvest	0.2879 (0.1171)	76 (98)	1,280 (614)	898 (682)	1,001 (955)	24 (47)	353 NAN	3,632 (1,329)
Release	0.9159 (0.3135)	533 (304)	3,154 (1,115)	1,785 (915)	4,536 (2,951)	1,405 (738)	142 (131)	11,555 (3,382)
Total catch	1.2038 (0.3586)	609 (320)	4,433 (1,273)	2,683 (1,141)	5,536 (3,101)	1,428 (739)	496 NAN	15,186 (3,634)
Reedsburg Dam to Dolph Road								
Harvest	1.4705 (0.6261)	36 (35)	3,053 (3,203)	3,410 (2,202)	6,733 (3,200)	2,676 (2,788)	798 (467)	16,706 (5,774)
Release	3.2449 (1.2812)	171 (119)	4,535 (4,724)	6,572 (3,790)	18,256 (8,503)	5,219 (3,695)	2,108 (2,281)	36,863 (11,307)
Total catch	4.7154 (1.6197)	208 (124)	7,589 (5,708)	9,982 (4,383)	24,989 (9,085)	7,895 (4,628)	2,906 (2,328)	53,568 (12,696)
Dolph Road to Temple Campground								
Harvest	0.6107 (0.6949)	313 (307)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	313 (307)
Release	0.6238 (0.4957)	0 (0)	41 (44)	279 (169)	0 (0)	0 (0)	0 (0)	319 (174)
Total catch	1.2345 (0.9913)	313 (307)	41 (44)	279 (169)	0 (0)	0 (0)	0 (0)	632 (353)
Temple Campground to Rogers Dam (includes Rogers Impoundment)								
Harvest	0.1815 (0.1517)	136 (149)	1,920 (1,780)	103 (112)	3,053 (4,193)	18 (30)	539 (549)	5,770 (4,592)
Released	0.2656 (0.1440)	303 (271)	3,710 (3,438)	228 (160)	2,979 (1,912)	48 (64)	1,174 (852)	8,442 (4,038)
Total catch	0.4471 (0.2237)	439 (309)	5,631 (3,871)	331 (195)	6,031 (4,609)	66 (71)	1,713 (1,014)	14,212 (6,115)
Meads Landing to Rogers Dam								
Harvest	0.4695 (0.1514)	562 (356)	6,254 (3,716)	4,411 (2,307)	10,786 (5,361)	2,718 (2,788)	1,690 NAN	26,420 (7,468)
Released	1.0160 (0.2722)	1,008 (424)	11,440 (5,948)	8,865 (3,906)	25,770 (9,201)	6,672 (3,768)	3,424 (2,438)	57,179 (12,475)
Total catch	1.4855 (0.3465)	1,569 (554)	17,693 (7,014)	13,275 (4,536)	36,556 (10,649)	9,390 (4,687)	5,115 NAN	83,599 (14,539)

Table 5. Estimated angler (shore and boat) and recreational (boat) effort for the Muskegon River during 2008, from Meads Landing to Rogers Dam. Detailed data for each river section and method are provided in Appendices 1-11.

Location	April-May	June	July	August	September	October	Season	Effort per acre
Meads Landing to Reedsburg Dam (Reedsburg Impoundment)								
Angler hours	1,029 (770)	2,218 (1,073)	1,626 (830)	1,620 (927)	900 (527)	580 NAN	7,972 (1,890)	13.9 (3.3)
Angler trips	297 (227)	595 (313)	526 (300)	586 (358)	288 (176)	327 NAN	2,620 (631)	4.6 (1.1)
Recreational hours	103 (81)	113 (68)	357 (156)	20 (5)	0 (0)	0 (0)	592 188	1.0 (0.3)
Reedsburg Dam to Dolph Road								
Angler hours	961 (739)	1,628 (1,378)	2,940 (1,420)	3,626 (1,579)	1,247 (803)	958 (614)	11,360 (2,825)	164.6 (40.9)
Angler trips	528 (460)	630 (589)	1,105 (569)	1,456 (648)	500 (325)	400 (277)	4,620 (1,219)	67.0 (17.7)
Recreational hours	37 (36)	306 (268)	579 (250)	923 (290)	141 (124)	184 (131)	2,171 (502)	31.5 (7.3)
Dolph Road to Temple Campground								
Angler hours	302 (288)	44 (27)	112 (42)	55 (43)	0 (0)	0 (0)	512 (296)	2.1 (1.2)
Angler trips	291 (287)	46 (30)	112 (42)	55 (43)	0 (0)	0 (0)	504 (295)	2.0 (1.2)
Recreational hours	461 (344)	626 (416)	4,861 (3,551)	302 (306)	0 (0)	0 (0)	6,250 3,604	25.2 (14.5)
Temple Campground to Rogers Dam (includes Rogers Impoundment)								
Angler hours	1,718 NAN	4,132 (1,688)	7,468 (2,993)	14,430 (7,222)	2,420 (1,089)	1,620 (834)	31,790 (8,115)	30.2 (7.7)
Angler trips	554 NAN	1,423 (634)	291 (240)	4,377 (2,378)	68 (68)	635 (336)	7,348 (2,497)	7.0 (2.4)
Recreational hours	35 (11)	2,321 (1,358)	3,880 (3,062)	9,873 (5,880)	1,216 (734)	423 (258)	17,750 (6,984)	16.9 (6.6)
Meads Landing to Rogers Dam								
Angler hours	4,668 NAN	8,951 (2,504)	13,225 (3,444)	21,029 (7,487)	5,110 (1,523)	3,295 NAN	56,277 (8,747)	29.0 (4.5)
Angler trips	1,927 NAN	3,308 (1,011)	2,482 (732)	7,249 (2,531)	1,015 (406)	1,384 NAN	17,365 (2,851)	8.9 (1.5)
Recreational hours	636 (472)	3,366 (2,110)	9,677 (7,018)	11,118 (6,481)	1,357 (858)	607 (389)	26,763 (11,278)	13.8 (5.8)
Boat								
Angler hours	2,539 NAN	6,173 (1,998)	8,543 (3,071)	14,763 (7,259)	3,242 (1,206)	2,170 NAN	37,431 (8,220)	19.3 (4.2)
Angler trips	733 NAN	1,932 (705)	587 (317)	4,228 (2,360)	307 (178)	932 NAN	8,719 (2,490)	4.5 (1.3)
Shore								
Angler hours	2,128 (881)	2,777 (1,511)	4,682 (1,558)	6,266 (1,835)	1,869 (930)	1,125 (639)	18,846 (3,182)	9.7 (1.6)
Angler trips	1,194 (571)	1,376 (724)	1,895 (660)	3,021 (914)	708 (366)	452 (281)	8,646 (1,528)	4.5 (0.8)
Angler and recreational hours	5304 NAN	12,317 (4,614)	22,902 (10,462)	32,147 (13,968)	6,467 (2,381)	3,902 NAN	83,040 (20,025)	42.8 (10.3)

Table 6. Estimated minimum dollar value of fish harvested from the Muskegon River between Meads Landing and Rogers Dam, from April through October 2008. Estimated weight based on minimum harvest size and standard length-weight equations from Schneider et al. (2000). Fillet weight was estimated at 30% of total weight.

Species	Number	Size (in.)	Weight (lb.)	Fillet weight (lb.)	Fillet value at \$8.00/lb.
Bass, Largemouth	877	14	1,261	378	\$3,025
Bass, Smallmouth	454	14	647	194	\$1,553
Bass, Rock	329	6	53	16	\$128
Bluegill	17,984	6	2,706	812	\$6,493
Catfish, Channel	18	12	9	3	\$20
Crappie, Black	5,247	7	965	290	\$2,316
Perch, Yellow	610	7	88	26	\$210
Pike, Northern	119	24	364	109	\$874
Redhorse, all	321	14	318	96	\$764
Sucker, all	23	14	25	8	\$60
Trout, Brook	10	7	1	0	\$3
Trout, Rainbow	72	10	25	8	\$60
Walleye	356	15	392	118	\$942
Total	26,420		6,854	2,056	\$16,450

Table 7. Angler survey summaries for 37 Upper Peninsula Michigan lakes. Angler-trips were estimated (italicized) for some lakes based on a ratio of angler trips to angler-hours (0.32) from 96 Michigan inland lake surveys. Angler-days were estimated (italicized) for most lakes based on a ratio of angler-days to angler trips (0.87) from five Michigan inland lake surveys on three lakes. Note that “ww” indicates warmwater fish and “tr” indicates trout. Data obtained from Beyerle (1980, 1984), Dexter (1991), Duffy (1995), Herman (1989), Laarman (1980), Laarman and Schneider (1986), Lockwood (2000), Ryckman and Lockwood (1985), Schneider et al. (1989), Thomas (1990), Wagner (1988), and Waybrant and Thomas (1988).

Waterbody	County	Year	Number of months	Type of fishing	Surface acres	Angler hours/acre	Angler trips/acre	Angler days/acre
Brockies Pond	Luce	1978	5	tr	4	69.5	26.0	22.6
Buckies Pond	Luce	1978	6	tr	6	34.5	16.8	14.6
Brush Lake	Luce	1978	5	ww	9	31.6	9.4	8.2
Wedge	Schoolcraft	1993	5	ww	27	27.6	8.3	7.2
Deep Lake	Schoolcraft	1978	4	ww	35	14.3	9.0	7.8
Beaver House Lake	Luce	1978	5	tr	42	4.3	0.5	0.4
Pretty Lake	Luce	1978	6	ww	46	38.5	23.0	20.0
Anderson Lake	Marquette	1985	5	ww	49	56.2	18.0	15.6
Camp Lake	Luce	1978	6	tr	67	6.7	1.9	1.6
Skeels Lake	Delta	1978	4	ww	91	21.6	8.0	7.0
Stager	Iron	1983	5	ww	110	30.9	9.9	8.6
Tepee	Iron	1983	5	ww	121	13.0	4.2	3.6
Corner Lake	Delta	1978	4	ww	144	15.9	9.9	8.6
Big Shag	Marquette	1985	5	ww	185	58.0	18.6	16.1
Straits Lake	Schoolcraft	1978	4	ww	189	4.2	2.9	2.6
Petes Lake	Schoolcraft	1993	5	ww	194	15.5	5.7	5.0
Bass Lake	Schoolcraft	1995	5	ww	287	11.5	3.8	3.3
Pomeroy	Gogebic	1993, 94	5, 5	ww	317	27.3	7.3	6.4
Stanley	Iron	1993	7	ww	318	32.0	8.7	7.5
Stanley	Iron	1994	10	ww	318	46.8	14.0	12.2
Continued								

Table 7. Continued

Waterbody	County	Year	Number of months	Type of fishing	Surface acres	Angler hours/acre	Angler trips/acre	Angler days/acre
Marion Lake	Gogebic	1993	5	ww	318	10.6	3.3	2.9
Tamarack	Gogebic	1993	5	ww	326	7.4	1.9	1.7
Thunder	Schoolcraft	1995	5	ww	349	17.2	7.5	6.5
Cisco Lake	Gogebic	1977, 78	6, 4	ww	506	54.5	18.6	16.2
Hagerman	Iron	1993, 94	8, 9	ww	566	19.5	4.5	3.9
Duck	Gogebic	1993, 94	5, 5	ww	622	16.4	4.0	3.5
Beaver	Alger	1998	5	ww	765	8.5	2.4	2.1
Thousand Island Lake	Gogebic	1977, 78	6, 4	ww	1,020	35.7	11.3	9.9
Chicagon	Iron	1994	10	ww + tr	1,083	41.1	9.8	8.5
Chicagon	Iron	1993	7	ww + tr	1,083	25.7	6.1	5.3
McDonald Lake	Schoolcraft	1976, 77	6, 6	ww	1,612	11.1	3.8	3.3
Bond Falls Flowage	Ontonogan	1994	5	ww	2,118	3.7	0.8	0.7
S. Manistique Lake	Mackinac	1978	4	ww	4,001	15.4	6.5	5.7
Big Manistique Lake	Luce	1979, 80	10, 10	ww	10,130	5.5	1.7	1.5
Gogebic Lake	Gogebic	1976, 77	5, 6	ww	15,530	1.5	0.5	0.4
Gogebic Lake	Gogebic	1999	9	ww	15,530	7.8	1.8	1.5
Average						23.4	8.1	7.0

Table 8. Angler survey summaries for 31 Lower Peninsula Michigan lakes. Angler-trips were estimated (italicized) for some lakes based on a ratio of angler trips to angler-hours (0.32) from 96 Michigan inland lake surveys. Angler-days were estimated (italicized) for most lakes based on a ratio of angler-days to angler trips (0.87) from five Michigan inland lake surveys on three lakes. Note that “ww” indicates warmwater fish and “tr” indicates trout. Data obtained from Beyerle (1980, 1984), Dexter (1991), Duffy (1995), Herman (1989), Laarman (1980), Laarman and Schneider (1986), Lockwood (2000), Ryckman and Lockwood (1985), Schneider et al. (1989), Thomas (1990), Wagner (1988), and Waybrant and Thomas (1988).

Waterbody	County	Year	Number of months	Type of fishing	Surface acres	Angler hours/acre	Angler trips/acre	Angler days/acre
Little Wolf Lake	Oscoda	1982	5	ww	86	67.8	50.0	<i>43.5</i>
Little Bear Lake	Otsego	1982	5	ww	127	32.4	29.8	<i>26.0</i>
Sessions Imp.	Ionia	1996, 97	6, 6	ww	135	264.3	77.1	<i>67.1</i>
Osterhout Lake	Allegan	1979	4	ww	168	42.9	16.9	<i>14.7</i>
Round Lake	Van Buren	1977, 78, 79, 80	7, 4, 5, 5	ww	187	64.5	21.0	<i>18.3</i>
Bankson	Van Buren	1986	3	ww	217	61.4	13.1	<i>11.4</i>
Long Lake	Barry	1975, 76, 77, 78	12	ww	297	86.5	31.7	<i>27.5</i>
Ovid Lake	Clinton	1977, 1978	5	ww	412	207.7	83.1	<i>72.3</i>
Maceday-Lotus Lake	Oakland	1986	11	ww	419	88.3	28.5	<i>24.8</i>
Big Bear Lake	Otsego	1982	5	ww	435	39.1	18.9	<i>16.5</i>
Lake Lansing	Ingham	1987	6	ww	453	19.8	5.8	<i>5.0</i>
Vinyard Lake	Jackson	1987	6	ww	505	55.6	14.5	<i>12.6</i>
White Lake	Oakland	1987	10	ww	540	74.6	2.4	<i>2.1</i>
Pontiac Lake	Oakland	1980	6	ww	585	81.0	21.8	<i>19.0</i>
Whitmore Lake	Livingston	1980	6	ww	677	95.3	24.0	<i>20.9</i>
Silver Lake	Oceana	1996, 97	6, 5	ww	690	26.3	6.9	<i>6.0</i>
Orchard Lake	Oakland	1986	11	ww	788	31.0	8.2	<i>7.2</i>
Manistee Lake	Kalkaska	1976, 77, 78	12	ww	860	15.0	6.4	<i>5.6</i>
Manistee Lake	Manistee	1999, 2000, 01	9, 10, 11	ww + tr	900	72.6	19.7	<i>16.2</i>

Continued

Table 8. Continued

Waterbody	County	Year	Number of months	Type of fishing	Surface acres	Angler hours/acre	Angler trips/acre	Angler days/acre
East Twin Lake	Montmorency	1982	5	ww	974	13.6	7.5	6.5
Kent Lake	Oakland	1987	5	ww	1,000	92.1	25.5	24.4
Kent Lake	Oakland	1987	10	ww	1,000	231.0	74.7	65.0
Kent Lake	Oakland	1980	6	ww	1,200	159.3	42.6	37.1
Belleville Imp.	Wayne	1976-79	6	ww	1,270	206.1	66.9	58.2
Cass Lake	Oakland	1986, 87	11, 9	ww	1,280	27.3	7.2	6.4
Devils Lake	Lenawee	1987	6	ww	1,300	32.6	8.4	7.3
Missaukee Lake	Missaukee	1978	7	ww	1,707	27.4	9.0	7.8
Gull Lake Fletcher	Barry	1987	5	ww + tr	2,022	15.9	3.7	3.2
Floodwater	Alpena	1995-97	8	ww	8,970	24.2	5.7	5.0
Burt lake	Cheboygan	1977, 93	4, 6	ww + tr	17,120	5.3	1.3	1.2
Mullet Lake	Cheboygan	1998	4	ww + tr	17,360	5.0	1.2	1.1
Average						73.1	23.7	20.6

Appendix 1. Estimated number of fish harvested and released, catch per hour (C/H), and angler-use for boat fishing from Meads Landing to Reedsburg Impoundment on the Muskegon River during 2008. Two standard errors are given in parentheses.

Species	C/H	April-May	June	July	August	September	October	Season
HARVEST								
Northern pike	0.0090 (0.0078)	0 (0)	72 (60)	0 (0)	0 (0)	0 (0)	0 (0)	72 (60)
Largemouth bass	0.0988 (0.0719)	30 (41)	181 (116)	462 (527)	0 (0)	0 (0)	115 NAN	788 (542)
Bluegill	0.1739 (0.0986)	44 (89)	734 (550)	288 (389)	108 (217)	0 (0)	212 NAN	1,386 (714)
Black crappie	0.0084 (0.0091)	0 (0)	67 (71)	0 (0)	0 (0)	0 (0)	0 (0)	67 (71)
Total	0.2900 (0.1323)	74 (98)	1,053 (570)	750 (656)	108 (217)	0 (0)	327 NAN	2,312 (901)
RELEASED								
Northern pike	0.1851 (0.0939)	158 (174)	472 (296)	205 (312)	370 (347)	271 (321)	0 (0)	1,476 (662)
Largemouth bass	0.2276 (0.1082)	95 (98)	371 (246)	704 (525)	441 (417)	165 (186)	39 (72)	1,814 (748)
Smallmouth bass	0.0008 (0.0017)	0 (0)	7 (14)	0 (0)	0 (0)	0 (0)	0 (0)	7 (14)
Yellow Perch	0.0077 (0.0086)	30 (45)	32 (49)	0 (0)	0 (0)	0 (0)	0 (0)	61 (67)
Bluegill	0.4100 (0.2176)	163 (200)	1,276 (856)	503 (625)	716 (993)	592 (510)	19 (36)	3,269 (1,552)
Rock bass	0.0042 (0.0084)	0 (0)	33 (66)	0 (0)	0 (0)	0 (0)	0 (0)	33 (66)
Black crappie	0.0099 (0.0202)	0 (0)	7 (13)	0 (0)	0 (0)	72 (160)	0 (0)	79 (160)
Bowfin	0.0027 (0.0050)	0 (0)	0 (0)	0 (0)	0 (0)	22 (40)	0 (0)	22 (40)
Total	0.8480 (0.3076)	445 (286)	2,196 (942)	1,412 (874)	1,527 (1,131)	1,121 (652)	58 (80)	6,760 (1,856)
Total catch	1.1381 (0.3738)	519 (303)	3,250 (1,101)	2,162 (1,092)	1,635 (1,152)	1,121 (652)	386 NAN	9,073 (2,063)
Angler hours		1,029 (770)	2,218 (1,073)	1,626 (830)	1,620 (927)	900 (527)	580 NAN	7,972 (1,890)
Angler trips		297 (227)	595 (313)	526 (300)	586 (358)	288 (176)	327 NAN	2,620 (631)

Appendix 2. Estimated number of fish harvested and released, catch per hour (C/H), and angler-use for shore fishing, from Meads Landing to Reedsburg Dam, on the Muskegon River during 2008. Two standard errors are given in parentheses.

Species	C/H	April-May	June	July	August	September	October	Season
HARVEST								
Largemouth bass	0.0068 (0.0109)	0 (0)	0 (0)	0 (0)	0 (0)	24 (47)	8 (16)	32 (50)
Yellow Perch	0.0024 (0.0049)	0 (0)	11 (22)	0 (0)	0 (0)	0 (0)	0 (0)	11 (22)
Bluegill	0.2686 (0.2214)	2 (5)	203 (226)	148 (186)	876 (930)	0 (0)	18 (36)	1,247 (975)
Rock bass	0.0027 (0.0055)	0 (0)	13 (25)	0 (0)	0 (0)	0 (0)	0 (0)	13 (25)
Black crappie	0.0036 (0.0073)	0 (0)	0 (0)	0 (0)	17 (34)	0 (0)	0 (0)	17 (34)
Total	0.2841 (0.2233)	2 (5)	227 (228)	148 (186)	893 (930)	24 (47)	26 (39)	1,319 (978)
RELEASED								
Northern pike	0.0199 (0.0197)	0 (0)	41 (57)	24 (48)	0 (0)	0 (0)	27 (48)	92 (88)
Largemouth bass	0.0813 (0.0801)	0 (1)	29 (48)	38 (55)	27 (59)	284 (346)	0 (0)	377 (359)
Smallmouth bass	0.0218 (0.0304)	0 (0)	0 (0)	0 (0)	101 (139)	0 (0)	0 (0)	101 (139)
Yellow Perch	0.0235 (0.0247)	12 (24)	40 (57)	12 (22)	0 (0)	0 (0)	45 (90)	109 (111)
Bluegill	0.8652 (0.6433)	76 (100)	784 (586)	271 (257)	2,881 (2,721)	0 (0)	6 (12)	4,017 (2,797)
Rock bass	0.0150 (0.0131)	0 (0)	64 (57)	0 (0)	0 (0)	0 (0)	6 (12)	70 (58)
Bowfin	0.0060 (0.0121)	0 (0)	0 (0)	28 (56)	0 (0)	0 (0)	0 (0)	28 (56)
Total	1.0326 (0.6659)	88 (103)	957 (596)	373 (274)	3,008 (2,725)	284 (346)	84 (103)	4,795 (2,828)
Total catch	1.3167 (0.7302)	91 (103)	1,184 (638)	521 (331)	3,901 (2,880)	307 (349)	110 (110)	6,114 (2,992)
Angler hours		657 (355)	929 (609)	1,080 (442)	1,298 (732)	543 (458)	137 (172)	4,643 (1,211)
Angler trips		256 (157)	614 (416)	448 (251)	774 (445)	160 (155)	22 (33)	2,273 (696)

Appendix 3. Estimated number of fish harvested and released, catch per hour (C/H), and angler-use for all fishing, from Meads Landing to Reedsburg Dam, on the Muskegon River during 2008. Two standard errors are given in parentheses.

Species	C/H	April-May	June	July	August	September	October	Season
HARVEST								
Northern pike	0.0057 (0.0048)	0 (0)	72 (60)	0 (0)	0 (0)	0 (0)	0 (0)	72 (60)
Largemouth bass	0.0649 (0.0446)	30 (41)	181 (116)	462 (527)	0 (0)	24 (47)	123 NAN	819 (544)
Yellow Perch	0.0009 (0.0018)	0 (0)	11 (22)	0 (0)	0 (0)	0 (0)	0 (0)	11 (22)
Bluegill	0.2088 (0.1027)	46 (89)	937 (595)	436 (432)	984 (955)	0 (0)	230 NAN	2,633 (1,208)
Rock bass	0.0010 (0.0020)	0 (0)	13 (25)	0 (0)	0 (0)	0 (0)	0 (0)	13 (25)
Black crappie	0.0066 (0.0063)	0 (0)	67 (71)	0 (0)	17 (34)	0 (0)	0 (0)	83 (79)
Total	0.2879 (0.1171)	76 (98)	1,280 (614)	898 (682)	1,001 (955)	24 (47)	353 NAN	3,632 (1,329)
RELEASED								
Northern pike	0.1243 (0.0573)	158 (174)	513 (301)	229 (316)	370 (347)	271 (321)	27 (48)	1,568 (668)
Largemouth bass	0.1737 (0.0726)	95 (98)	399 (251)	741 (528)	468 (422)	449 (393)	39 (72)	2,192 (830)
Smallmouth bass	0.0085 (0.0112)	0 (0)	7 (14)	0 (0)	101 (139)	0 (0)	0 (0)	108 (139)
Yellow Perch	0.0135 (0.0105)	41 (51)	71 (75)	12 (22)	0 (0)	0 (0)	45 (90)	170 (130)
Bluegill	0.5776 (0.2735)	239 (224)	2,060 (1,037)	774 (676)	3,596 (2,896)	592 (510)	25 (38)	7,286 (3,199)
Rock bass	0.0082 (0.0071)	0 (0)	97 (87)	0 (0)	0 (0)	0 (0)	6 (12)	103 (88)
Black crappie	0.0062 (0.0127)	0 (0)	7 (13)	0 (0)	0 (0)	72 (160)	0 (0)	79 (160)
Bowfin	0.0039 (0.0055)	0 (0)	0 (0)	28 (56)	0 (0)	0 (40)	22 (0)	49 (68)
Total	0.9159 (0.3135)	533 (304)	3,154 (1,115)	1,785 (915)	4,536 (2,951)	1,405 (738)	142 (131)	11,555 (3,382)
Total catch	1.2038 (0.3586)	609 (320)	4,433 (1,273)	2,683 (1,141)	5,536 (3,101)	1,428 (739)	496 NAN	15,186 (3,634)
Angler hours		1,686 (847)	3,147 (1,234)	2,705 (941)	2,917 (1,181)	1,443 (698)	717 NAN	12,615 (2,238)
Angler trips		553 (276)	1,209 (521)	974 (391)	1,360 (571)	447 (234)	349 NAN	4,893 (938)

Appendix 4. Estimated number of fish harvested and released, catch per hour (C/H), and angler-use for shore fishing, from Reedsburg Dam to Dolph Road, on the Muskegon River during 2008. Boat fishing did not occur at this site. Two standard errors are given in parentheses.

Species	C/H	April-May	June	July	August	September	October	Season
HARVEST								
Walleye	0.0011 (0.0019)	12 (22)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	12 (22)
Northern pike	0.0039 (0.0037)	18 (25)	0 (0)	6 (12)	0 (0)	0 (0)	19 (30)	44 (41)
Largemouth bass	0.0050 (0.0101)	0 (0)	57 (113)	0 (0)	0 (0)	0 (0)	0 (0)	57 (113)
Yellow Perch	0.0485 (0.0368)	0 (0)	113 (227)	44 (50)	60 (72)	24 (49)	309 (308)	550 (395)
Bluegill	1.2811 (0.5958)	0 (0)	2,847 (3,192)	2,897 (2,164)	6,093 (3,169)	2,497 (2,782)	220 (268)	14,554 (5,721)
Rock bass	0.0060 (0.0101)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	68 (114)	68 (114)
Black crappie	0.1250 (0.0656)	6 (12)	37 (74)	462 (403)	580 (440)	154 (176)	182 (195)	1,421 (656)
Total	1.4705 (0.6261)	36 (35)	3,053 (3,203)	3,410 (2,202)	6,733 (3,200)	2,676 (2,788)	798 (467)	16,706 (5,774)
RELEASED								
Walleye	0.0006 (0.0012)	0 (0)	0 (0)	0 (0)	0 (0)	7 (13)	0 (0)	7 (13)
Northern pike	0.0406 (0.0238)	32 (36)	37 (73)	66 (72)	64 (61)	122 (151)	141 (147)	461 (245)
Largemouth bass	0.0674 (0.0467)	73 (80)	209 (365)	78 (68)	197 (181)	178 (257)	31 (41)	766 (495)
Smallmouth bass	0.0090 (0.0088)	0 (0)	0 (0)	54 (75)	0 (0)	24 (49)	24 (37)	102 (97)
Yellow Perch	0.1080 (0.0629)	0 (0)	150 (255)	340 (237)	374 (467)	119 (128)	244 (248)	1,227 (646)
Bluegill	2.6119 (1.1590)	18 (29)	3,984 (4,699)	4,889 (3,665)	16,208 (8,371)	4,205 (3,627)	368 (452)	29,671 (10,906)
Rock bass	0.0417 (0.0348)	0 (0)	79 (125)	185 (206)	202 (290)	7 (13)	0 (0)	474 (378)
Black crappie	0.3614 (0.2651)	37 (73)	75 (148)	961 (906)	1,176 (1,371)	558 (623)	1,300 (2,216)	4,106 (2,833)
White sucker	0.0005 (0.0011)	6 (12)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	6 (12)
Redhorse	0.0031 (0.0064)	0 (0)	0 (0)	0 (0)	36 (72)	0 (0)	0 (0)	36 (72)
Bowfin	0.0007 (0.0011)	6 (12)	2 (3)	0 (0)	0 (0)	0 (0)	0 (0)	8 (13)
Total	3.2449 (1.2812)	171 (119)	4,535 (4,724)	6,572 (3,790)	18,256 (8,503)	5,219 (3,695)	2,108 (2,281)	36,863 (11,307)
Total catch	4.7154 (1.6197)	208 (124)	7,589 (5,708)	9,982 (4,383)	24,989 (9,085)	7,895 (4,628)	2,906 (2,328)	53,568 (12,696)
Angler hours		961 (739)	1,628 (1,378)	2,940 (1,420)	3,626 (1,579)	1,247 (803)	958 (614)	11,360 (2,825)
Angler trips		528 (460)	630 (589)	1,105 (569)	1,456 (648)	500 (325)	400 (277)	4,620 (1,219)

Appendix 5. Estimated number of fish harvested and released, catch per hour (C/H), and angler-use for shore fishing, from Dolph Road to Temple, on the Muskegon River during 2008. Boat fishing did not occur at this site. Two standard errors are given in parentheses.

Species	C/H	April-May	June	July	August	September	October	Season
HARVEST								
Redhorse	0.6107 (0.6949)	313 (307)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	313 (307)
Total	0.6107 (0.6949)	313 (307)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	313 (307)
RELEASED								
Northern pike	0.0224 (0.0466)	0 (0)	0 (0)	11 (23)	0 (0)	0 (0)	0 (0)	11 (23)
Smallmouth bass	0.1089 (0.1894)	0 (0)	0 (0)	56 (92)	0 (0)	0 (0)	0 (0)	56 (92)
Bluegill	0.0224 (0.0466)	0 (0)	0 (0)	11 (23)	0 (0)	0 (0)	0 (0)	11 (23)
Redhorse	0.3043 (0.2714)	0 (0)	0 (0)	156 (106)	0 (0)	0 (0)	0 (0)	156 (106)
Bullhead	0.1432 (0.2075)	0 (0)	29 (41)	44 (89)	0 (0)	0 (0)	0 (0)	73 (97)
Channel catfish	0.0113 (0.0235)	0 (0)	6 (12)	0 (0)	0 (0)	0 (0)	0 (0)	6 (12)
Carp	0.0113 (0.0235)	0 (0)	6 (12)	0 (0)	0 (0)	0 (0)	0 (0)	6 (12)
Total	0.6238 (0.4957)	0 (0)	41 (44)	279 (169)	0 (0)	0 (0)	0 (0)	319 (174)
Total catch	1.2345 (0.9913)	313 (307)	41 (44)	279 (169)	0 (0)	0 (0)	0 (0)	632 (353)
Angler hours		302 (288)	44 (27)	112 (42)	55 (43)	0 (0)	0 (0)	512 (296)
Angler trips		291 (287)	46 (30)	112 (42)	55 (43)	0 (0)	0 (0)	504 (295)

Appendix 6. Estimated number of fish harvested and released, catch per hour (C/H), and angler-use for boat fishing, from Temple to Rogers Dam, on the Muskegon River during 2008. Two standard errors are given in parentheses.

Species	C/H	April-May	June	July	August	September	October	Season
HARVEST								
Walleye	0.0113 (0.0108)	0 (0)	221 (237)	18 (44)	93 (184)	0 (0)	0 (0)	333 (304)
Northern pike	0.0001 (0.0003)	0 (0)	0 (0)	3 (8)	0 (0)	1 (2)	0 (0)	4 (8)
Smallmouth bass	0.0153 (0.0177)	72 (138)	332 (481)	8 (23)	0 (0)	6 (16)	32 (68)	450 (506)
Bluegill	0.0271 (0.0468)	0 (0)	111 (225)	30 (70)	652 (1,341)	4 (14)	0 (0)	797 (1,362)
Rock bass	0.0084 (0.0106)	0 (0)	55 (107)	3 (8)	93 (192)	0 (0)	97 (210)	248 (304)
Black crappie	0.1258 (0.1510)	18 (35)	1,195 (1,679)	3 (8)	2,125 (3,961)	7 (21)	357 (495)	3,705 (4,331)
Channel catfish	0.0006 (0.0012)	18 (35)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	18 (35)
Total	0.1886 (0.1641)	108 (147)	1,914 (1,780)	65 (87)	2,963 (4,190)	18 (30)	487 (542)	5,555 (4,588)
RELEASED								
Walleye	0.0317 (0.0363)	0 (0)	709 (1,001)	5 (15)	186 (269)	0 (0)	32 (70)	933 (1,039)
Northern pike	0.0098 (0.0114)	18 (37)	166 (262)	11 (20)	93 (188)	1 (3)	0 (0)	289 (325)
Largemouth bass	0.0025 (0.0042)	0 (0)	55 (114)	0 (0)	0 (0)	0 (0)	19 (39)	74 (121)
Smallmouth bass	0.1677 (0.1322)	215 (264)	2,298 (3,232)	14 (14)	1,644 (1,561)	36 (62)	733 (622)	4,940 (3,653)
Rock bass	0.0070 (0.0083)	0 (0)	106 (142)	5 (13)	93 (191)	2 (5)	0 (0)	206 (238)
Black crappie	0.0356 (0.0346)	0 (0)	251 (506)	9 (20)	465 (613)	0 (0)	325 (570)	1,050 (978)
Rainbow trout	0.0011 (0.0023)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	32 (66)	32 (66)
White sucker	0.0007 (0.0012)	18 (34)	0 (0)	0 (0)	0 (0)	2 (7)	0 (0)	20 (35)
Redhorse	0.0152 (0.0286)	0 (0)	0 (0)	0 (0)	416 (832)	0 (0)	32 (66)	448 (834)
Channel catfish	0.0019 (0.0038)	0 (0)	55 (112)	0 (0)	0 (0)	0 (0)	0 (0)	55 (112)
Total	0.2732 (0.1561)	251 (269)	3,640 (3,438)	44 (37)	2,898 (1,910)	42 (63)	1,174 (852)	8,048 (4,033)
Total catch	0.4618 (0.2430)	359 (307)	5,554 (3,871)	109 (95)	5,860 (4,605)	60 (70)	1,661 (1,010)	13,603 (6,109)
Angler hours		1,510 NAN	3,956 (1,685)	6,918 (2,957)	13,144 (7,199)	2,342 (1,084)	1,590 (833)	29,459 (8,080)
Angler trips		436 NAN	1,337 (632)	60 (103)	3,642 (2,333)	19 (28)	605 (334)	6,099 (2,442)

Appendix 7. Estimated number of fish harvested and released, catch per hour (C/H), and angler-use for shore fishing, from Temple to Rogers Dam, on the Muskegon River during 2008. Two standard errors are given in parentheses.

Species	C/H	April-May	June	July	August	September	October	Season
HARVEST								
Walleye	0.0049 (0.0064)	8 (12)	0 (0)	0 (0)	0 (0)	0 (0)	4 (8)	11 (14)
Largemouth bass	0.0006 (0.0013)	1 (3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (3)
Smallmouth bass	0.0016 (0.0023)	1 (3)	2 (4)	0 (0)	0 (0)	0 (0)	0 (0)	4 (5)
Yellow Perch	0.0209 (0.0390)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	49 (90)	49 (90)
Black crappie	0.0165 (0.0309)	0 (0)	0 (0)	38 (71)	0 (0)	0 (0)	0 (0)	38 (71)
Rainbow trout	0.0307 (0.0646)	1 (1)	4 (5)	0 (0)	67 (149)	0 (0)	0 (0)	72 (149)
White sucker	0.0097 (0.0197)	0 (0)	0 (0)	0 (0)	23 (45)	0 (0)	0 (0)	23 (45)
Redhorse	0.0034 (0.0054)	8 (12)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	8 (12)
Brook trout	0.0042 (0.0057)	10 (13)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	10 (13)
Total	0.0925 (0.0888)	29 (22)	6 (7)	38 (71)	90 (155)	0 (0)	53 (90)	216 (194)
RELEASED								
Walleye	0.0007 (0.0015)	2 (3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (3)
Smallmouth bass	0.0550 (0.0545)	15 (15)	14 (16)	99 (118)	0 (0)	0 (0)	0 (0)	128 (120)
Bluegill	0.0006 (0.0013)	0 (0)	1 (3)	0 (0)	0 (0)	0 (0)	0 (0)	1 (3)
Pumpkinseed	0.0006 (0.0013)	0 (0)	1 (3)	0 (0)	0 (0)	0 (0)	0 (0)	1 (3)
Rock bass	0.0028 (0.0044)	0 (0)	7 (10)	0 (0)	0 (0)	0 (0)	0 (0)	7 (10)
Rainbow trout	0.0123 (0.0142)	0 (0)	29 (32)	0 (0)	0 (0)	0 (0)	0 (0)	29 (32)
Brown trout	0.0032 (0.0057)	0 (0)	8 (13)	0 (0)	0 (0)	0 (0)	0 (0)	8 (13)
White sucker	0.0304 (0.0363)	5 (7)	1 (3)	0 (0)	65 (81)	0 (0)	0 (0)	71 (81)
Redhorse	0.0601 (0.0514)	24 (23)	10 (13)	84 (102)	16 (32)	6 (13)	0 (0)	140 (111)
Brook trout	0.0030 (0.0044)	7 (10)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	7 (10)
Total	0.1689 (0.0974)	52 (30)	71 (42)	184 (156)	81 (87)	6 (13)	0 (0)	394 (186)
Total catch	0.2613 (0.1441)	81 (38)	77 (42)	222 (171)	171 (178)	6 (13)	53 (90)	609 (269)
Angler hours		208 (149)	177 (101)	551 (462)	1,287 (578)	79 (105)	30 (35)	2,331 (770)
Angler trips		118 (87)	86 (50)	230 (217)	735 (465)	49 (62)	30 (35)	1,249 (528)

Appendix 8. Estimated number of fish harvested and released, catch per hour (C/H), and angler-use for all fishing, from Temple to Rogers Dam, on the Muskegon River during 2008. Two standard errors are given in parentheses.

Species	C/H	April-May	June	July	August	September	October	Season
HARVEST								
Walleye	0.0108 (0.0100)	8 (12)	221 (237)	18 (44)	93 (184)	0 (0)	4 (8)	344 (304)
Northern pike	0.0001 (0.0002)	0 (0)	0 (0)	3 (8)	0 (0)	1 (2)	0 (0)	4 (8)
Largemouth bass	0.0000 (0.0001)	1 (3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (3)
Smallmouth bass	0.0143 (0.0163)	73 (139)	334 (481)	8 (23)	0 (0)	6 (16)	32 (68)	454 (506)
Yellow Perch	0.0015 (0.0028)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	49 (90)	49 (90)
Bluegill	0.0251 (0.0433)	0 (0)	111 (225)	30 (70)	652 (1,341)	4 (14)	0 (0)	797 (1,362)
Rock bass	0.0078 (0.0098)	0 (0)	55 (107)	3 (8)	93 (192)	0 (0)	97 (210)	248 (304)
Black crappie	0.1177 (0.1395)	18 (35)	1,195 (1,679)	41 (71)	2,125 (3,961)	7 (21)	357 (495)	3,743 (4,331)
Rainbow trout	0.0023 (0.0047)	1 (1)	4 (5)	0 (0)	67 (149)	0 (0)	0 (0)	72 (149)
White sucker	0.0007 (0.0014)	0 (0)	0 (0)	0 (0)	23 (45)	0 (0)	0 (0)	23 (45)
Redhorse	0.0002 (0.0004)	8 (12)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	8 (12)
Brook trout	0.0003 (0.0004)	10 (13)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	10 (13)
Channel catfish	0.0006 (0.0011)	18 (35)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	18 (35)
Total	0.1815 (0.1517)	136 (149)	1,920 (1,780)	103 (112)	3,053 (4,193)	18 (30)	539 (549)	5,770 (4,592)
RELEASED								
Walleye	0.0294 (0.0335)	2 (3)	709 (1,001)	5 (15)	186 (269)	0 (0)	32 (70)	934 (1,039)
Northern pike	0.0091 (0.0105)	18 (37)	166 (262)	11 (20)	93 (188)	1 (3)	0 (0)	289 (325)
Largemouth bass	0.0023 (0.0038)	0 (0)	55 (114)	0 (0)	0 (0)	0 (0)	19 (39)	74 (121)
Smallmouth bass	0.1594 (0.1220)	230 (265)	2,311 (3,232)	113 (119)	1,644 (1,561)	36 (62)	733 (622)	5,069 (3,655)
Bluegill	0.0000 (0.0001)	0 (0)	1 (3)	0 (0)	0 (0)	0 (0)	0 (0)	1 (3)
Pumpkinseed	0.0000 (0.0001)	0 (0)	1 (3)	0 (0)	0 (0)	0 (0)	0 (0)	1 (3)
Rock bass	0.0067 (0.0077)	0 (0)	112 (143)	5 (13)	93 (191)	2 (5)	0 (0)	213 (239)
Black crappie	0.0330 (0.0319)	0 (0)	251 (506)	9 (20)	465 (613)	0 (0)	325 (570)	1,050 (978)
Rainbow trout	0.0019 (0.0024)	0 (0)	29 (32)	0 (0)	0 (0)	0 (0)	32 (66)	61 (73)
Brown trout	0.0002 (0.0004)	0 (0)	8 (13)	0 (0)	0 (0)	0 (0)	0 (0)	8 (13)

White sucker	0.0029 (0.0029)	23 (35)	1 (3)	0 (0)	65 (81)	2 (7)	0 (0)	91 (88)
Redhorse	0.0185 (0.0269)	24 (23)	10 (13)	84 (102)	432 (832)	6 (13)	32 (66)	588 (842)
Brook trout	0.0002 (0.0003)	7 (10)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	7 (10)
Channel catfish	0.0017 (0.0036)	0 (0)	55 (112)	0 (0)	0 (0)	0 (0)	0 (0)	55 (112)
Total	0.2656 (0.1440)	303 (271)	3,710 (3,438)	228 (160)	2,979 (1,912)	48 (64)	1,174 (852)	8,442 (4,038)
Total catch	0.4471 (0.2237)	439 (309)	5,631 (3,871)	331 (195)	6,031 (4,609)	66 (71)	1,713 (1,014)	14,212 (6,115)
Angler hours		1,718 NAN	4,132 (1,688)	7,468 (2,993)	14,430 (7,222)	2,420 (1,089)	1,620 (834)	31,790 (8,115)
Angler trips		554 NAN	1,423 (634)	291 (240)	4,377 (2,378)	68 (68)	635 (336)	7,348 (2,497)

Appendix 9. Estimated number of fish harvested and released, catch per hour (C/H), and angler-use for boat fishing, from Meads Landing to Rogers Dam, on the Muskegon River during 2008.

Species	C/H	April-May	June	July	August	September	October	Season
HARVEST								
Walleye	0.0089 (0.0083)	0 (0)	221 (237)	18 (44)	93 (184)	0 (0)	0 (0)	333 (304)
Northern pike	0.0020 (0.0017)	0 (0)	72 (60)	3 (8)	0 (0)	1 (2)	0 (0)	75 (60)
Largemouth bass	0.0210 (0.0152)	30 (41)	181 (116)	462 (527)	0 (0)	0 (0)	115 NAN	788 (542)
Smallmouth bass	0.0120 (0.0138)	72 (138)	332 (481)	8 (23)	0 (0)	6 (16)	32 (68)	450 (506)
Bluegill	0.0583 (0.0430)	44 (89)	845 (594)	318 (396)	760 (1,359)	4 (14)	212 NAN	2,183 (1,538)
Rock bass	0.0066 (0.0083)	0 (0)	55 (107)	3 (8)	93 (192)	0 (0)	97 (210)	248 (304)
Black crappie	0.1008 (0.1178)	18 (35)	1,262 (1,680)	3 (8)	2,125 (3,961)	7 (21)	357 (495)	3,771 (4,331)
Channel catfish	0.0005 (0.0009)	18 (35)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	18 (35)
Total	0.2102 (0.1324)	181 (177)	2,968 (1,869)	815 (661)	3,071 (4,196)	18 (30)	814 NAN	7,867 (4,644)
RELEASED								
Walleye	0.0249 (0.0283)	0 (0)	709 (1,001)	5 (15)	186 (269)	0 (0)	32 (70)	933 (1,039)
Northern pike	0.0471 (0.0223)	176 (178)	638 (395)	216 (313)	463 (394)	272 (321)	0 (0)	1,765 (737)
Largemouth bass	0.0504 (0.0231)	95 (98)	426 (272)	704 (525)	441 (417)	165 (186)	57 (82)	1,888 (758)
Smallmouth bass	0.1322 (0.1018)	215 (264)	2,304 (3,232)	14 (14)	1,644 (1,561)	36 (62)	733 (622)	4,947 (3,653)
Yellow Perch	0.0016 (0.0018)	30 (45)	32 (49)	0 (0)	0 (0)	0 (0)	0 (0)	61 (67)
Bluegill	0.0873 (0.0457)	163 (200)	1,276 (856)	503 (625)	716 (993)	592 (510)	19 (36)	3,269 (1,552)
Rock bass	0.0064 (0.0068)	0 (0)	139 (157)	5 (13)	93 (191)	2 (5)	0 (0)	240 (247)
Black crappie	0.0302 (0.0273)	0 (0)	258 (506)	9 (20)	465 (613)	72 (160)	325 (570)	1,129 (991)
Rainbow trout	0.0009 (0.0018)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	32 (66)	32 (66)
White sucker	0.0005 (0.0009)	18 (34)	0 (0)	0 (0)	0 (0)	2 (7)	0 (0)	20 (35)
Redhorse	0.0120 (0.0224)	0 (0)	0 (0)	0 (0)	416 (832)	0 (0)	32 (66)	448 (834)
Channel catfish	0.0015 (0.0030)	0 (0)	55 (112)	0 (0)	0 (0)	0 (0)	0 (0)	55 (112)
Bowfin	0.0006 (0.0011)	0 (0)	0 (0)	0 (0)	0 (0)	22 (40)	0 (0)	22 (40)
Total	0.3956 (0.1470)	696 (393)	5,836 (3,564)	1,457 (874)	4,425 (2,220)	1,163 (655)	1,232 (856)	14,808 (4,440)
Total catch	0.6058 (0.2172)	877 (431)	8,804 (4,025)	2,271 (1,096)	7,496 (4,747)	1,181 (655)	2,046 NAN	22,676 (6,425)
Angler hours		2,539	6,173	8,543	14,763	3,242	2,170	37,431

	NAN	(1,998)	(3,071)	(7,259)	(1,206)	NAN	(8,220)
Angler trips	733	1,932	587	4,228	307	932	8,719
	NAN	(705)	(317)	(2,360)	(178)	NAN	(2,490)

Appendix 10. Estimated number of fish harvested and released, catch per hour (C/H), and angler-use for shore fishing, from Meads Landing to Rogers Dam, on the Muskegon River during 2008.

Species	C/H	April-May	June	July	August	September	October	Season
HARVEST								
Walleye	0.0012 (0.0014)	20 (25)	0 (0)	0 (0)	0 (0)	0 (0)	4 (8)	24 (26)
Northern pike	0.0023 (0.0022)	18 (25)	0 (0)	6 (12)	0 (0)	0 (0)	19 (30)	44 (41)
Largemouth bass	0.0048 (0.0066)	1 (3)	57 (113)	0 (0)	0 (0)	24 (47)	8 (16)	90 (124)
Smallmouth bass	0.0002 (0.0003)	1 (3)	2 (4)	0 (0)	0 (0)	0 (0)	0 (0)	4 (5)
Yellow Perch	0.0324 (0.0222)	0 (0)	125 (228)	44 (50)	60 (72)	24 (49)	357 (321)	610 (406)
Bluegill	0.8384 (0.3389)	2 (5)	3,049 (3,200)	3,045 (2,172)	6,969 (3,302)	2,497 (2,782)	238 (270)	15,801 (5,803)
Rock bass	0.0043 (0.0062)	0 (0)	13 (25)	0 (0)	0 (0)	0 (0)	68 (114)	81 (117)
Black crappie	0.0783 (0.0375)	6 (12)	37 (74)	501 (409)	597 (441)	154 (176)	182 (195)	1,476 (661)
Rainbow trout	0.0038 (0.0079)	1 (1)	4 (5)	0 (0)	67 (149)	0 (0)	0 (0)	72 (149)
White sucker	0.0012 (0.0024)	0 (0)	0 (0)	0 (0)	23 (45)	0 (0)	0 (0)	23 (45)
Redhorse	0.0170 (0.0165)	321 (307)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	321 (307)
Brook trout	0.0005 (0.0007)	10 (13)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	10 (13)
Total	0.9844 (0.3529)	380 (309)	3,286 (3,212)	3,596 (2,211)	7,715 (3,336)	2,700 (2,788)	876 (478)	18,553 (5,867)
RELEASED								
Walleye	0.0004 (0.0007)	2 (3)	0 (0)	0 (0)	0 (0)	7 (13)	0 (0)	8 (14)
Northern pike	0.0300 (0.0148)	32 (36)	78 (92)	101 (90)	64 (61)	122 (151)	168 (155)	565 (262)
Largemouth bass	0.0606 (0.0340)	73 (80)	237 (369)	116 (87)	224 (190)	461 (431)	31 (41)	1,143 (611)
Smallmouth bass	0.0205 (0.0125)	15 (15)	14 (16)	209 (167)	101 (139)	24 (49)	24 (37)	387 (227)
Yellow Perch	0.0709 (0.0368)	12 (24)	190 (261)	352 (238)	374 (467)	119 (128)	289 (264)	1,336 (656)
Bluegill	1.7882 (0.6693)	94 (104)	4,769 (4,735)	5,172 (3,674)	19,088 (8,802)	4,205 (3,627)	374 (452)	33,702 (11,259)
Pumpkinseed	0.0001 (0.0002)	0 (0)	1 (3)	0 (0)	0 (0)	0 (0)	0 (0)	1 (3)
Rock bass	0.0292 (0.0209)	0 (0)	149 (138)	185 (206)	202 (290)	7 (13)	6 (12)	550 (382)
Black crappie	0.2179 (0.1548)	37 (73)	75 (148)	961 (906)	1,176 (1,371)	558 (623)	1,300 (2,216)	4,106 (2,833)
Rainbow trout	0.0015 (0.0017)	0 (0)	29 (32)	0 (0)	0 (0)	0 (0)	0 (0)	29 (32)
Brown trout	0.0004 (0.0007)	0 (0)	8 (13)	0 (0)	0 (0)	0 (0)	0 (0)	8 (13)
White sucker	0.0041	11	1	0	65	0	0	77

	(0.0044)	(14)	(3)	(0)	(81)	(0)	(0)	(82)
Redhorse	0.0176	24	10	240	52	6	0	331
	(0.0095)	(23)	(13)	(147)	(79)	(13)	(0)	(169)
Brook trout	0.0004	7	0	0	0	0	0	7
	(0.0005)	(10)	(0)	(0)	(0)	(0)	(0)	(10)
Bullhead	0.0039	0	29	44	0	0	0	73
	(0.0052)	(0)	(41)	(89)	(0)	(0)	(0)	(97)
Channel catfish	0.0003	0	6	0	0	0	0	6
	(0.0006)	(0)	(12)	(0)	(0)	(0)	(0)	(12)
Carp	0.0003	0	6	0	0	0	0	6
	(0.0006)	(0)	(12)	(0)	(0)	(0)	(0)	(12)
Bowfin	0.0019	6	2	28	0	0	0	36
	(0.0030)	(12)	(3)	(56)	(0)	(0)	(0)	(57)
Total	2.2482	312	5,604	7,408	21,346	5,509	2,192	42,370
	(0.7257)	(160)	(4,762)	(3,807)	(8,929)	(3,711)	(2,283)	(11,658)
Total catch	3.2326	692	8,890	11,004	29,061	8,209	3,068	60,923
	(0.8817)	(349)	(5,744)	(4,402)	(9,532)	(4,641)	(2,332)	(13,051)
Angler hours		2,128	2,777	4,682	6,266	1,869	1,125	18,846
		(881)	(1,511)	(1,558)	(1,835)	(930)	(639)	(3,182)
Angler trips		1,194	1,376	1,895	3,021	708	452	8,646
		(571)	(724)	(660)	(914)	(366)	(281)	(1,528)

Appendix 11. Estimated number of fish harvested and released, catch per hour (C/H), and angler-use for all fishing, from Meads Landing to Rogers Dam, on the Muskegon River during 2008.

Species	C/H	April-May	June	July	August	September	October	Season
HARVEST								
Walleye	0.0063 (0.0055)	20 (25)	221 (237)	18 (44)	93 (184)	0 (0)	4 (8)	356 (305)
Northern pike	0.0021 (0.0013)	18 (25)	72 (60)	9 (15)	0 (0)	1 (2)	19 (30)	119 (73)
Largemouth bass	0.0156 (0.0102)	31 (41)	237 (162)	462 (527)	0 (0)	24 (47)	123 NAN	877 (555)
Smallmouth bass	0.0081 (0.0091)	73 (139)	334 (481)	8 (23)	0 (0)	6 (16)	32 (68)	454 (506)
Yellow Perch	0.0108 (0.0074)	0 (0)	125 (228)	44 (50)	60 (72)	24 (49)	357 (321)	610 (406)
Bluegill	0.3196 (0.1176)	46 (89)	3,894 (3,255)	3,363 (2,208)	7,728 (3,571)	2,502 (2,782)	450 NAN	17,984 (5,997)
Rock bass	0.0058 (0.0059)	0 (0)	68 (110)	3 (8)	93 (192)	0 (0)	166 (239)	329 (326)
Black crappie	0.0932 (0.0792)	24 (37)	1,299 (1,682)	503 (409)	2,722 (3,986)	161 (178)	539 (532)	5,247 (4,381)
Rainbow trout	0.0013 (0.0026)	1 (1)	4 (5)	0 (0)	67 (149)	0 (0)	0 (0)	72 (149)
White sucker	0.0004 (0.0008)	0 (0)	0 (0)	0 (0)	23 (45)	0 (0)	0 (0)	23 (45)
Redhorse	0.0057 (0.0055)	321 (307)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	321 (307)
Brook trout	0.0002 (0.0002)	10 (13)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	10 (13)
Channel catfish	0.0003 (0.0006)	18 (35)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	18 (35)
Total	0.4695 (0.1514)	562 (356)	6,254 (3,716)	4,411 (2,307)	10,786 (5,361)	2,718 (2,788)	1,690 NAN	26,420 (7,468)
RELEASED								
Walleye	0.0167 (0.0187)	2 (3)	709 (1,001)	5 (15)	186 (269)	7 (13)	32 (70)	941 (1,039)
Northern pike	0.0414 (0.0153)	208 (182)	716 (406)	317 (325)	527 (399)	394 (354)	168 (155)	2,330 (782)
Largemouth bass	0.0539 (0.0192)	168 (126)	663 (458)	820 (532)	665 (459)	626 (470)	89 (91)	3,031 (974)
Smallmouth bass	0.0948 (0.0667)	230 (265)	2,318 (3,232)	223 (168)	1,745 (1,567)	60 (79)	757 (623)	5,334 (3,660)
Yellow Perch	0.0248 (0.0123)	41 (51)	221 (266)	352 (238)	374 (467)	119 (128)	289 (264)	1,397 (659)
Bluegill	0.6569 (0.2263)	257 (226)	6,045 (4,812)	5,675 (3,726)	19,804 (8,858)	4,797 (3,662)	394 (454)	36,970 (11,365)
Pumpkinseed	0.0000 (0.0001)	0 (0)	1 (3)	0 (0)	0 (0)	0 (0)	0 (0)	1 (3)
Rock bass	0.0140 (0.0084)	0 (0)	288 (209)	191 (206)	296 (347)	9 (14)	6 (12)	790 (455)
Black crappie	0.0930 (0.0553)	37 (73)	333 (527)	970 (906)	1,641 (1,502)	630 (643)	1,624 (2,288)	5,234 (3,001)
Rainbow trout	0.0011 (0.0013)	0 (0)	29 (32)	0 (0)	0 (0)	0 (0)	32 (66)	61 (73)
Brown trout	0.0001	0	8	0	0	0	0	8

	(0.0002)	(0)	(13)	(0)	(0)	(0)	(0)	(13)
White sucker	0.0017	29	1	0	65	2	0	97
	(0.0016)	(37)	(3)	(0)	(81)	(7)	(0)	(89)
Redhorse	0.0139	24	10	240	468	6	32	780
	(0.0153)	(23)	(13)	(147)	(835)	(13)	(66)	(851)
Brook trout	0.0001	7	0	0	0	0	0	7
	(0.0002)	(10)	(0)	(0)	(0)	(0)	(0)	(10)
Bullhead	0.0013	0	29	44	0	0	0	73
	(0.0017)	(0)	(41)	(89)	(0)	(0)	(0)	(97)
Channel catfish	0.0011	0	61	0	0	0	0	61
	(0.0020)	(0)	(113)	(0)	(0)	(0)	(0)	(113)
Carp	0.0001	0	6	0	0	0	0	6
	(0.0002)	(0)	(12)	(0)	(0)	(0)	(0)	(12)
Bowfin	0.0010	6	2	28	0	22	0	57
	(0.0012)	(12)	(3)	(56)	(0)	(40)	(0)	(69)
Total	1.0160	1,008	11,440	8,865	25,770	6,672	3,424	57,179
	(0.2722)	(424)	(5,948)	(3,906)	(9,201)	(3,768)	(2,438)	(12,475)
Total catch	1.4855	1,569	17,693	13,275	36,556	9,390	5,115	83,599
	(0.3465)	(554)	(7,014)	(4,536)	(10,649)	(4,687)	NAN	(14,539)
Angler hours		4,668	8,951	13,225	21,029	5,110	3,295	56,277
		NAN	(2,504)	(3,444)	(7,487)	(1,523)	NAN	(8,747)
Angler trips		1,927	3,308	2,482	7,249	1,015	1,384	17,365
		NAN	(1,011)	(732)	(2,531)	(406)	NAN	(2,851)

