



## 2006 Hardy Impoundment Angler Survey Report

### **2006 Hardy Impoundment Angler Survey Report** Michigan Department of Natural Resources, Fisheries Division

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#### **Introduction**

Hardy Impoundment is located 57 miles upstream of Muskegon Lake on the Muskegon River in Newaygo County. 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). Hardy Dam creates Hardy Impoundment and is one of three hydroelectric dams located on the Muskegon River. Hardy Impoundment is located immediately upstream of Croton Impoundment and Rogers Impoundment is located immediately upstream of Hardy Impoundment. Hardy Impoundment is 3,971 surface acres in size and has a maximum depth of about 100 feet (Figure 2). More detailed information on the fisheries and management of Hardy Impoundment can be found in the Muskegon River Watershed Assessment (O'Neal 1997).

In 2006, 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 Hardy Impoundment. 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, 2006. The impoundment was broken into two sections, north and south, for the angler survey and only one section was evaluated during any one survey day.

One Michigan Department of Natural Resources 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.



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separately. Angler effort and fish catch was estimated from the angler interview and count information.

Fishing effort was determined through shore angler and boat counts made by the creel clerk. Two counts of boat and shore anglers were made each survey day using a boat, at the south site, to visually verify anglers. One count was made each survey day at the north site.

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. Anglers were counted from a boat in the south section using a two way path beginning at Hardy Dam and proceeding upstream to a point just south of Big Bend Park, and then returning on the opposite shore downstream to Hardy Dam (Figure 2). Anglers were counted using a single one-way path in the narrower, north section beginning just south of Big Bend Park and proceeding upstream to Rogers Dam. Angler counts were also made at two shore access sites including Rogers Dam (N 43.613067, W 85.478055) and the Hardy Dam Fishing Pier (N 43.48572, W 85.62698).

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 within the impoundment, 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 seven sites including the 1) U.S. 131 DNR boat ramp (N 43.60863, W 85.49355), the 2) Brower Park boat ramp (N 43.56223, W 85.54436), the 3) Big Bend boat Ramp (N 43.51194, W 85.58182), the 4) Newaygo State Park boat ramp (N 43.50452, W 85.58633), the 5) Oxbow Park boat ramp (N 43.50540, W 85.61054), the 6) Sandy Beach boat ramp (N 43.50028, W 85.63151), and the 7) Hardy Dam boat ramp (N 43.49108, W 85.63681). Shore angler interviews were discontinued during the survey because of low effort, but shore anglers were counted and included in the angler effort estimates. Separate estimates of fish catch by shore anglers could not be made due to lack of interview data.

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 no restriction on time 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 (effort only) modes of fishing, for each month (Appendices 1-9). Estimates of



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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, 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 Hardy Impoundment. The value of all fillets was assumed to be \$8.00 per pound based on current values listed in local Michigan grocery stores.

### **Results**

Ten species of fish were captured by anglers during the seven month angler survey (Appendix 9). The top three species, by number, of fish harvested were yellow perch, bluegill, and walleye, and they accounted for 75.8% of total harvest. The top three species of fish caught and released were smallmouth bass, northern pike and bluegill and they represented 69.5% of total released fish (Appendix 9). Other species found in the catch included largemouth bass, rock bass, black crappie, white sucker, and carp.

Fish harvest represented 15.9% (10,325) of total fish catch (64,803; Appendix 9). The north site accounted for 52.3% of total fish harvest and 67.1% of total fish released (Appendices 5 & 6).

The greatest amount of fish harvest occurred during June, coinciding with high harvest numbers of bluegill, rock bass and black crappie (Appendix 9). Monthly variations in harvested fish were not as high as released fish. High levels of fish caught and released occurred during May, June, August, and September (Appendix 9). Part of the monthly



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discrepancies in harvested and released fish was the result of fishing regulation closures during April and May for walleye, northern pike, smallmouth bass and largemouth bass.

Boat fishing accounted for 93.2% (90,496 hours) of total fishing effort (Table 1). The greatest amount of fishing effort occurred in June and the lowest occurred in April (Table 1). The total amount of fishing effort was estimated at 97,100 angler-hours or 23,111 angler-trips.

Non-fishing (recreational) boat effort was estimated at 116,755 hours for the seven month period (Table 1). This estimate is a minimum value because it does not include more than one-person per boat, but only the number of non-fishing boats present on the impoundment. The highest amount of non-fishing boat effort occurred from May through September. The combined fishing (boat and shore) and non-fishing recreational effort was estimated at 213,855 hours for the seven month period (Table 1).

### **Discussion**

The percentage of fish released in Hardy Impoundment during 2006 was very high for all species combined (84.1%). Bass are typically a species that are frequently released in Michigan, and nearly all of the smallmouth bass (98.9%) and all of the largemouth bass were released by anglers in Hardy Impoundment. A high percentage of walleye (78.7%) were also released and this was likely a function of the size structure of the walleye population in the impoundment. The population has fewer large walleye because many walleye migrate out of the impoundment when they reach maturity (Eschmeyer 1950). Fairly high release rates also occurred for northern pike (94.6%), bluegill (76.8%), yellow perch (58.7%), rock bass (81.1%) and black crappie (49.5%). The reason for this is uncertain because data were unavailable on the size structure of the pike population or the size of the pike released during the survey.

The value of harvested fish fillets from Hardy Impoundment during 2007 was estimated at \$12,911 (Table 2). This estimate is considered a minimum value because minimum lengths were used to estimate weight, and a conservative value was used to estimate fillet weight from whole fish weight. Most harvested fish are larger than the legal minimum size limit.

A total of 27,068 angler-days were expended during the seven month period on Hardy Impoundment in 2007. The annual value of this fishery to the local economy is estimated at \$1,055,652, 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.



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The number of angler hours expended on Hardy Impoundment was average for lakes of the same size in Michigan (Figure 3). Angler-hours per acre on Hardy Impoundment (24.4) during 2007 was nearer to the average for Upper Peninsula lakes (23.4; Table 3) than to Lower Peninsula lakes (73.1; Table 4)

### **References**

Beyerle, G. B. 1980. Contribution to the angler's creel of marsh-reared northern pike stocked as fingerlings in Long Lake, Barry County, Michigan. Michigan Department of Natural Resources, Fisheries Research Report 1876, Ann Arbor.

Beyerle, G. B. 1984. An evaluation of the tiger muskellunge stocking program in Michigan. Michigan Department of Natural Resources, Fisheries Research Report 1924, Ann Arbor.

Dexter, J. L., Jr. 1991. Gull Lake as a Broodstock source for Atlantic Salmon. Michigan Department of Natural Resources, Fisheries Technical Report 98-1, Ann Arbor.

Duffy, J. E. 1995. Creel survey of Bankson Lake, Van Buren County, Michigan, 1985-86. Michigan Department of Natural Resources, Fisheries Technical Report 91-5, Ann Arbor.

Eschmeyer, P. H. 1950. The life history of the walleye, *Stizostedion vitreum vitreum* (Mitchell), in Michigan. Michigan Department of Natural Resources, Bulletin of the Institute for Fisheries Research Number 3, Ann Arbor.

Food and Agriculture Organization of the United Nations. 2014. Measures, stowage rates and yields of fishery products, FOA corporate document repository (<http://www.fao.org>).

Herman, M. P. 1989. Results of the 1987 creel survey of Devils Lake, Vinyard Lake, Lake Lansing, and two sites on the Grand River. Michigan Department of Natural Resources, Fisheries Technical Report 89-8, Ann Arbor.

Laarman, P. W. 1980. Vital statistics of the fish population in Manistee Lake, Kalkaska County, with special emphasis on mortality and exploitation of stocked 15 cm walleye fingerlings. Michigan Department of Natural Resources, Fisheries Research Report 1881, Ann Arbor.

Laarman, P. W., and J. C. Schneider. 1986. Walleye stocking experiments and fish population studies at Manistee Lake, 1972-84. Michigan Department of Natural Resources, Fisheries Research Report 1938, Ann Arbor.



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Lockwood, R. N., D. M. Benjamin, and J. R. Bence. 1999. Estimating angling effort and catch from Michigan roving and access site angler survey data. Michigan Department of Natural Resources, Fisheries Division Research Report Number 2044, Ann Arbor.

Lockwood, R. N. 2000. Sportfishing angler surveys on Michigan inland waters. Michigan Department of Natural Resources, Fisheries Technical Report 2000-3, Ann Arbor.

Michigan Department of Natural Resources, Fisheries Division. 2013. Michigan fishing reports system database (<http://www.dnr.state.mi.us/chartercreel/>, 5/15/2013). Statewide angler survey program, Lansing, MI 48933.

O'Neal, R. P. 1997. Muskegon River Watershed Assessment. Michigan Department of Natural Resources, Fisheries Division Special Report Number 19, Ann Arbor. ([http://www.michigan.gov/dnr/0,4570,7-153-10364\\_52259\\_19056---,00.html](http://www.michigan.gov/dnr/0,4570,7-153-10364_52259_19056---,00.html))

Ryckman, J. R., and R. N. Lockwood. 1985. On-site creel surveys in Michigan, 1975-82. Michigan Department of Natural Resources, Fisheries Research Report 1922, Ann Arbor.

Schneider, J. C., J. R. Waybrant, R. P. O'Neal, and R. L. Tillitt. 1989. First-year results of early –season catch-and-release bass fishing. Michigan Department of Natural Resources, Fisheries Technical Report 89-2, Ann Arbor.

Schneider, J. C., P. W. Laarman, and H. Gowing. 2000. Length-weight relationships. Chapter 17 in Schneider, J. C. (editor) 2000. Manual of fisheries survey methods II: with periodic updates. Michigan Department of Natural Resources, Fisheries Division Special Report 25, Ann Arbor.

Thomas, M. V. 1990. Results of the 1986 creel survey on Kent and White lakes. Michigan Department of Natural Resources, Fisheries Technical Report 90-9, Ann Arbor.

U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, Bureau of the Census. 2013. 2011 National survey of fishing, hunting and wildlife associated recreation (<http://www.census.gov/prod/2013pubs/fhw11-mi.pdf>).

Wagner, W. C. 1988. Largemouth bass in Michigan's Upper Peninsula lakes. Michigan Department of Natural Resources, Fisheries Division Research Report Number 1945, Ann Arbor.

Waybrant, J. R., and M. V. Thomas. 1988. Results of the 1986 creel census on Orchard, Cass, and Maceday-Lotus lakes. Michigan Department of Natural Resources, Fisheries Technical Report 88-2, Ann Arbor.

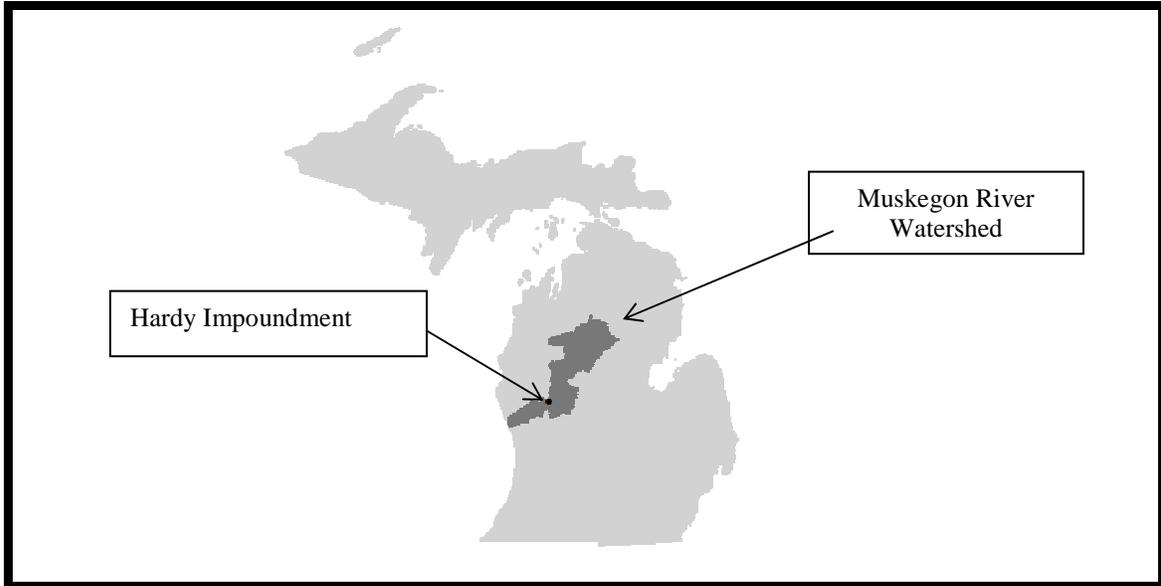


Figure 1. The location of the Muskegon River Watershed and Hardy Impoundment in Michigan.

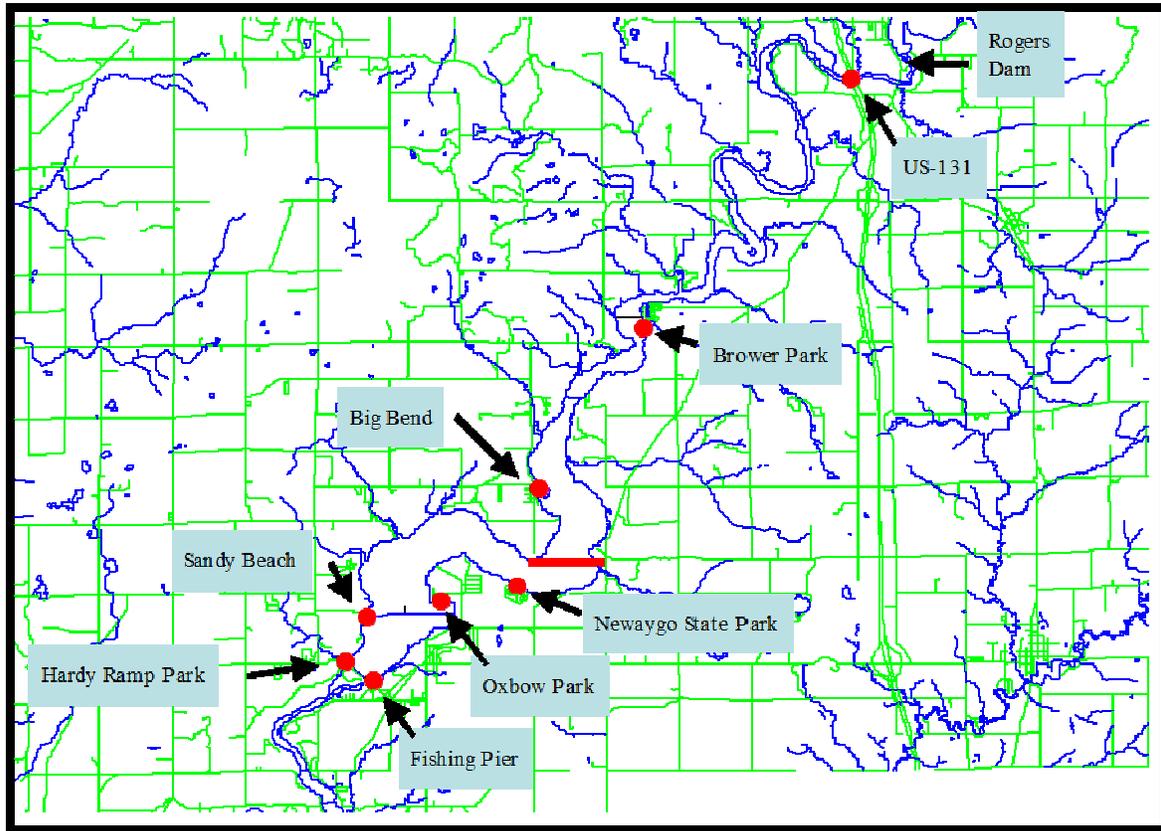


Figure 2. A map of Hardy Impoundment on the Muskegon River showing angler interview sites. The dividing line between the south and north boat count sections was at the land point just south of Big Bend. Boat counts were made using a single pass in the north section and a double pass in the south section due to width of the impoundment.



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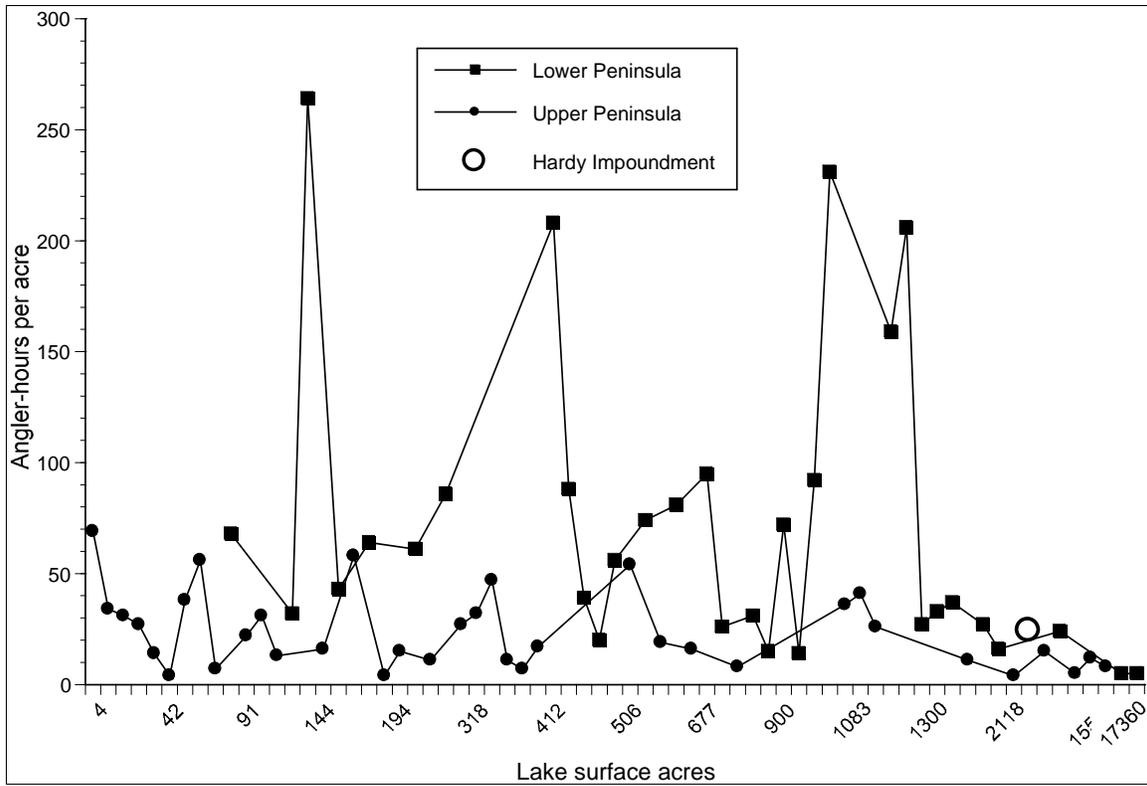


Figure 3. The number of angler-hours per acre expended on Hardy Impoundment during 2006, compared to other lakes in Michigan.



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Table 1. Estimated fishing (boat and shore) and non-fishing (recreational) boat effort expended on Hardy Impoundment during April – October 2007. C/H indicates catch/hour. Two standard errors are given in parentheses.

Species	April	May	June	July	August	September	October	Season
<b>Boat</b>								
Angler hours	4,907 (2,966)	14,591 (10,706)	20,595 (6,768)	12,206 (2,361)	19,408 (7,219)	12,167 (5,348)	6,622 (3,659)	90,496 (16,397)
Angler trips	922 (586)	2,647 (2,904)	5,873 (2,377)	3,359 (935)	5,100 (1,984)	2,345 (1,278)	1,372 (1,001)	21,617 (4,222)
<b>Shore</b>								
Angler hours	1,365 (816)	976 (640)	1,635 (679)	989 (465)	977 (931)	472 (383)	190 (187)	6,604 (1,674)
Angler trips	311 (187)	221 (145)	369 (155)	222 (106)	221 (212)	108 (88)	43 (42)	1,494 (382)
<b>Boat and Shore</b>								
Angler hours	6,272 (3,076)	15,567 (10,725)	22,231 (6,801)	13,194 (2,406)	20,386 (7,278)	12,639 (5,361)	6,812 (3,664)	97,100 (16,483)
Angler trips	1,233 (615)	2,868 (2,099)	6,242 (2,382)	3,581 (941)	5,320 (1,996)	2,453 (1,281)	1,415 (1,002)	23,111 (4,239)
<b>Non-fishing Boat</b>								
Hours	615 (508)	5,589 (4,975)	14,757 (11,596)	46,975 (12,492)	33,308 (15,465)	14,995 (8,366)	516 (556)	116,755 (25,000)
<b>Fishing and Non-fishing</b>								
Hours	6,887 (3,584)	21,156 (15,700)	36,988 (18,397)	60,169 (14,898)	53,694 (22,743)	27,634 (13,727)	7,328 (4,220)	213,855 (41,483)

Table 2. Estimated minimum dollar value of fish harvested from Hardy Impoundment, from April through October 2007. 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 harvested	Size (in.)	Weight (lb.)	Fillet weight (lb.)	Fillet value at \$8.00/lb.
Bass, Smallmouth	168	14	239	72	\$575
Bass, Rock	934	6	152	45	\$364
Bluegill	2,886	6	434	130	\$1,042
Crappie, Black	619	7	114	34	\$273
Perch, Yellow	3,455	7	497	149	\$1,192
Pike, Northern	740	24	2,265	679	\$5,436
Walleye	1,523	15	1,679	504	\$4,029
<b>Total</b>	<b>10,325</b>		<b>5,379</b>	<b>1,614</b>	<b>\$12,911</b>



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Table 3. 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	<i>14.6</i>
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	<i>0.4</i>
Pretty Lake	Luce	1978	6	ww	46	38.5	23.0	20.0
Anderson Lake	Marquette	1985	5	ww	49	56.2	<i>18.0</i>	<i>15.6</i>
Camp Lake	Luce	1978	6	tr	67	6.7	1.9	<i>1.6</i>
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	<i>18.6</i>	<i>16.1</i>
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								



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Table 6. 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



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Table 4. 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	Okland	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								



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Table 4. 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	Barry	1987	5	ww + tr	2,022	15.9	3.7	3.2
Fletcher Floodwater	Alpena	1995-97	8	ww	8,970	24.2	5.7	5.0
Burt lake	Chebygan	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



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Appendix 1– Estimated harvest, catch per hour, and fishing pressure for boat anglers at the north site on Hardy Impoundment. Two standard errors are given in parentheses.

Species	C/H	April	May	June	July	August	September	October	Season
<b><u>HARVEST</u></b>									
Walleye	0.0085 (0.0089)	0 (0)	185 (255)	0 (0)	0 (0)	0 (0)	112 (245)	234 (412)	530 (543)
Northern pike	0.0107 (0.0116)	0 (0)	46 (95)	278 (542)	0 (0)	0 (0)	112 (219)	234 (382)	670 (705)
Smallmouth bass	0.0018 (0.0037)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	112 (230)	0 (0)	112 (230)
Yellow Perch	0.0470 (0.0517)	1,811 (2,907)	0 (0)	278 (533)	0 (0)	841 (1,075)	0 (0)	0 (0)	2,930 (3,145)
Bluegill	0.0026 (0.0040)	0 (0)	0 (0)	53 (107)	0 (0)	0 (0)	112 (219)	0 (0)	164 (243)
Rock bass	0.0070 (0.0097)	0 (0)	46 (98)	278 (542)	0 (0)	0 (0)	112 (230)	0 (0)	435 (597)
Black crappie	0.0089 (0.0175)	0 (0)	0 (0)	556 (1,085)	0 (0)	0 (0)	0 (0)	0 (0)	556 (1,085)
Total harvest	0.0865 (0.0602)	1,811 (2,907)	277 (289)	1,442 (1,435)	0 (0)	841 (1,075)	558 (511)	468 (562)	5,397 (3,511)
<b><u>RELEASED</u></b>									
Walleye	0.0654 (0.0547)	0 (0)	323 (374)	1,811 (1,913)	597 (816)	0 (0)	1,115 (2,450)	234 (412)	4,082 (3,261)
Northern pike	0.1490 (0.1068)	0 (0)	1,062 (1,225)	3,875 (4,818)	987 (1,483)	76 (178)	2,008 (2,987)	1,288 (1,815)	9,296 (6,258)
Largemouth bass	0.0058 (0.0106)	0 (0)	46 (98)	317 (648)	0 (0)	0 (0)	0 (0)	0 (0)	363 (655)
Smallmouth bass	0.1421 (0.1036)	0 (0)	2,140 (2,367)	2,406 (2,916)	358 (317)	2,063 (4,297)	1,896 (2,074)	0 (0)	8,864 (6,080)
Yellow Perch	0.0632 (0.0575)	0 (0)	46 (98)	278 (597)	0 (0)	3,058 (3,318)	446 (676)	117 (271)	3,945 (3,451)
Bluegill	0.1072 (0.1878)	0 (0)	0 (0)	1,111 (1,780)	0 (0)	5,245 (11,454)	335 (486)	0 (0)	6,691 (11,601)
Rock bass	0.0421 (0.0613)	0 (0)	92 (178)	1,667 (3,476)	119 (277)	76 (151)	669 (1,405)	0 (0)	2,624 (3,767)
Black crappie	0.0083 (0.0167)	466 (1,027)	0 (0)	53 (110)	0 (0)	0 (0)	0 (0)	0 (0)	519 (1,033)
White sucker	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Carp	0.0025 (0.0047)	0 (0)	0 (0)	158 (293)	0 (0)	0 (0)	0 (0)	0 (0)	158 (293)
Total released	0.5856 (0.2913)	466 (1,027)	3,710 (2,700)	11,676 (7,177)	2,062 (1,744)	10,518 (12,677)	6,469 (4,678)	1,640 (1,881)	36,541 (15,781)
Total catch	0.6721 (0.3076)	2,277 (3,083)	3,987 (2,716)	13,118 (7,319)	2,062 (1,744)	11,359 (12,723)	7,026 (4,706)	2,108 (1,963)	41,938 (16,167)
Angler hours		2,070 (1,488)	10,240 (10,349)	13,504 (6,159)	7,412 (1,202)	15,560 (7,058)	8,867 (5,120)	4,743 (3,474)	62,395 (15,388)
Angler trips		440 (380)	1,893 (2,039)	4,360 (2,268)	1,827 (628)	4,005 (1,925)	1,612 (1,066)	1,009 (972)	15,146 (3,954)



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Appendix 2– Estimated fishing pressure for shore fishing at the north site on Hardy Impoundment. Two standard errors are given in parentheses. Fish catch was not estimated because interviews were not collected at shore sites.

<b>Species</b>	<b>C/H</b>	<b>April</b>	<b>May</b>	<b>June</b>	<b>July</b>	<b>August</b>	<b>September</b>	<b>October</b>	<b>Season</b>
Angler hours		1,215 (798)	640 (498)	890 (516)	239 (272)	515 (858)	440 (378)	108 (157)	4,046 (1,459)
Angler trips		277 (183)	146 (114)	203 (118)	54 (62)	118 (196)	100 (86)	25 (36)	923 (334)



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Appendix 3– Estimated harvest, catch per hour, and fishing pressure for boat fishing at the south site on Hardy Impoundment. Two standard errors are given in parentheses.

<u>Species</u>	<u>C/H</u>	<u>April</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>August</u>	<u>September</u>	<u>October</u>	<u>Season</u>
<u>HARVEST</u>									
Walleye	0.0353 (0.0272)	20 (40)	320 (560)	160 (165)	306 (383)	55 (121)	0 (0)	131 (206)	992 (739)
Northern pike	0.0025 (0.0055)	0 (0)	0 (0)	0 (0)	70 (154)	0 (0)	0 (0)	0 (0)	70 (154)
Smallmouth bass	0.0020 (0.0037)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	56 (103)	56 (103)
Yellow Perch	0.0187 (0.0233)	0 (0)	189 (399)	0 (0)	0 (0)	0 (0)	0 (0)	336 (508)	525 (646)
Bluegill	0.0969 (0.1029)	0 (0)	0 (0)	1,063 (1,493)	1,363 (2,380)	183 (324)	0 (0)	112 (229)	2,722 (2,838)
Rock bass	0.0177 (0.0293)	0 (0)	113 (239)	385 (782)	0 (0)	0 (0)	0 (0)	0 (0)	499 (818)
Black crappie	0.0023 (0.0031)	0 (0)	38 (70)	26 (52)	0 (0)	0 (0)	0 (0)	0 (0)	63 (87)
Total harvest	0.1754 (0.1165)	20 (40)	659 (731)	1,635 (1,695)	1,739 (2,416)	238 (346)	0 (0)	636 (602)	4,928 (3,119)
<u>RELEASED</u>									
Walleye	0.0558 (0.0349)	82 (108)	302 (559)	410 (423)	321 (405)	248 (277)	0 (0)	206 (341)	1,568 (927)
Northern pike	0.1284 (0.0626)	676 (729)	795 (818)	1,057 (887)	423 (457)	432 (553)	0 (0)	224 (247)	3,607 (1,601)
Largemouth bass	0.0310 (0.0352)	0 (0)	189 (373)	26 (52)	0 (0)	46 (81)	611 (896)	0 (0)	871 (975)
Smallmouth bass	0.2334 (0.1734)	655 (957)	3,354 (4,345)	705 (843)	822 (988)	798 (642)	0 (0)	224 (342)	6,560 (4,691)
Yellow Perch	0.0341 (0.0494)	20 (40)	0 (0)	51 (75)	141 (285)	91 (162)	0 (0)	654 (1,333)	959 (1,376)
Bluegill	0.1013 (0.1251)	61 (123)	0 (0)	0 (0)	376 (554)	1,473 (2,841)	0 (0)	935 (1,905)	2,846 (3,467)
Rock bass	0.0494 (0.0455)	20 (42)	0 (0)	1,111 (1,155)	211 (461)	46 (99)	0 (0)	0 (0)	1,389 (1,249)
Black crappie	0.0031 (0.0048)	61 (123)	0 (0)	26 (51)	0 (0)	0 (0)	0 (0)	0 (0)	87 (134)
White sucker	0.0009 (0.0019)	0 (0)	0 (0)	26 (52)	0 (0)	0 (0)	0 (0)	0 (0)	26 (52)
Carp	0.0009 (0.0018)	0 (0)	0 (0)	26 (49)	0 (0)	0 (0)	0 (0)	0 (0)	26 (49)
Total released	0.6383 (0.2638)	1,577 (1,222)	4,639 (4,472)	3,437 (1,740)	2,295 (1,397)	3,135 (2,984)	611 (896)	2,243 (2,388)	17,938 (6,471)
Total catch	0.8137 (0.3037)	1,597 (1,223)	5,298 (4,531)	5,072 (2,429)	4,034 (2,790)	3,373 (3,004)	611 (896)	2,879 (2,462)	22,865 (7,184)
Angler hours		2,837 (2,566)	4,351 (2,741)	7,091 (2,804)	4,794 (2,032)	3,848 (1,514)	3,300 (1,542)	1,879 (1,152)	28,100 (5,664)
Angler trips		482 (446)	754 (474)	1,512 (709)	1,532 (692)	1,094 (482)	733 (706)	363 (238)	6,471 (1,481)



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Appendix 4– Estimated fishing pressure for shore fishing at the south site on Hardy Impoundment. Two standard errors are given in parentheses. Fish catch was not estimated because interviews were not collected at shore sites.

<b>Species C/H</b>	<b>April</b>	<b>May</b>	<b>June</b>	<b>July</b>	<b>August</b>	<b>September</b>	<b>October</b>	<b>Season</b>
Angler	150	336	746	750	462	32	82	2,557
hours	(171)	(402)	(441)	(377)	(361)	(64)	(101)	(820)
Angler	33	75	166	167	103	7	18	571
trips	(38)	(90)	(100)	(86)	(82)	(14)	(23)	(185)



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Appendix 5– Estimated harvest, catch per hour, and fishing pressure for boat and shore fishing at the north site on Hardy Impoundment. Two standard errors are given in parentheses.

Species	C/H	April	May	June	July	August	September	October	Season
<b><u>HARVEST</u></b>									
Walleye	0.0080 (0.0084)	0 (0)	185 (255)	0 (0)	0 (0)	0 (0)	112 (245)	234 (412)	530 (543)
Northern pike	0.0101 (0.0109)	0 (0)	46 (95)	278 (542)	0 (0)	0 (0)	112 (219)	234 (382)	670 (705)
Smallmouth bass	0.0017 (0.0035)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	112 (230)	0 (0)	112 (230)
Yellow Perch	0.0441 (0.0484)	1,811 (2,907)	0 (0)	278 (533)	0 (0)	841 (1,075)	0 (0)	0 (0)	2,930 (3,145)
Bluegill	0.0025 (0.0037)	0 (0)	0 (0)	53 (107)	0 (0)	0 (0)	112 (219)	0 (0)	164 (243)
Rock bass	0.0066 (0.0091)	0 (0)	46 (98)	278 (542)	0 (0)	0 (0)	112 (230)	0 (0)	435 (597)
Black crappie	0.0084 (0.0164)	0 (0)	0 (0)	556 (1,085)	0 (0)	0 (0)	0 (0)	0 (0)	556 (1,085)
Total harvest	0.0812 (0.0561)	1,811 (2,907)	277 (289)	1,442 (1,435)	0 (0)	841 (1,075)	558 (511)	468 (562)	5,397 (3,511)
<b><u>RELEASED</u></b>									
Walleye	0.0614 (0.0511)	0 (0)	323 (374)	1,811 (1,913)	597 (816)	0 (0)	1,115 (2,450)	234 (412)	4,082 (3,261)
Northern pike	0.1399 (0.0996)	0 (0)	1,062 (1,225)	3,875 (4,818)	987 (1,483)	76 (178)	2,008 (2,987)	1,288 (1,815)	9,296 (6,258)
Largemouth bass	0.0055 (0.0099)	0 (0)	46 (98)	317 (648)	0 (0)	0 (0)	0 (0)	0 (0)	363 (655)
Smallmouth bass	0.1334 (0.0966)	0 (0)	2,140 (2,367)	2,406 (2,916)	358 (317)	2,063 (4,297)	1,896 (2,074)	0 (0)	8,864 (6,080)
Yellow Perch	0.0594 (0.0537)	0 (0)	46 (98)	278 (597)	0 (0)	3,058 (3,318)	446 (676)	117 (271)	3,945 (3,451)
Bluegill	0.1007 (0.1762)	0 (0)	0 (0)	1,111 (1,780)	0 (0)	5,245 (11,454)	335 (486)	0 (0)	6,691 (11,601)
Rock bass	0.0395 (0.0574)	0 (0)	92 (178)	1,667 (3,476)	119 (277)	76 (151)	669 (1,405)	0 (0)	2,624 (3,767)
Black crappie	0.0078 (0.0156)	466 (1,027)	0 (0)	53 (110)	0 (0)	0 (0)	0 (0)	0 (0)	519 (1,033)
White sucker	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Carp	0.0024 (0.0044)	0 (0)	0 (0)	158 (293)	0 (0)	0 (0)	0 (0)	0 (0)	158 (293)
Total released	0.5500 (0.2698)	466 (1,027)	3,710 (2,700)	11,676 (7,177)	2,062 (1,744)	10,518 (12,677)	6,469 (4,678)	1,640 (1,881)	36,541 (15,781)
Total catch	0.6312 (0.2842)	2,277 (3,083)	3,987 (2,716)	13,118 (7,319)	2,062 (1,744)	11,359 (12,723)	7,026 (4,706)	2,108 (1,963)	41,938 (16,167)
Angler hours		3,285 (1,688)	10,880 (10,361)	14,394 (6,181)	7,650 (1,233)	16,075 (7,110)	9,307 (5,134)	4,851 (3,477)	66,442 (15,457)
Angler trips		718 (422)	2,039 (2,043)	4,563 (2,271)	1,881 (631)	4,123 (1,935)	1,713 (1,070)	1,034 (973)	16,070 (3,968)



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Appendix 6– Estimated harvest, catch per hour, and fishing pressure for boat and shore fishing at the south site on Hardy Impoundment. Two standard errors are given in parentheses.

Species	C/H	April	May	June	July	August	September	October	Season
<b><u>HARVEST</u></b>									
Walleye	0.0324 (0.0249)	20 (40)	320 (560)	160 (165)	306 (383)	55 (121)	0 (0)	131 (206)	992 (739)
Northern pike	0.0023 (0.0050)	0 (0)	0 (0)	0 (0)	70 (154)	0 (0)	0 (0)	0 (0)	70 (154)
Smallmouth bass	0.0018 (0.0034)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	56 (103)	56 (103)
Yellow Perch	0.0171 (0.0213)	0 (0)	189 (399)	0 (0)	0 (0)	0 (0)	0 (0)	336 (508)	525 (646)
Bluegill	0.0888 (0.0940)	0 (0)	0 (0)	1,063 (1,493)	1,363 (2,380)	183 (324)	0 (0)	112 (229)	2,722 (2,838)
Rock bass	0.0163 (0.0269)	0 (0)	113 (239)	385 (782)	0 (0)	0 (0)	0 (0)	0 (0)	499 (818)
Black crappie	0.0021 (0.0029)	0 (0)	38 (70)	26 (52)	0 (0)	0 (0)	0 (0)	0 (0)	63 (87)
Total harvest	0.1607 (0.1061)	20 (40)	659 (731)	1,635 (1,695)	1,739 (2,416)	238 (346)	0 (0)	636 (602)	4,928 (3,119)
<b><u>RELEASED</u></b>									
Walleye	0.0511 (0.0317)	82 (108)	302 (559)	410 (423)	321 (405)	248 (277)	0 (0)	206 (341)	1,568 (927)
Northern pike	0.1177 (0.0567)	676 (729)	795 (818)	1,057 (887)	423 (457)	432 (553)	0 (0)	224 (247)	3,607 (1,601)
Largemouth bass	0.0284 (0.0322)	0 (0)	189 (373)	26 (52)	0 (0)	46 (81)	611 (896)	0 (0)	871 (975)
Smallmouth bass	0.2140 (0.1581)	655 (957)	3,354 (4,345)	705 (843)	822 (988)	798 (642)	0 (0)	224 (342)	6,560 (4,691)
Yellow Perch	0.0313 (0.0453)	20 (40)	0 (0)	51 (75)	141 (285)	91 (162)	0 (0)	654 (1,333)	959 (1,376)
Bluegill	0.0928 (0.1144)	61 (123)	0 (0)	0 (0)	376 (554)	1,473 (2,841)	0 (0)	935 (1,905)	2,846 (3,467)
Rock bass	0.0453 (0.0416)	20 (42)	0 (0)	1,111 (1,155)	211 (461)	46 (99)	0 (0)	0 (0)	1,389 (1,249)
Black crappie	0.0028 (0.0044)	61 (123)	0 (0)	26 (51)	0 (0)	0 (0)	0 (0)	0 (0)	87 (134)
White sucker	0.0008 (0.0017)	0 (0)	0 (0)	26 (52)	0 (0)	0 (0)	0 (0)	0 (0)	26 (52)
Carp	0.0008 (0.0016)	0 (0)	0 (0)	26 (49)	0 (0)	0 (0)	0 (0)	0 (0)	26 (49)
Total released	0.5851 (0.2377)	1,577 (1,222)	4,639 (4,472)	3,437 (1,740)	2,295 (1,397)	3,135 (2,984)	611 (896)	2,243 (2,388)	17,938 (6,471)
Total catch	0.7458 (0.2726)	1,597 (1,223)	5,298 (4,531)	5,072 (2,429)	4,034 (2,790)	3,373 (3,004)	611 (896)	2,879 (2,462)	22,865 (7,184)
Angler hours		2,987 (2,571)	4,687 (2,770)	7,837 (2,839)	5,544 (2,067)	4,310 (1,557)	3,332 (1,544)	1,961 (1,156)	30,658 (5,723)
Angler trips		515 (448)	829 (482)	1,679 (716)	1,700 (698)	1,198 (489)	740 (706)	381 (239)	7,042 (1,492)



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Appendix 7– Estimated harvest, catch per hour, and fishing pressure for boat fishing on Hardy Impoundment. Two standard errors are given in parentheses.

Species	C/H	April	May	June	July	August	September	October	Season
<b><u>HARVEST</u></b>									
Walleye	0.0168 (0.0106)	20 (40)	505 (615)	160 (165)	306 (383)	55 (121)	112 (245)	365 (461)	1,523 (917)
Northern pike	0.0082 (0.0081)	0 (0)	46 (95)	278 (542)	70 (154)	0 (0)	112 (219)	234 (382)	740 (721)
Smallmouth bass	0.0019 (0.0028)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	112 (230)	56 (103)	168 (252)
Yellow Perch	0.0382 (0.0361)	1,811 (2,907)	189 (399)	278 (533)	0 (0)	841 (1,075)	0 (0)	336 (508)	3,455 (3,210)
Bluegill	0.0319 (0.0320)	0 (0)	0 (0)	1,116 (1,497)	1,363 (2,380)	183 (324)	112 (219)	112 (229)	2,886 (2,848)
Rock bass	0.0103 (0.0113)	0 (0)	159 (259)	663 (952)	0 (0)	0 (0)	112 (230)	0 (0)	934 (1,013)
Black crappie	0.0068 (0.0121)	0 (0)	38 (70)	581 (1,086)	0 (0)	0 (0)	0 (0)	0 (0)	619 (1,088)
Total harvest	0.1141 (0.0559)	1,832 (2,907)	936 (786)	3,076 (2,221)	1,739 (2,416)	1,079 (1,129)	558 (511)	1,104 (824)	10,325 (4,696)
<b><u>RELEASED</u></b>									
Walleye	0.0624 (0.0391)	82 (108)	625 (673)	2,221 (1,959)	919 (911)	248 (277)	1,115 (2,450)	440 (534)	5,650 (3,391)
Northern pike	0.1426 (0.0759)	676 (729)	1,856 (1,473)	4,932 (4,899)	1,410 (1,552)	509 (581)	2,008 (2,987)	1,513 (1,832)	12,903 (6,459)
Largemouth bass	0.0136 (0.0132)	0 (0)	235 (385)	343 (650)	0 (0)	46 (81)	611 (896)	0 (0)	1,234 (1,175)
Smallmouth bass	0.1704 (0.0903)	655 (957)	5,495 (4,947)	3,111 (3,036)	1,181 (1,038)	2,861 (4,345)	1,896 (2,074)	224 (342)	15,423 (7,680)
Yellow Perch	0.0542 (0.0422)	20 (40)	46 (98)	329 (602)	141 (285)	3,149 (3,322)	446 (676)	771 (1,361)	4,904 (3,715)
Bluegill	0.1054 (0.1352)	61 (123)	0 (0)	1,111 (1,780)	376 (554)	6,719 (11,801)	335 (486)	935 (1,905)	9,536 (12,108)
Rock bass	0.0443 (0.0446)	20 (42)	92 (178)	2,778 (3,663)	331 (537)	122 (180)	669 (1,405)	0 (0)	4,013 (3,968)
Black crappie	0.0067 (0.0116)	527 (1,034)	0 (0)	79 (121)	0 (0)	0 (0)	0 (0)	0 (0)	606 (1,041)
White sucker	0.0003 (0.0006)	0 (0)	0 (0)	26 (52)	0 (0)	0 (0)	0 (0)	0 (0)	26 (52)
Carp	0.0020 (0.0033)	0 (0)	0 (0)	184 (297)	0 (0)	0 (0)	0 (0)	0 (0)	184 (297)
Total released	0.6020 (0.2178)	2,043 (1,596)	8,349 (5,224)	15,114 (7,385)	4,357 (2,234)	13,653 (13,024)	7,080 (4,763)	3,883 (3,039)	54,478 (17,056)
Total catch	0.7161 (0.2346)	3,874 (3,316)	9,285 (5,283)	18,190 (7,711)	6,096 (3,291)	14,732 (13,073)	7,638 (4,791)	4,987 (3,149)	64,803 (17,691)
Angler hours		4,907 (2,966)	14,591 (10,706)	20,595 (6,768)	12,206 (2,361)	19,408 (7,219)	12,167 (5,348)	6,622 (3,659)	90,496 (16,397)
Angler trips		922 (586)	2,647 (2,094)	5,873 (2,377)	3,359 (935)	5,100 (1,984)	2,345 (1,278)	1,372 (1,001)	21,617 (4,222)



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Appendix 8– Estimated fishing pressure for shore fishing on Hardy Impoundment. Two standard errors are given in parentheses. Fish catch was not estimated because interviews were not collected at shore sites.

<b>Species</b>	<b>C/H</b>	<b>April</b>	<b>May</b>	<b>June</b>	<b>July</b>	<b>August</b>	<b>September</b>	<b>October</b>	<b>Season</b>
Angler hours	1,365 (816)	976 (640)	1,635 (679)	989 (465)	977 (931)	472 (383)	190 (187)	6,604 (1,674)	
Angler trips	311 (187)	221 (145)	369 (155)	222 (106)	221 (212)	108 (88)	43 (42)	1,494 (382)	



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Appendix 9– Estimated harvest, catch per hour, and fishing pressure for Hardy Impoundment. Two standard errors are given in parentheses.

Species	C/H	April	May	June	July	August	September	October	Season
<b><u>HARVEST</u></b>									
Walleye	0.0157 (0.0098)	20 (40)	505 (615)	160 (165)	306 (383)	55 (121)	112 (245)	365 (461)	1,523 (917)
Northern pike	0.0076 (0.0075)	0 (0)	46 (95)	278 (542)	70 (154)	0 (0)	112 (219)	234 (382)	740 (721)
Smallmouth bass	0.0017 (0.0026)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	112 (230)	56 (103)	168 (252)
Yellow Perch	0.0356 (0.0336)	1,811 (2,907)	189 (399)	278 (533)	0 (0)	841 (1,075)	0 (0)	336 (508)	3,455 (3,210)
Bluegill	0.0297 (0.0298)	0 (0)	0 (0)	1,116 (1,497)	1,363 (2,380)	183 (324)	112 (219)	112 (229)	2,886 (2,848)
Rock bass	0.0096 (0.0106)	0 (0)	159 (259)	663 (952)	0 (0)	0 (0)	112 (230)	0 (0)	934 (1,013)
Black crappie	0.0064 (0.0113)	0 (0)	38 (70)	581 (1,086)	0 (0)	0 (0)	0 (0)	0 (0)	619 (1,088)
Total harvest	0.1063 (0.0516)	1,832 (2,907)	936 (786)	3,076 (2,221)	1,739 (2,416)	1,079 (1,129)	558 (511)	1,104 (824)	10,325 (4,696)
<b><u>RELEASED</u></b>									
Walleye	0.0582 (0.0363)	82 (108)	625 (673)	2,221 (1,959)	919 (911)	248 (277)	1,115 (2,450)	440 (534)	5,650 (3,391)
Northern pike	0.1329 (0.0702)	676 (729)	1,856 (1,473)	4,932 (4,899)	1,410 (1,552)	509 (581)	2,008 (2,987)	1,513 (1,832)	12,903 (6,459)
Largemouth bass	0.0127 (0.0123)	0 (0)	235 (385)	343 (650)	0 (0)	46 (81)	611 (896)	0 (0)	1,234 (1,175)
Smallmouth bass	0.1588 (0.0836)	655 (957)	5,495 (4,947)	3,111 (3,036)	1,181 (1,038)	2,861 (4,345)	1,896 (2,074)	224 (342)	15,423 (7,680)
Yellow Perch	0.0505 (0.0392)	20 (40)	46 (98)	329 (602)	141 (285)	3,149 (3,322)	446 (676)	771 (1,361)	4,904 (3,715)
Bluegill	0.0982 (0.1258)	61 (123)	0 (0)	1,111 (1,780)	376 (554)	6,719 (11,801)	335 (486)	935 (1,905)	9,536 (12,108)
Rock bass	0.0413 (0.0415)	20 (42)	92 (178)	2,778 (3,663)	331 (537)	122 (180)	669 (1,405)	0 (0)	4,013 (3,968)
Black crappie	0.0062 (0.0108)	527 (1,034)	0 (0)	79 (121)	0 (0)	0 (0)	0 (0)	0 (0)	606 (1,041)
White sucker	0.0003 (0.0005)	0 (0)	0 (0)	26 (52)	0 (0)	0 (0)	0 (0)	0 (0)	26 (52)
Carp	0.0019 (0.0031)	0 (0)	0 (0)	184 (297)	0 (0)	0 (0)	0 (0)	0 (0)	184 (297)
Total released	0.5611 (0.1998)	2,043 (1,596)	8,349 (5,224)	15,114 (7,385)	4,357 (2,234)	13,653 (13,024)	7,080 (4,763)	3,883 (3,039)	54,478 (17,056)
Total catch	0.6674 (0.2145)	3,874 (3,316)	9,285 (5,283)	18,190 (7,711)	6,096 (3,291)	14,732 (13,073)	7,638 (4,791)	4,987 (3,149)	64,803 (17,691)
Angler hours		6,272 (3,076)	15,567 (10,725)	22,231 (6,801)	13,194 (2,406)	20,386 (7,278)	12,639 (5,361)	6,812 (3,664)	97,100 (16,483)
Angler trips		1,233 (615)	2,868 (2,099)	6,242 (2,382)	3,581 (941)	5,320 (1,996)	2,453 (1,281)	1,415 (1,002)	23,111 (4,239)



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