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**Pulaski Lake Creel Survey
May 1, 2003 to October 31, 2003**

Completion Report

By

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Montrose Area Fisheries Office



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Abstract

A creel survey was conducted on Pulaski Lake from May 1, 2003 to October 31, 2003. The objectives of the survey were to provide information on fishing pressure, catch and harvest, angler demographics, and satisfaction with the fishery. Angling pressure was estimated to be 23,108 angler hours or 32.92 hours per acre, which is above the historical median (26.3 hrs/acre) of summer creel surveys for lake class 27 (Cook and Younk 1998) and above the 1985 summer recreational use survey estimate (22.5 hrs/acre). Non-fishing recreational use was also high (35.25 hrs/acre). Northern pike had the highest catch (12.83/acre), harvest (2.20/acre) and yield (4.47 lbs/acre) estimates, but harvested mean length and weight (20.64 inches, 2.03 lbs) were below statewide averages for all lake classes. Sunfish were the second most commonly caught and harvested species (11.63/acre, 2.11/acre, respectively), but mean harvest length (6.3 inches) was below the statewide average (7.2 inches). Walleye (2.32/acre caught, 2.03/acre harvested) had the highest harvest percentage (87%) and were the most sought after species (51.5% targeted). Harvested mean length and weight of walleye (17.57 inches, 1.98 lbs) were above statewide averages. Largemouth bass, black crappie, and rock bass were also important species in the creel. Most crappie were harvested, but most largemouth and rock bass were released. Rock bass were numerous and large, but may be viewed as less palatable. Northern pike anglers gave the highest ratings for fishing success and also satisfaction with the number caught; largemouth bass anglers gave the highest satisfaction rating for size. Recent lake surveys have found northern pike increasing in number and decreasing in size, but pike anglers were mostly satisfied with the high catch rate, despite a small mean size. In contrast, sunfish were also small and numerous, but angler success ratings were lower and fewer anglers targeted sunfish. Summer lake survey results indicate a high walleye population, but angler catch rates were moderate. Depth, water clarity, and high recreational use may limit walleye catchability. A winter creel survey and summer lake survey in 2004 should help clarify the status of the fishery in Pulaski Lake and indicate whether any management changes are needed.

Introduction

Pulaski Lake is a popular, multi-species fishery in Wright County, MN, located 30 miles west of the Twin Cities metro area. Walleye fingerlings are stocked in Pulaski Lake every other year. The most recent lake survey in 2000 (Minnesota Department of Natural Resources 2001) found walleye and northern pike abundance to be above the expected range for lake class 27. Walleye fingerlings are currently stocked every other year. There is no record of previous creel surveys, but a summer recreational use survey was conducted in 1985 (Minnesota Department of Natural Resources, 1989). The lake currently receives considerable recreational use during the summer (M. Pelham, personal observation).

Pulaski Lake has no natural outlet. An outlet was constructed in 1986 during a period of high water and water is pumped as needed to Buffalo Lake. In 1991, an infestation of Eurasian watermilfoil (*M. spicatum*) was discovered and is now widely distributed.

A summer creel survey was conducted on Pulaski Lake from May 1, 2003 through October 31, 2003 using a full-time creel clerk. The objectives of the survey were to provide information on fishing pressure, catch and harvest, angler demographics, and satisfaction with the fishery. A winter creel survey and summer lake survey will be conducted on Pulaski Lake in 2004 to complement these results.

Study Area

Pulaski Lake is located in eastern Wright County, adjoins the city of Buffalo, and is heavily developed. Pulaski Lake has a surface area of 702 acres (Table 1), maximum depth is 87 feet and only 17% of the lake area is littoral. A shallow basin known as Little Pulaski Lake is located at the north end and connects to the main lake by a navigable channel. Little Pulaski was included in this creel survey. Pulaski Lake is classified as lake class 27 (Schupp 1992), has a small watershed of 1,805 acres, and is classified as mesotrophic (combined Carlson's TSI=44, Minnesota Pollution Control Agency 1994). The lake has one public access, 2 private accesses, and one public fishing pier.

Methods

A stratified random, roving creel survey was conducted from May 1, 2003 through October 31, 2003. The survey was stratified by month, day type (weekday, weekend/holiday), and angler

type (boat, bank, pier). For individual sampling days, one of two non-overlapping, nine hour periods (5 AM to 2 PM, 2-11 PM) was used initially. Beginning in August, the day length was decreased by one hour each month due to declining daylight (Tables 2 and 3). Sampling periods were therefore shortened by one half hour per month, with the clerk's day beginning one half hour later (early shift) or ending one half hour earlier (late shift). A similar creel survey was conducted concurrently on nearby Buffalo Lake using the same clerk (Minnesota Department of Natural Resources 2004a). Each sampling period was split equally between the two lakes with the starting lake chosen randomly. Four weekdays were sampled during each two week period and all weekend days were sampled. All weekdays and sampling periods were randomly chosen.

The creel clerk roved the lakes by boat or by foot and interviewed as many anglers as possible. During the interview, the clerk recorded the number of anglers in the party, start and end times, angler demographics, and catch information. Fish were measured to the nearest 0.1 inch; length of previously released fish was estimated by anglers. Angler demographics were recorded individually, whereas all other data were recorded for the party. Bank and pier anglers were treated as parties of one. Anglers were also asked a series of questions regarding satisfaction with the fishing and regulations:

- 1.) "On a scale of 1 to 10, with one being poor and ten being excellent, how would you rate your fishing success?"
- 2.) "Have you been interviewed before on this lake?"
- 3.) "On a scale of 1 to 10, how satisfied are you with the number of (targeted species) you catch on Pulaski Lake?"
- 4.) "On a scale of 1 to 10, how satisfied are you with the size of (targeted species) you catch on Pulaski Lake?"

Only one answer to each question was allowed per party.

Angling pressure was estimated from instantaneous counts at randomly selected times. Two counts were made during each sampling period. Recreational users were counted and assigned to categories (Table 3). Data were analyzed with the General Creel Survey Analysis Program (GENCREEL, version 2) (Bindman and Mach 1997).

Results and Discussion

Fishing Pressure and Recreational Use

The creel survey encompassed 184 days and a total of 103 periods were sampled during the survey, including 48 weekdays and 55 weekend days (Table 2). A total of 206 activity counts and 550 interviews were recorded. The percentage of interviews which were completed trips was 34%.

Angling pressure on Pulaski Lake was 23,108 angler hours or 32.92 hours per acre (Table 3), which is above the historical median (26.3 hrs/acre) of summer creel surveys for lake class 27 (Cook and Younk 1998) and above the 1985 summer recreational use survey estimate (22.5 hrs/acre, Minnesota Department of Natural Resources, 1986). Pressure estimates were highest in June (5,363 hrs, 7.64 hrs/acre) and lowest in October (1,698 hrs, 2.42 hrs/acre). Mean party size for boat anglers was 1.91 and boat anglers represented 96% of all angler hours (Table 3). Mean completed trip length for all parties was 3.23 hours. Non-fishing use on Pulaski was 24,746 hours or 35.25 hours per acre, almost entirely in June, July, and August (Table 3). This is substantially higher than the 1985 non-fishing estimate of 16.4 hours per acre (Minnesota Department of Natural Resources, 1986). Waterskiing and pleasure boating represented 90% of non-fishing use in 2003.

Catch and Harvest

An estimated 28,325 fish were caught and 6,286 fish harvested from Pulaski Lake for all species combined (Table 4). Northern pike had the highest catch (9,009, 12.83/acre), harvest (1,543, 2.20/acre) and yield (3,138 lbs, 4.47 lbs/acre) estimates, all of which were in the fourth quartile for lake class 27 summer creel surveys and the catch rate was higher than previously recorded in historic lake class 27 results (Tables 4-6; Minnesota Department of Natural Resources, unpublished data). Similarly, the catch rate for targeting anglers (0.72/hr,) was in the fourth quartile, whereas harvest rate (0.18/hr) was in the third quartile (Table 7). Harvested mean length and weight of northern pike (20.64 inches, 2.03 lbs, Table 8) were below summer creel survey statewide averages for all lake classes (Cook and Younk 1998). Northern pike anglers were more likely to harvest their limit (11.4% of pike anglers) than anglers seeking other species (Table 9).

Sunfish were the second most commonly caught and harvested species (8,163 caught, 11.63/acre; 1,481 harvested, 2.11/acre; Tables 4 and 5). Catch rates for targeting anglers (14.0%

of all anglers, Table 10) were highest for sunfish (1.81/hr) and in the third quartile for lake class 27, whereas harvest rate (0.40/hr) was in the first quartile. This is likely due to the low mean length of harvested sunfish (6.3 inches), compared to the statewide average (7.2 inches, Cook and Younk 1998). This also helps explain the low percentage of harvested (18%) versus released sunfish.

Walleye (1,628 caught, 2.32/acre; 1,424 harvested, 2.03/acre) had the highest harvest percentage (87% of walleye caught) of any species (Table 4) and were the most sought after species (51.5% targeted, Table 10). Walleye yield (4.01 lbs/acre) was in the fourth quartile for lake class 27, catch and harvest per acre were both in the third quartile, whereas targeting angler catch and harvest rates (0.099/hr, 0.091/hr, respectively) were in the second quartile (Minnesota Department of Natural Resources, unpublished data). Harvested mean length and weight of walleye (17.57 inches, 1.98 lbs) were above statewide averages for all lake classes (Cook and Younk 1998), which may help explain the high level of angler interest and harvest.

Largemouth bass were frequently caught (3,576 caught, 5.09/acre; Table 4), but mostly released (556 harvested, 0.79/acre), although mean length and weight of harvested bass (13.25 inches, 1.42 lbs) were similar to statewide averages for all lakes (Cook and Younk 1998). Catch per acre was in the fourth quartile and harvest per acre in the third quartile, although catch and harvest rates (0.342/hr, 0.082/hr, respectively) were both in the second quartile for lake class 27 (Minnesota Department of Natural Resources, unpublished data).

Black crappie catch (1,062, 1.51/acre) and harvest (828, 1.18/acre) were both in the third quartile for lake class 27, as were catch and harvest rate (0.602/hr, 0.478/hr, respectively). For the season, 7.8% of anglers targeted black crappie, but this was concentrated in May (29.5% of anglers) in Little Pulaski Lake. Mean length (10.5 in.) and weight (0.68 lbs) of black crappie were similar to statewide averages for all lakes, but are favorable for the Montrose area.

Rock bass (4,515 caught, 6.43/acre; 420 harvested, 0.60/acre) were frequently caught, but primarily released, and only three parties targeted rock bass. However, harvested mean length (9.5 inches) and weight (0.75 lbs) were above statewide averages for all lakes and very favorable for the Montrose area. Mean length of released rock bass (8.9 inches) was nearly as large. The largest rock bass measured was 13.0 inches, nearly the length of the state record fish (13.5 inches).

Among all targeting anglers, the majority harvested none of the target species, based on complete trip interviews (Table 9). Anglers targeting black crappie or northern pike were most likely to harvest at least one fish. Northern pike anglers were more likely to harvest their limit (11.4% of pike anglers) than anglers seeking other species.

Additional catch and harvest estimates by season strata can be found in the appendix.

Angler Demographics and Interview Questions

A total of 550 parties were interviewed; most anglers targeted walleye (51.5%), followed by northern pike (19.6%) and largemouth bass (15.1%) (Table 10). Walleye was the most sought after species in every month, but the highest targeting percentages were in October (75.4%) and September (68.2%). Male anglers were a large majority (86.4%) and most were 26-45 years old (Table 11). Most anglers traveled 25 miles or less from home to Pulaski Lake (82.7%)(Table 12).

When asked the question “On a scale of 1 to 10, with one being poor and ten being excellent, how would you rate your fishing success?”, the mean response for all parties was 4.2; 38.7% of all anglers gave a response of 1 or 2, and 4.3% gave a response of 9 or 10 (Table 13). Success ratings differed among targeting anglers; 58% of northern pike anglers gave a rating of 5 or better, followed by largemouth bass (46%), sunfish (42%), walleye (41%) and black crappie anglers (27%, Table). Only four parties targeted other species and all data include both complete and incomplete interviews.

When asked to rate overall satisfaction with size and number of targeted species, ratings were dissimilar between size and number of each species, except for largemouth bass (Table 14). Among species, northern pike had the highest mean rating for number (6.8), but were rated lower for size (4.7). Black crappie anglers gave the lowest rating for number (4.4), but were rated higher for size (6.0). Largemouth bass ratings were 6.4 for both size and number. Pike and sunfish anglers were more satisfied with the number caught than size, whereas crappie and walleye anglers were more satisfied with size than number. This corresponds well with creel catch data for number caught and mean size.

Economic Value

One method for estimating the average amount spent by an angler (non-Great Lakes) on a day of fishing was reported in the 2001 National Survey of Fishing, Hunting and Wildlife-Associated recreation data (US Department of the Interior 2003). An angler trip to Pulaski Lake was considered an angler day. A total of 23,108 angler hours and 3.23 hours per trip equals 7,154

trips during the summer season. Using a rate of \$26 per trip (food, lodging, transportation, fuel, oil, bait, tackle, and licenses), the estimated value of the summer fishery was \$186,001.

Conclusions and Management Implications

Results from the summer creel survey show the catch on Pulaski Lake to be dominated by small northern pike, small sunfish, and largemouth bass. However, most anglers targeted walleye, even though the catch rate was the lowest of the five major species. The fact that relatively few walleye were released suggests that their favorable size influenced angler behavior. These results are similar to lake survey results in 2000 for most species (Minnesota Department of Natural Resources 2001), although the walleye gill net catch rate in 2000 (15.7/net) suggests that walleye are more abundant than the creel survey indicates.

Since 1982, walleye abundance in lake surveys has been high; in the 2000 survey, the walleye gill net catch was nearly twice the third quartile benchmark for lake class 27 (Minnesota Department of Natural Resources 2001). In contrast, nearby Buffalo Lake (with a concurrent creel survey) had a much lower gill net catch rate in the 2003 lake survey, but the walleye catch rate by targeting anglers was twice as high (0.217/hr, Minnesota Department of Natural Resources 2004a, 2004b). This suggests that walleye may be more difficult to catch in Pulaski Lake, perhaps due to the difficulty of angling in a relatively deep, clear lake with a high level of recreational use. Numerous angler comments concur with this. Another possibility is that gill net catch rates overestimate abundance, perhaps by concentrating on the best available habitat. A walleye population estimate will be conducted as part of the 2004 lake survey to assess how well gill net catch reflects population size.

For comparison, Sugar Lake (lake class 24) is also located in Wright County and is similar to Pulaski in terms of size, water quality, and walleye management. A summer creel survey was conducted on Sugar Lake in 1998 and found walleye catch and harvest per acre and per hour to be substantially lower than on Pulaski, but mean harvest length was identical (Minnesota Department of Natural Resources 1999a). The summer gill net catch in the 1998 Sugar Lake survey was much lower than the 2000 lake survey on Pulaski, but still in the third quartile for the lake class (Minnesota Department of Natural Resources 1999b). This provides some evidence that Pulaski may have a high density of walleye in the lake and that the higher gill net catch is a reasonable estimate of the fishery.

Northern pike were the most numerous species caught and harvested during the creel survey and 11.4% of pike anglers caught their limit. Recent lake surveys show a substantial increase in pike abundance, along with a decrease in size. Even though pike were small, they had the highest angler success rating. This suggests that anglers may value the ease of catching pike, despite their size. In contrast, sunfish were also small and numerous in the survey, but angler success ratings were lower than for northern pike and fewer anglers targeted sunfish. Given the lower catch rate for walleye, small pike may be important for angler harvest and provide a better opportunity for a meal than small sunfish. However, most small pike were still released. A special regulation could be considered for northern pike in order to retain larger individuals, and anglers should be encouraged to harvest smaller pike and release larger ones.

Few anglers targeted rock bass and relatively few were harvested, although they were the third most numerous species caught and their average size was large (Table 8). A number of anglers commented favorably about the large rock bass they were catching, but rock bass may be perceived as less palatable than other panfish species.

A winter creel survey and summer lake survey in 2004 should help clarify the status of the fishery in Pulaski Lake and indicate whether any management changes are needed.

Acknowledgments

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Table 1. Descriptive characteristics of Pulaski Lake, Wright County, Minnesota.

Characteristic	Pulaski Lake
DOW number	86-53
Minnesota lake class ¹	27
Total surface acres	702
Percent littoral area ²	17
Maximum depth (ft)	87
Secchi disk transparency ³ (ft)	7.9
Total alkalinity ⁴ (ppm)	122
Total phosphorus ⁴ (ppm)	0.017
Shoreline development index ⁵	1.09

¹Schupp (1992).

²Percent of the total surface area shallower than 15 ft.

³Average for May-October, as recorded by creel clerk during each daylight count.

⁴Lake Survey, Minnesota DNR 2000.

⁵Shoreline length/ $2(\pi \times \text{lake area})^{1/2}$, length and area are consistent units (miles and square miles).

Table 2. Summary of creel strata statistics, Pulaski Lake, Minnesota, May 1, 2003-October 31, 2003. Standard errors appear in parentheses.

Statistic	Month						Entire Season ²
	May	June	July	August	September	October	
Start date of stratum	05/01/2003	06/01/2003	07/01/2003	08/01/2003	09/01/2003	10/01/2003	05/01/2003
End date of stratum	05/31/2003	06/30/2003	07/31/2003	08/31/2003	09/30/2003	10/31/2003	10/31/2003
Length of fishing day (hours)	18	18	18	17	16	15	—
Number of days in stratum	31	30	31	31	30	31	184
Weekdays sampled	7	8	9	8	8	8	48
Weekend/holiday days sampled	10	9	9	10	9	8	55
Number of angler counts	34	34	36	36	34	32	206
Number of boat interviews	91	98	96	88	63	54	490
Number of bank interviews	8	14	7	4	3	2	38
Number of pier interviews	6	5	8	2	0	1	22
Total number of interviews	105	117	111	94	66	57	550
Percent of completed trip interviews	31	22	23	37	45	65	34
Mean numbers per count							
Fishing boats	5.32(0.76)	4.94(0.73)	5.08(0.61)	4.06(0.52)	3.24(0.48)	2.84(0.60)	4.27(0.26)
Bank Anglers	0.32(0.16)	0.71(0.27)	0.58(0.19)	0.17(0.07)	0.12(0.07)	0.31(0.16)	0.37(0.07)
Pier Anglers	0.41(0.18)	0.68(0.19)	0.67(0.21)	0.08(0.06)	0.06(0.04)	0.00	0.32(0.06)
Mean number of anglers per party ¹							
Boat party	1.95(0.31)	2.02(0.35)	1.94(0.32)	1.89(0.26)	1.65(0.25)	2.06(0.44)	1.91(0.15)
Mean completed trip data (hours)							
Boat party	3.19(0.71)	3.48(0.32)	3.53(0.71)	3.13(0.83)	3.35(0.71)	3.41(0.66)	3.27(0.36)
Bank angler	1.82(—)	2.00(—)	2.00(—)	—	2.23(—)	4.05(—)	2.19(0.45)
Pier angler	—	—	—	—	—	—	—
All angler types	3.11(0.69)	3.44(0.33)	3.5(0.71)	3.13(0.83)	3.21(0.39)	3.41(0.67)	3.23(0.35)

¹Bank and pier anglers were counted as individuals. ²Season totals were analyzed across months.

Table 3. Recreational water surface use estimates, Pulaski Lake, Minnesota, May 1-October 31, 2003. Standard errors appear in parentheses.

Activity	Month						Entire Season ¹
	May	June	July	August	September	October	
Angler/User Hours							
Boat Anglers	4,980.2(900.7)	4,793.2(1,007.7)	4,541.5(822.7)	3,504.1(537.5)	1,989.9(264.2)	1,608.5(323.8)	21,417.5(1,722.5)
Bank Anglers	117.0(55.4)	303.8(98.5)	306.0(178.2)	106.3(49.0)	45.0(27.0)	89.1(52.0)	967.1(224.5)
Pier Anglers	162.0(84.9)	265.5(111.7)	229.0(58.5)	25.5(18.1)	42.0(27.5)	0.0(—)	724.0(155.5)
All Anglers	5,259.2(952.1)	5,362.5(1,116.3)	5,076.5(937.1)	3,635.8(558.1)	2,076.9(271.6)	1,697.6(346.9)	23,108.5(1,880.5)
Water skiing	333.0(286.5)	3,299.6(911.2)	3,329.0(929.0)	4,976.8(1,564.6)	305.0(169.0)	0.0(—)	12,243.4(2,062.0)
Pleasure boating	387.0(337.3)	2,887.9(1,119.3)	3,648.0(1,138.7)	2,518.1(606.7)	541.0(272.2)	95.6(57.7)	10,077.6(1,763.2)
Sailing	0.0(—)	27.0(19.1)	97.0(67.5)	162.6(122.7)	0.0(—)	0.0(—)	286.6(141.3)
Canoeing/kayaking	0.0(—)	108.0(55.7)	18.0(18.0)	34.0(22.7)	37.0(26.4)	0.0(—)	197.0(197.0)
Paddle boating	0.0(—)	173.3(65.3)	45.0(30.5)	34.0(22.7)	16.0(16.0)	0.0(—)	268.3(77.2)
Personal watercraft	99.0(71.6)	464.6(159.3)	395.0(96.1)	595.0(187.7)	120.0(111.3)	0.0(—)	1,673.6(295.5)
Total non-fishing	819.0(689.9)	6,960.4(2,090.4)	7,532.0(2,094.7)	8,320.4(2,294.5)	1,019.0(539.4)	95.6(57.7)	24,746.4(3,846.1)
Total recreation use	6,078.2	12,322.9	12,608.5	11,956.2	3,095.9	1,793.2	47,854.9
Fishing as % of total	86.5	43.5	40.3	30.4	67.1	94.7	48.3
Angler/User Hours per Acre							
Boat anglers	7.09(1.28)	6.83(1.44)	6.47(1.17)	4.99(0.77)	2.83(0.38)	2.29(0.46)	30.51(2.45)
Bank anglers	0.17(0.08)	0.43(0.14)	0.44(0.25)	0.15(0.07)	0.06(0.04)	0.13(0.07)	1.38(0.32)
Pier anglers	0.23(0.12)	0.38(0.16)	0.33(0.08)	0.04(0.03)	0.06(0.04)	0.00(—)	1.03(0.22)
All anglers	7.49(1.36)	7.64(1.59)	7.23(1.33)	5.18(0.79)	2.96(0.39)	2.42(0.49)	32.92(2.68)
Water skiing	0.47(0.41)	4.70(1.30)	4.74(1.32)	7.09(2.23)	0.43(0.24)	0.00(—)	17.44(2.94)
Pleasure boating	0.55(0.48)	4.11(1.59)	5.20(1.62)	3.59(0.86)	0.77(0.39)	0.14(0.08)	14.36(2.51)
Sailing	0.00(—)	0.04(0.03)	0.14(0.10)	0.23(0.17)	0.00(—)	0.00(—)	0.41(0.20)
Canoeing/kayaking	0.00(—)	0.15(0.08)	0.03(0.03)	0.05(0.03)	0.05(0.04)	0.00(—)	0.28(0.10)
Paddle boating	0.00(—)	0.25(0.09)	0.06(0.04)	0.05(0.03)	0.02(0.02)	0.00(—)	0.38(0.11)
Personal watercraft	0.14(0.10)	0.66(0.23)	0.56(0.14)	0.85(0.27)	0.17(0.16)	0.00(—)	2.38(0.42)
Total non-fishing	1.17(0.98)	9.92(2.98)	10.73(2.98)	11.85(3.27)	1.45(0.77)	0.14(0.08)	35.25(5.48)
Total recreation use	8.66	17.56	17.96	17.03	4.41	2.56	68.17

¹Season totals were analyzed across months.

Table 4. Catch and harvest estimates, Pulaski Lake, Minnesota, May 1, 2003-October 31, 2003. Standard errors appear in parentheses.

Species	Number Harvested	Number Released	Number Caught
Black crappie	827.7 (282.1)	233.9 (120.0)	1,061.6 (308.4)
Largemouth bass	555.8 (110.1)	3,019.7 (434.6)	3,575.5 (495.5)
Northern pike	1,542.7 (339.2)	7,466.6 (1,052.4)	9,009.3 (1,217.7)
Rock bass	419.6 (133.1)	4,095.7 (1,011.5)	4,515.2 (1,030.7)
Sunfish ¹	1,480.6 (463.4)	6,681.9 (1,271.9)	8,162.5 (1,424.7)
Walleye	1,423.6 (277.2)	204.0 (77.1)	1,627.6 (303.0)
Yellow perch	0.0 (0.0)	69.5 (41.5)	69.5 (41.5)
All species	6,285.5 (718.7)	22,039.8 (1,992.2)	28,325.3 (2,240.3)

¹Includes bluegill, pumpkinseed, hybrid and green sunfish.

Table 5. Catch and harvest estimates per acre, Pulaski Lake, Minnesota, May 1, 2003-October 31, 2003. Standard errors appear in parentheses.

Species	Number Harvested per Acre	Number Released per Acre	Number Caught per Acre
Black crappie	1.18 (0.40)	0.33 (0.17)	1.51 (0.44)
Largemouth bass	0.79 (0.16)	4.30 (0.62)	5.09 (0.71)
Northern pike	2.20 (0.48)	10.64 (1.50)	12.83 (1.73)
Rock bass	0.60 (0.19)	5.83 (1.44)	6.43 (1.47)
Sunfish ¹	2.11 (0.66)	9.52 (1.81)	11.63 (2.03)
Walleye	2.03 (0.39)	0.29 (0.11)	2.32 (0.43)
Yellow perch	0.00 (0.00)	0.10 (0.06)	0.10 (0.06)
All species	8.95 (1.02)	31.40 (2.84)	40.35 (3.19)

¹Includes bluegill, pumpkinseed, hybrid and green sunfish.

Table 6. Yield estimates, Pulaski Lake, Minnesota, May 1, 2003-October 31, 2003. Standard errors appear in parentheses.

Species	Pounds Harvested	Pounds Harvested per Acre
Black crappie	561.80(307.80)	0.80(0.44)
Largemouth bass	789.60(258.00)	1.12(0.37)
Northern pike	3,138.40(1,394.00)	4.47(1.99)
Rock bass	315.20(328.30)	0.45(0.47)
Sunfish ¹	316.10(129.40)	0.45(0.18)
Walleye	2,817.20(946.50)	4.01(1.35)
Yellow perch	0.00(0.00)	0.00(0.00)
All species	7,958.30(—)	11.34(—)

¹Includes bluegill, pumpkinseed, hybrid and green sunfish.

Table 7. Harvest, release, and catch rate estimates, Pulaski Lake, Minnesota, May 1, 2003-October 31, 2003. Standard errors appear in parentheses.

Species	Harvest per Angler Hour		Release per Angler Hour		Catch per Angler Hour	
All Anglers						
Black crappie	0.034	(0.006)	0.010	(0.001)	0.044	(0.013)
Largemouth bass	0.023	(0.003)	0.124	(0.012)	0.147	(0.011)
Northern pike	0.063	(0.013)	0.307	(0.038)	0.370	(0.043)
Rock bass	0.017	(0.006)	0.168	(0.044)	0.185	(0.045)
Sunfish ¹	0.061	(0.016)	0.274	(0.057)	0.335	(0.065)
Walleye	0.058	(0.011)	0.008	(0.003)	0.067	(0.012)
Yellow perch	0.000	(0.000)	0.003	(0.002)	0.003	(0.002)
All species	0.258	(0.026)	0.905	(0.083)	1.163	(0.093)
Targeting Anglers						
Black crappie	0.478	(0.146)	0.123	(0.071)	0.602	(0.158)
Largemouth bass	0.082	(0.023)	0.260	(0.066)	0.342	(0.068)
Northern pike	0.182	(0.040)	0.538	(0.140)	0.720	(0.133)
Sunfish	0.400	(0.146)	1.409	(0.430)	1.809	(0.391)
Walleye	0.091	(0.017)	0.008	(0.003)	0.099	(0.017)

¹Includes bluegill, pumpkinseed, hybrid and green sunfish.

Table 8. Length frequency distribution¹ of harvested and released² fish, Pulaski Lake, Minnesota, May 1, 2003-October 31, 2003.

TL (inches)	BLC		BLH		LMB		NOP	
	Harvest	Release	Harvest	Release	Harvest	Release	Harvest	Release
<4.0	—	—	—	—	—	1	—	—
4.0-4.4	—	4	—	—	—	1	—	—
4.5-4.9	—	—	—	—	—	—	—	—
5.0-5.4	—	—	—	—	—	3	—	—
5.5-5.9	—	—	—	—	—	—	—	—
6.0-6.4	—	—	1	1	1	—	—	—
6.5-6.9	—	—	—	—	—	—	—	—
7.0-7.4	—	3	—	—	—	9	—	—
7.5-7.9	—	4	—	—	—	—	—	—
8.0-8.4	—	6	—	—	—	12	—	—
8.5-8.9	—	—	—	—	—	—	—	—
9.0-9.4	7	2	—	—	—	15	—	2
9.5-9.9	6	—	—	—	—	4	—	—
10.0-10.4	12	—	1	1	8	64	—	5
10.5-10.9	4	—	1	—	1	7	—	—
11.0-11.4	11	—	1	1	3	34	—	2
11.5-11.9	4	—	—	4	—	5	—	—
12.0-12.9	4	—	—	3	10	58	1	6
13.0-13.9	2	—	—	5	3	52	—	2
14.0-14.9	—	—	—	1	21	46	—	23
15.0-15.9	—	—	—	—	2	23	2	31
16.0-16.9	—	—	—	—	3	6	4	65
17.0-17.9	—	—	—	—	7	3	8	105
18.0-18.9	—	—	—	—	1	4	16	169
19.0-19.9	—	—	—	—	—	—	27	77
20.0-20.9	—	—	—	—	—	1	27	148
21.0-21.9	—	—	—	—	—	—	13	57
22.0-22.9	—	—	—	—	—	—	10	25
23.0-23.9	—	—	—	—	—	—	10	23
24.0-24.9	—	—	—	—	—	—	6	13
25.0-25.9	—	—	—	—	—	—	2	19
26.0-26.9	—	—	—	—	—	—	2	1
27.0-27.9	—	—	—	—	—	—	2	1
28.0-28.9	—	—	—	—	—	—	—	2
29.0-29.9	—	—	—	—	—	—	—	—
30.0-30.9	—	—	—	—	—	—	—	2
31.0-31.9	—	—	—	—	—	—	—	—
32.0-32.9	—	—	—	—	—	—	2	1
33.0-33.9	—	—	—	—	—	—	1	—
34.0-34.9	—	—	—	—	—	—	—	—
35.0-35.9	—	—	—	—	—	—	—	1
36.0-36.9	—	—	—	—	—	—	—	3
37.0-37.9	—	—	—	—	—	—	—	—
38.0-39.0	—	—	—	—	—	—	—	—
>39	—	—	—	—	—	—	—	1
Total N	50	19	4	16	60	348	133	784
Mean Length	10.49	7.35	9.85	11.68	13.25	11.75	20.64	18.85
SE	6.55	15.44	—	—	5.09	3.69	9.87	5.51
Mean Weight	0.68	0.23	0.56	0.92	1.42	0.99	2.03	1.54
SE	0.43	—	—	—	0.54	0.33	1.01	0.44

¹Data analyzed across months. ²Lengths estimated by anglers. ³Includes bluegill, pumpkinseed, hybrid and green sunfish.

Table 8 (cont.). Length frequency distribution of harvested and released fish, Pulaski Lake, Minnesota, May 1, 2003-October 31, 2003.

TL (inches)	RKB		SUN ³		WAE		YEP	
	Harvest	Release	Harvest	Release	Harvest	Release	Harvest	Release
<4.0	—	—	—	37	—	—	—	3
4.0-4.4	—	—	8	242	—	—	—	6
4.5-4.9	—	—	—	86	—	—	—	—
5.0-5.4	—	6	4	194	—	—	—	—
5.5-5.9	—	—	5	86	—	—	—	—
6.0-6.4	—	3	23	111	—	—	—	1
6.5-6.9	—	—	13	6	—	—	—	—
7.0-7.4	—	41	23	13	—	1	—	1
7.5-7.9	3	1	12	3	—	—	—	—
8.0-8.4	6	59	6	4	—	—	—	—
8.5-8.9	—	9	—	—	—	—	—	—
9.0-9.4	4	220	—	—	—	—	—	—
9.5-9.9	1	17	—	—	—	—	—	—
10.0-10.4	5	51	—	—	—	2	—	—
10.5-10.9	—	3	—	—	—	—	—	—
11.0-11.4	4	11	—	—	—	1	—	—
11.5-11.9	—	6	—	—	—	—	—	—
12.0-12.9	2	12	—	—	2	9	—	—
13.0-13.9	1	1	—	—	9	4	—	—
14.0-14.9	—	—	—	—	15	1	—	—
15.0-15.9	—	—	—	—	19	7	—	—
16.0-16.9	—	—	—	—	18	—	—	—
17.0-17.9	—	—	—	—	17	—	—	—
18.0-18.9	—	—	—	—	25	1	—	—
19.0-19.9	—	—	—	—	14	—	—	—
20.0-20.9	—	—	—	—	21	—	—	—
21.0-21.9	—	—	—	—	11	—	—	—
22.0-22.9	—	—	—	—	8	1	—	—
23.0-23.9	—	—	—	—	4	1	—	—
24.0-24.9	—	—	—	—	1	—	—	—
25.0-25.9	—	—	—	—	—	1	—	—
26.0-26.9	—	—	—	—	—	—	—	—
27.0-27.9	—	—	—	—	—	—	—	—
28.0-28.9	—	—	—	—	—	—	—	—
29.0-30.0	—	—	—	—	—	—	—	—
>30	—	—	—	—	—	—	—	—
Total N	26	440	94	782	164	29	0	11
Mean Length	9.50	8.89	6.27	4.85	17.57	13.05	—	4.18
SE	9.21	5.15	3.20	2.53	6.36	12.57	—	10.13
Mean Weight	0.75	0.59	0.21	0.09	1.98	0.90	—	0.04
SE	0.81	0.33	0.11	0.05	0.71	0.78	—	0.08

Table 9. Percent of anglers¹ who harvested a given number of fish, Pulaski Lake, Minnesota, May 1, 2003-October 31, 2003.

Species ²	Number of Fish Harvested per Angler									N
	0	0.1-0.9	1-1.9	2-2.9	3-3.9	4-5.9	6-7.9	8-9.9	10+	
Black crappie/all anglers	95.1	1.4	3.0	0.0	0.3	0.0	0.0	0.0	0.3	369
Bl. crappie/crappie anglers	65.5	0.0	27.6	0.0	3.4	0.0	0.0	0.0	3.4	29
Largemouth bass/all anglers	91.6	5.4	2.7	0.3	0.0	0.0	0.0	NA	NA	369
L. bass/L. bass anglers	70.0	24.0	6.0	0.0	0.0	0.0	0.0	NA	NA	50
Northern pike/all anglers	83.2	5.1	6.5	1.9	3.3	NA	NA	NA	NA	369
Northern pike/pike anglers	66.7	4.8	11.4	5.7	11.4	NA	NA	NA	NA	105
Sunfish/all anglers	96.7	0.5	1.1	0.8	0.0	0.8	0.0	0.0	0.0	369
Sunfish/sunfish anglers	82.9	4.9	4.9	0.0	0.0	7.3	0.0	0.0	0.0	41
Walleye/all anglers	80.8	11.7	3.3	2.2	0.5	0.8	0.8	NA	NA	369
Walleye/walleye anglers	63.6	22.1	6.2	4.1	1.0	1.5	1.5	NA	NA	195

¹Data from completed trip interviews, analyzed across angler type and month. The number of fish harvested per angler was determined by dividing the number (by species) harvested by the number of anglers for each interview.

²Bag limits: crappie=10, largemouth bass=6, northern pike=3, sunfish=20, walleye=6.

Table 10. Percentage of angling parties targeting species on Pulaski Lake, Minnesota, May 1, 2003-October 31, 2003.

Species ^{1,2}	May ³	June	July	August	September	October	Season
Black crappie	29.5	4.3	2.7	3.2	1.5	0.0	7.8
Largemouth bass	8.6	17.1	13.5	30.9	9.1	7.0	15.1
Northern Pike	16.2	16.2	20.7	28.7	18.2	17.5	19.6
Sunfish ⁴	21.9	18.8	15.3	10.6	4.5	3.5	14.0
Walleye	42.9	48.7	54.1	35.1	68.2	75.4	51.5
Parties (N)	105	117	111	94	66	57	550

¹Data analyzed across angler type. ²Some parties gave multiple responses. ³The season for walleye and northern pike opened on May 10. The season for largemouth bass opened May 24. ⁴Includes bluegill, pumpkinseed, hybrid and green sunfish.

Table 11. Percent distributions by age and sex of anglers, Pulaski Lake, Minnesota, May 1, 2003-October 31, 2003.

Age in Years	Males	Females	Combined
0-15	3.7	1.4	5.1
16-25	6.5	1.1	7.5
26-35	27.3	3.8	31.1
36-45	28.8	4.6	33.4
46-55	17.6	2.2	19.8
56-65	2.3	0.5	2.8
Over 65	0.2	0.0	0.2
Total (N=2227)	86.4	13.6	100.0

Table 12. Approximate one-way distance traveled by interviewed anglers to Pulaski Lake, Minnesota, May 1, 2003-October 31, 2003.

Distance ¹ in Miles	Responses	Percent
0-10	655	64.2
11-25	189	18.5
26-50	155	15.2
51-100	5	0.5
101-300	7	0.7
Over 300	10	1.0
Total	1021	100

¹Distances are calculated in a straight line from center of zip code areas.

Table 13. Fishing success ratings¹ from interviewed anglers, Pulaski Lake, Minnesota, May 1-October 31, 2003. One response was collected from each party, regardless of party size.

Angler group	Fishing Success Rating					Total Responses
	1-2 N (%)	3-4 N (%)	5-6 N (%)	7-8 N (%)	9-10 N (%)	
Boat anglers	190 (39.0)	82 (16.8)	118 (24.2)	75 (15.4)	22 (4.5)	487
Bank, pier anglers	18 (35.3)	13 (25.5)	11 (21.6)	8 (15.7)	1 (2.0)	51
All anglers	208 (38.7)	95 (17.7)	129 (24.0)	83 (15.4)	23 (4.3)	538
Anglers seeking ² :						
Black crappie	19 (43.2)	13 (29.5)	8 (18.2)	3 (6.8)	1 (2.3)	44
Largemouth bass	30 (36.6)	14 (17.1)	20 (24.4)	14 (17.1)	4 (4.9)	82
Northern Pike	33 (30.8)	12 (11.2)	32 (29.9)	25 (23.4)	5 (4.7)	107
Sunfish	26 (37.7)	14 (20.3)	14 (20.3)	13 (18.8)	2 (2.9)	69
Walleye	119 (42.7)	45 (16.1)	67 (24.0)	34 (12.2)	14 (5.0)	279

¹Response of anglers to the question, "On a scale of one to ten, with one being poor and ten being excellent, how would you rate your fishing success today on Buffalo Lake?" ²Some anglers gave multiple responses.

Table 14. Responses to questions 3 and 4. One response was collected from each party, regardless of party size. Previously interviewed anglers were not asked.

Question 3: “On a scale of 1 to 10, how satisfied are you with the number of (targeted species) you catch on Pulaski Lake?”

Pulaski Lake		
Species	Mean response	N
Black crappie	4.4	34
Largemouth bass	6.4	45
Northern Pike	6.8	60
Sunfish	5.8	37
Walleye	4.7	127
Total		303

Question 4: “On a scale of 1 to 10, how satisfied are you with the size of (targeted species) you catch on Pulaski Lake?”

Pulaski Lake		
Species	Mean response	N
Black crappie	6.3	33
Largemouth bass	6.4	43
Northern Pike	4.7	57
Sunfish	4.6	36
Walleye	6.3	115
Total		284

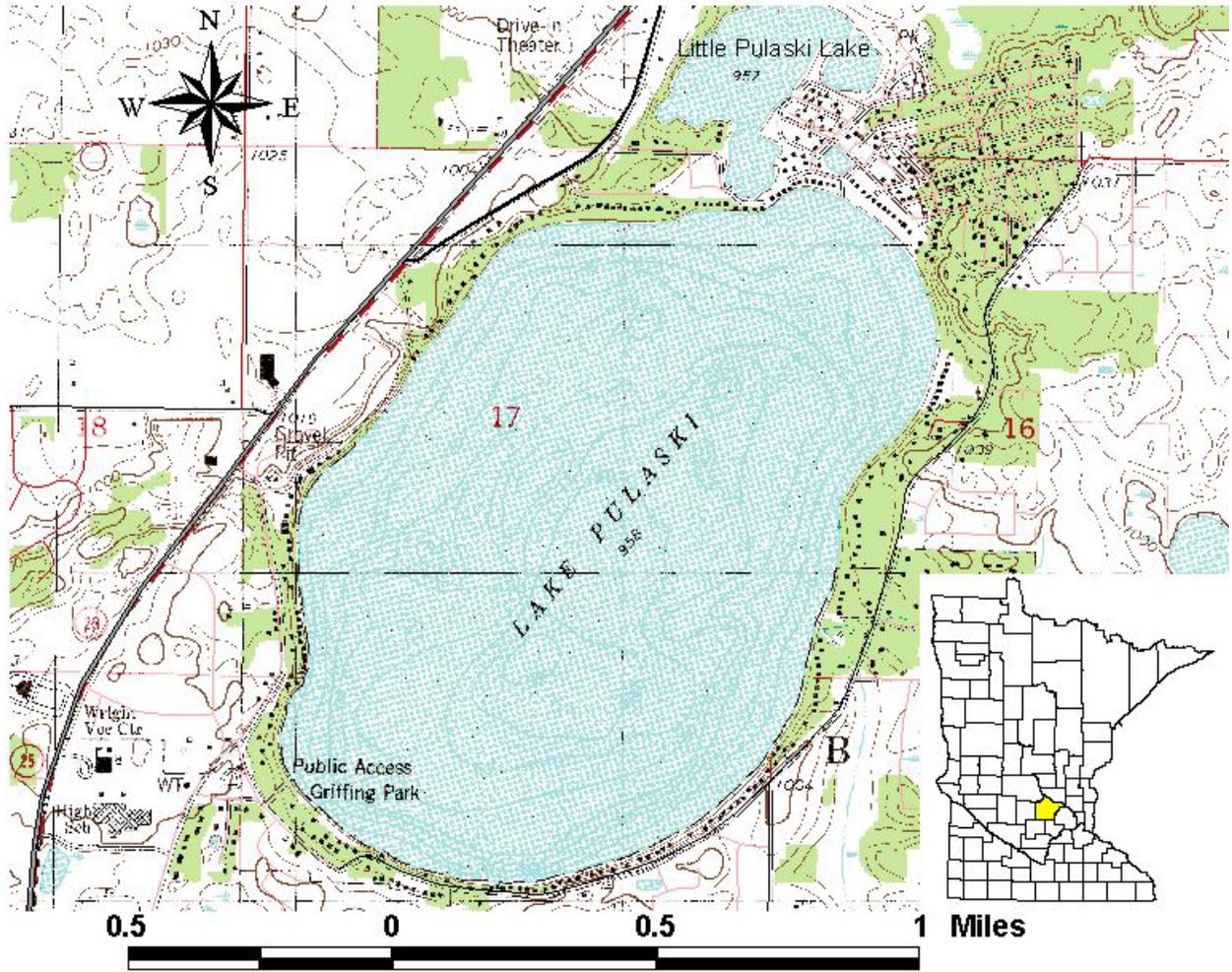


Figure 1. Location of Pulaski Lake, Wright County, Minnesota.

Addendum: Harvest Summary Form

MINNESOTA DEPARTMENT OF NATURAL RESOURCES DIVISION OF FISHERIES				
Creel Survey Summary For Pulaski Lake, May to October 2003				
DOW#: 86-53	County: Wright	Lake Class: 27	Lake Area: 702 Acres	Dates of Survey: 5/01/03 - 10/31/03

Fishing pressure (Angler Hours)	23,108	Weekdays surveyed	49
Angler Hours per Acre	32.9	Weekend/Holidays surveyed	55
Average Party Size (boat anglers)	1.9	Number of interviews	550
Average Trip Length (hours)	3.2		

What People Fished for:	Percent of Angling Parties
Black Crappie	7.8
Largemouth Bass	15.1
Northern Pike	19.6
Sunfish	14.0
Walleye	51.5

(Percentages add up to more than 100 due to anglers seeking more than one species)

Species Caught	Fish Harvested				Fish Released			
	Number	Pounds	Average		Number	Pounds	Average	
			Length (in)	weight (lb)			Length (in)	weight (lb)
Black crappie	828	562	10.5	0.7	234	53	7.4	0.2
Largemouth bass	556	790	13.3	1.4	3,020	2,998	11.8	1.0
Northern pike	1,543	3,138	20.6	2.0	7,467	11,490	18.9	1.5
Rock bass	420	315	9.5	0.8	4,096	2,399	8.9	0.6
Sunfish species	1,481	316	6.3	0.2	6,682	611	4.9	0.1
Walleye	1,424	2,817	17.6	2.0	204	214	13.1	0.9
Yellow perch	0	0	—	—	70	3	4.2	<0.1
All species	6,286	7,958	NA	NA	22,040	17,988	NA	NA

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Appendix

Table A1. Catch and harvest estimates, Pulaski Lake, Minnesota, May 1, 2003-May 31, 2003. Standard errors appear in parentheses.

Species	Number Harvested		Number Released		Number Caught	
Black crappie	541.1	(194.2)	31.1	(33.0)	572.2	(210.2)
Largemouth bass	77.9	(50.6)	750.3	(258.3)	828.2	(285.9)
Northern pike	278.1	(178.9)	1,426.6	(688.5)	1,704.7	(855.2)
Rock bass	7.8	(7.6)	1,006.2	(414.7)	1,014.0	(414.5)
Sunfish ¹	434.8	(209.6)	2,175.0	(676.9)	2,609.8	(822.0)
Walleye	132.4	(60.0)	101.2	(82.6)	233.6	(139.4)
Yellow perch	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)
All species	1,472.0	(346.2)	5,529.4	(1,086.0)	7,001.4	(1,313.3)

¹Includes bluegill, pumpkinseed, hybrid and green sunfish.

Table A2. Catch and harvest estimates per acre, Pulaski Lake, Minnesota, May 1, 2003-May 31, 2003. Standard errors appear in parentheses.

Species	Number Harvested per Acre		Number Released per Acre		Number Caught per Acre	
Black crappie	0.77	(0.28)	0.04	(0.05)	0.82	(0.30)
Largemouth bass	0.11	(0.07)	1.07	(0.37)	1.18	(0.41)
Northern pike	0.40	(0.25)	2.03	(0.98)	2.43	(1.22)
Rock bass	0.01	(0.01)	1.43	(0.59)	1.44	(0.59)
Sunfish ¹	0.62	(0.30)	3.10	(0.96)	3.72	(1.17)
Walleye	0.19	(0.09)	0.14	(0.12)	0.33	(0.20)
Yellow perch	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)
All species	2.10	(0.49)	7.88	(1.55)	9.97	(1.87)

¹Includes bluegill, pumpkinseed, hybrid and green sunfish.

Table A3. Yield estimates, Pulaski Lake, Minnesota, May 1, 2003-May 31, 2003. Standard errors appear in parentheses.

Species	Pounds Harvested		Pounds Harvested Per Acre	
Black crappie	391.7	(206.2)	0.56	(0.29)
Largemouth bass	130.4	(181.0)	0.19	(0.26)
Northern pike	503.0	(—)	0.72	(—)
Rock bass	6.3	(—)	0.01	(—)
Sunfish ¹	100.2	(60.1)	0.14	(0.09)
Walleye	319.7	(253.6)	0.46	(0.36)
Yellow perch	0.0	(0.0)	0.00	(0.00)
All species	1,451.2	(—)	2.07	(—)

Table A4. Catch and harvest estimates, Pulaski Lake, Minnesota, June 1, 2003-June 30, 2003. Standard errors appear in parentheses.

Species	Number Harvested		Number Released		Number Caught	
Black crappie	45.4	(29.2)	127.9	(112.6)	173.2	(119.2)
Largemouth bass	200.6	(74.5)	611.9	(225.4)	812.5	(269.5)
Northern pike	169.5	(70.6)	1,580.1	(412.8)	1,749.6	(428.0)
Rock bass	168.6	(97.1)	2,540.8	(858.1)	2,709.4	(876.5)
Sunfish ¹	214.9	(85.1)	2,857.6	(1,042.6)	3,072.5	(1,092.4)
Walleye	551.2	(182.4)	147.8	(100.2)	699.0	(248.5)
Yellow perch	0.0	(0.0)	6.5	(6.3)	6.5	(6.3)
All species	1,350.3	(247.7)	8,006.8	(1,441.2)	9,357.1	(1,517.6)

¹Includes bluegill, pumpkinseed, hybrid and green sunfish.

Table A5. Catch and harvest estimates per acre, Pulaski Lake, Minnesota, June 1, 2003-June 30, 2003. Standard errors appear in parentheses.

Species	Number Harvested per Acre		Number Released per Acre		Number Caught per Acre	
Black crappie	0.06	(0.04)	0.18	(0.16)	0.25	(0.17)
Largemouth bass	0.29	(0.11)	0.87	(0.32)	1.16	(0.38)
Northern pike	0.24	(0.10)	2.25	(0.59)	2.49	(0.61)
Rock bass	0.24	(0.14)	3.62	(1.22)	3.86	(1.25)
Sunfish ¹	0.31	(0.12)	4.07	(1.49)	4.38	(1.56)
Walleye	0.79	(0.26)	0.21	(0.14)	1.00	(0.35)
Yellow perch	0.00	(0.00)	0.01	(0.01)	0.01	(0.01)
All species	1.92	(0.35)	11.41	(2.05)	13.33	(2.16)

¹Includes bluegill, pumpkinseed, hybrid and green sunfish.

Table A6. Yield estimates, Pulaski Lake, Minnesota, June 1, 2003-June 30, 2003. Standard errors appear in parentheses.

Species	Pounds Harvested		Pounds Harvested Per Acre	
Black crappie	27.7	(28.0)	0.04	(0.04)
Largemouth bass	223.7	(131.7)	0.32	(0.19)
Northern pike	299.3	(189.1)	0.43	(0.27)
Rock bass	88.2	(—)	0.13	(—)
Sunfish ¹	39.6	(24.4)	0.06	(0.03)
Walleye	1,246.8	(630.4)	1.78	(0.90)
Yellow perch	0.0	(0.0)	0.00	(0.00)
All species	1,925.4	(—)	2.74	(—)

Table A7. Catch and harvest estimates, Pulaski Lake, Minnesota, July 1, 2003-July 31, 2003. Standard errors appear in parentheses.

Species	Number Harvested		Number Released		Number Caught	
Black crappie	21.1	11.3	18.4	19.0	39.4	22.1
Bullhead	21.1	16.4	63.2	28.5	84.3	30.6
Largemouth bass	64.8	47.1	480.3	182.4	545.2	216.0
Northern pike	218.3	92.6	1,746.8	485.1	1,965.1	503.4
Rock bass	49.2	38.0	494.8	139.9	544.0	164.8
Sunfish ¹	618.2	454.9	452.7	122.9	1,070.9	464.3
Walleye	185.9	59.0	32.4	21.1	218.3	75.5
Yellow perch	0.0	0.0	7.0	7.4	7.0	7.4
All species	1,178.5	472.3	3,314.0	552.6	4,492.5	741.9

¹Includes bluegill, pumpkinseed, hybrid and green sunfish.

Table A8. Catch and harvest estimates per acre, Pulaski Lake, Minnesota, July 1, 2003-July 31, 2003. Standard errors appear in parentheses.

Species	Number Harvested per Acre		Number Released per Acre		Number Caught per Acre	
Black crappie	0.03	0.02	0.03	0.03	0.06	0.03
Bullhead	0.03	0.02	0.09	0.04	0.12	0.04
Largemouth bass	0.09	0.07	0.68	0.26	0.78	0.31
Northern pike	0.31	0.13	2.49	0.69	2.80	0.72
Rock bass	0.07	0.05	0.70	0.20	0.77	0.23
Sunfish ¹	0.88	0.65	0.64	0.18	1.53	0.66
Walleye	0.26	0.08	0.05	0.03	0.31	0.11
Yellow perch	0.00	0.00	0.01	0.01	0.01	0.01
All species	1.68	0.67	4.72	0.79	6.40	1.06

¹Includes bluegill, pumpkinseed, hybrid and green sunfish.

Table A9. Yield estimates, Pulaski Lake, Minnesota, July 1, 2003-July 31, 2003. Standard errors appear in parentheses.

Species	Pounds Harvested		Pounds Harvested Per Acre	
Black crappie	12.5	(6.9)	0.02	(0.01)
Bullhead	8.9	(8.4)	0.01	(0.01)
Largemouth bass	108.4	(—)	0.15	(—)
Northern pike	487.4	(558.7)	0.69	(0.80)
Rock bass	28.5	(—)	0.04	(—)
Sunfish ¹	146.3	(91.1)	0.21	(0.13)
Walleye	309.4	(—)	0.44	(—)
Yellow perch	0.0	(0.0)	0.00	(0.00)
All species	1,101.4	(—)	1.57	(—)

Table A10. Catch and harvest estimates, Pulaski Lake, Minnesota, August 1, 2003-August 31, 2003. Standard errors appear in parentheses.

Species	Number Harvested	Number Released	Number Caught
Black crappie	171.6 (154.5)	57.9 (43.1)	229.5 (155.5)
Bullhead	13.2 (14.6)	5.1 (5.4)	18.3 (15.6)
Largemouth bass	137.5 (37.7)	526.4 (149.4)	663.9 (165.7)
Northern pike	332.4 (147.9)	889.1 (252.0)	1,221.6 (290.0)
Rock bass	109.8 (68.6)	152.8 (79.9)	262.6 (112.1)
Sunfish ¹	216.1 (93.3)	754.0 (292.8)	970.1 (284.0)
Walleye	150.7 (66.5)	5.1 (5.1)	155.8 (66.3)
All species	1,131.3 (255.3)	2,395.5 (424.1)	3,526.8 (483.4)

¹Includes bluegill, pumpkinseed, hybrid and green sunfish.

Table A11. Catch and harvest estimates per acre, Pulaski Lake, Minnesota, August 1, 2003-August 31, 2003. Standard errors appear in parentheses.

Species	Number Harvested per Acre	Number Released per Acre	Number Caught per Acre
Black crappie	0.24 (0.22)	0.08 (0.06)	0.33 (0.22)
Largemouth bass	0.02 (0.02)	0.01 (0.01)	0.03 (0.02)
Northern pike	0.20 (0.05)	0.75 (0.21)	0.95 (0.24)
Rock bass	0.47 (0.21)	1.27 (0.36)	1.74 (0.41)
Sunfish ¹	0.16 (0.10)	0.22 (0.11)	0.37 (0.16)
Walleye	0.31 (0.13)	1.07 (0.42)	1.38 (0.40)
Yellow perch	0.21 (0.09)	0.01 (0.01)	0.22 (0.09)
All species	1.61 (0.36)	3.41 (0.60)	5.02 (0.69)

¹Includes bluegill, pumpkinseed, hybrid and green sunfish.

Table A12. Yield estimates, Pulaski Lake, Minnesota, August 1, 2003-August 31, 2003. Standard errors appear in parentheses.

Species	Pounds Harvested	Pounds Harvested Per Acre
Black crappie	94.0 (238.5)	0.13 (0.34)
Bullhead	9.5 (—)	0.01 (—)
Largemouth bass	173.6 (54.6)	0.25 (0.08)
Northern pike	883.5 (876.8)	1.26 (1.25)
Rock bass	97.2 (—)	0.14 (—)
Sunfish ¹	49.9 (34.6)	0.07 (0.05)
Walleye	208.7 (156.2)	0.30 (0.22)
All species	1,516.5 (—)	2.16 (—)

Table A13. Catch and harvest estimates, Pulaski Lake, Minnesota, September 1, 2003-September 30, 2003. Standard errors appear in parentheses.

Species	Number Harvested	Number Released	Number Caught
Black crappie	5.2 (5.5)	0.0 (0.0)	5.2 (5.5)
Largemouth bass	59.2 (26.5)	339.4 (103.7)	398.5 (121.5)
Northern pike	329.9 (126.1)	655.2 (181.7)	985.1 (199.0)
Rock bass	56.2 (34.1)	134.5 (106.6)	190.8 (111.9)
Sunfish ¹	38.5 (28.7)	602.1 (321.3)	640.6 (316.9)
Walleye	121.3 (34.8)	20.7 (11.6)	141.9 (36.1)
Yellow perch	0.0 (0.0)	10.3 (10.9)	10.3 (10.9)
All species	610.2 (140.8)	1,777.8 (398.4)	2,388.0 (410.9)

¹Includes bluegill, pumpkinseed, hybrid and green sunfish.

Table A14. Catch and harvest estimates per acre, Pulaski Lake, Minnesota, September 1, 2003-September 30, 2003. Standard errors appear in parentheses.

Species	Number Harvested per Acre	Number Released per Acre	Number Caught per Acre
Black crappie	0.01 (0.01)	0.00 (0.00)	0.01 (0.01)
Largemouth bass	0.08 (0.04)	0.48 (0.15)	0.57 (0.17)
Northern pike	0.47 (0.18)	0.93 (0.26)	1.40 (0.28)
Rock bass	0.08 (0.05)	0.19 (0.15)	0.27 (0.16)
Sunfish ¹	0.05 (0.04)	0.86 (0.46)	0.91 (0.45)
Walleye	0.17 (0.05)	0.03 (0.02)	0.20 (0.05)
Yellow perch	0.00 (0.00)	0.01 (0.02)	0.01 (0.02)
All species	0.87 (0.20)	2.53 (0.57)	3.40 (0.59)

¹Includes bluegill, pumpkinseed, hybrid and green sunfish.

Table A15. Yield estimates, Pulaski Lake, Minnesota, September 1, 2003-September 31, 2003. Standard errors appear in parentheses.

Species	Pounds Harvested	Pounds Harvested Per Acre
Black crappie	2.1 (—)	0.00 (—)
Largemouth bass	128.0 (69.8)	0.18 (0.10)
Northern pike	644.5 (419.8)	0.92 (0.60)
Rock bass	40.6 (31.2)	0.06 (0.04)
Sunfish ¹	5.7 (—)	0.01 (—)
Walleye	172.2 (94.1)	0.25 (0.13)
Yellow perch	0.0 (0.0)	0.00 (0.00)
All species	993.1 (—)	1.41 (—)

Table A16. Catch and harvest estimates, Pulaski Lake, Minnesota, October 1, 2003-October 31, 2003. Standard errors appear in parentheses.

Species	Number Harvested	Number Released	Number Caught
Black crappie	12.5 (13.5)	0.0 (0.0)	12.5 (13.5)
Bullhead	0.0 (0.0)	4.2 (4.5)	4.2 (4.5)
Largemouth bass	0.0 (0.0)	177.1 (63.2)	177.1 (63.2)
Northern pike	72.4 (38.8)	776.7 (214.5)	849.1 (215.2)
Rock bass	0.0 (0.0)	16.6 (10.2)	16.6 (10.2)
Sunfish ¹	0.0 (0.0)	4.2 (4.4)	4.2 (4.4)
Walleye	134.8 (56.9)	4.2 (4.5)	139.0 (58.0)
Yellow perch	0.0 (0.0)	29.1 (27.1)	29.1 (27.1)
All species	219.7 (70.2)	1,012.1 (225.6)	1,231.8 (234.0)

¹Includes bluegill, pumpkinseed, hybrid and green sunfish.

Table A17. Catch and harvest estimates per acre, Pulaski Lake, Minnesota, October 1, 2003-October 31, 2003. Standard errors appear in parentheses.

Species	Number Harvested per Acre	Number Released per Acre	Number Caught per Acre
Black crappie	0.02 (0.02)	0.00 (0.00)	0.02 (0.02)
Bullhead	0.00 (0.00)	0.01 (0.01)	0.01 (0.01)
Largemouth bass	0.00 (0.00)	0.25 (0.09)	0.25 (0.09)
Northern pike	0.10 (0.06)	1.11 (0.31)	1.21 (0.31)
Rock bass	0.00 (0.00)	0.02 (0.01)	0.02 (0.01)
Sunfish ¹	0.00 (0.00)	0.01 (0.01)	0.01 (0.01)
Walleye	0.19 (0.08)	0.01 (0.01)	0.20 (0.08)
Yellow perch	0.00 (0.00)	0.04 (0.04)	0.04 (0.04)
All species	0.31 (0.10)	1.44 (0.32)	1.75 (0.33)

¹Includes bluegill, pumpkinseed, hybrid and green sunfish.

Table A18. Yield estimates, Pulaski Lake, Minnesota, October 1, 2003-October 31, 2003. Standard errors appear in parentheses.

Species	Pounds Harvested	Pounds Harvested Per Acre
Black crappie	10.2 (—)	0.01 (—)
Largemouth bass	0.0 (0.0)	0.00 (0.00)
Northern pike	122.2 (—)	0.17 (—)
Rock bass	0.0 (0.0)	0.00 (0.00)
Sunfish ¹	0.0 (0.0)	0.00 (0.00)
Walleye	308.6 (—)	0.44 (—)
Yellow perch	0.0 (0.0)	0.00 (0.00)
All species	441.0 (—)	0.63 (—)

Table A19. Harvest, release and catch rate estimates, Pulaski Lake, Minnesota, May 1, 2003-
May 31, 2003. Standard errors appear in parentheses.

Species	Harvest per Angler Hour		Release per Angler Hour		Catch per Angler Hour	
Targeting Anglers						
Black crappie	0.491	(0.172)	0.027	(0.013)	0.518	(0.171)
Largemouth bass	0.053	(—)	0.525	(—)	0.579	(—)
Northern pike	0.127	(0.058)	0.727	(0.288)	0.854	(0.342)
Rock bass	0.000	(—)	0.105	(—)	0.105	(—)
Sunfish	0.306	(0.131)	1.967	(0.672)	2.273	(0.702)
Walleye	0.027	(0.011)	0.021	(0.018)	0.048	(0.029)
All Anglers						
Black crappie	0.103	(0.037)	0.006	(0.006)	0.108	(0.038)
Bullhead spp.	0.000	(0.000)	0.002	(0.002)	0.002	(0.002)
Common carp	0.000	(0.000)	0.002	(0.002)	0.002	(0.002)
Largemouth bass	0.015	(0.011)	0.142	(0.048)	0.157	(0.057)
Northern pike	0.053	(0.031)	0.270	(0.088)	0.323	(0.118)
Rock bass	0.002	(0.002)	0.191	(0.111)	0.192	(0.112)
Smallmouth bass	0.000	(0.000)	0.004	(0.004)	0.004	(0.004)
Sunfish	0.082	(0.037)	0.412	(0.103)	0.495	(0.127)
Walleye	0.025	(0.011)	0.019	(0.016)	0.044	(0.027)
All species	0.279	(0.062)	1.048	(0.183)	1.327	(0.219)

Table A20. Harvest, release and catch rate estimates, Pulaski Lake, Minnesota, June 1, 2003-
June 30, 2003. Standard errors appear in parentheses.

Species	Harvest per Angler Hour		Release per Angler Hour		Catch per Angler Hour	
Targeting Anglers						
Black crappie	0.245	(—)	0.667	(—)	0.912	(—)
Largemouth bass	0.281	(0.126)	0.184	(0.127)	0.466	(0.192)
Northern pike	0.168	(0.198)	0.632	(0.270)	0.800	(0.457)
Rock bass	0.237	(—)	3.892	(—)	4.129	(—)
Sunfish	0.190	(0.054)	2.828	(1.420)	3.017	(1.379)
Walleye	0.151	(0.039)	0.029	(0.020)	0.180	(0.051)
All Anglers						
Black crappie	0.008	(0.006)	0.023	(0.020)	0.032	(0.013)
Bullhead spp.	0.000	(0.000)	0.007	(0.004)	0.007	(0.004)
Largemouth bass	0.037	(0.013)	0.112	(0.039)	0.148	(0.046)
Northern pike	0.031	(0.015)	0.288	(0.081)	0.319	(0.087)
Rock bass	0.031	(0.019)	0.463	(0.136)	0.494	(0.142)
Smallmouth bass	0.000	(0.000)	0.017	(0.018)	0.017	(0.018)
Sunfish	0.039	(0.006)	0.521	(0.221)	0.560	(0.233)
Walleye	0.101	(0.043)	0.027	(0.020)	0.127	(0.057)
All species	0.246	(0.052)	1.460	(0.276)	1.706	(0.296)

Table A21. Harvest, release and catch rate estimates, Pulaski Lake, Minnesota, July 1, 2003-July 31, 2003. Standard errors appear in parentheses.

Species	Harvest per Angler		Release per Angler		Catch per Angler	
	Hour		Hour		Hour	
Targeting Anglers						
Black crappie	0.000	(—)	0.000	(—)	0.000	(—)
Largemouth bass	0.040	(0.041)	0.226	(0.204)	0.266	(0.244)
Northern pike	0.015	(0.014)	1.003	(0.272)	1.019	(0.273)
Rock bass	v	(0.000)	0.000	(0.000)	0.000	(0.000)
Sunfish	0.721	(0.274)	0.335	(0.145)	1.056	(0.282)
Walleye	0.049	(0.015)	0.013	(0.009)	0.061	(0.023)
All Anglers						
Black crappie	0.004	(0.002)	0.004	(0.004)	0.008	(0.005)
Bullhead spp.	0.004	(0.002)	0.012	(0.006)	0.016	(0.005)
Largemouth bass	0.013	(0.009)	0.092	(0.039)	0.105	(0.046)
Northern pike	0.042	(0.020)	0.336	(0.104)	0.378	(0.084)
Rock bass	0.009	(0.008)	0.095	(0.033)	0.105	(0.038)
Sunfish	0.119	(0.080)	0.087	(0.004)	0.206	(0.068)
Walleye	0.036	(0.002)	0.006	(0.003)	0.042	(0.006)
Yellow perch	0.000	(0.000)	0.001	(0.002)	0.001	(0.002)
All species	0.226	(0.083)	0.637	(0.116)	0.863	(0.124)

Table A22. Harvest, release and catch rate estimates, Pulaski Lake, Minnesota, August 1, 2003-August 31, 2003. Standard errors appear in parentheses.

Species	Harvest per Angler		Release per Angler		Catch per Angler	
	Hour		Hour		Hour	
Targeting Anglers						
Black crappie	1.003	(0.759)	0.309	(0.258)	1.312	(0.610)
Largemouth bass	0.048	(0.015)	0.230	(0.092)	0.278	(0.089)
Northern pike	0.222	(0.075)	0.385	(0.184)	0.606	(0.134)
Rock bass	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
Sunfish	0.121	(—)	8.413	(—)	8.533	(—)
Walleye	0.121	(0.024)	0.000	(0.000)	0.121	(0.024)
All Anglers						
Black crappie	0.047	(0.043)	0.016	(0.009)	0.062	(0.044)
Bullhead spp.	0.004	(0.004)	0.001	(0.002)	0.005	(0.004)
Channel catfish	0.000	(0.000)	0.001	(0.001)	0.001	(0.001)
Largemouth bass	0.037	(0.012)	0.143	(0.026)	0.181	(0.053)
Northern pike	0.091	(0.040)	0.242	(0.044)	0.332	(0.049)
Rock bass	0.030	(0.019)	0.042	(0.030)	0.072	(0.033)
Sunfish	0.059	(0.008)	0.205	(0.099)	0.264	(0.088)
Walleye	0.041	(0.014)	0.001	(0.001)	0.042	(0.014)
All species	0.308	(0.065)	0.652	(0.116)	0.960	(0.128)

Table A23. Harvest, release and catch rate estimates, Pulaski Lake, Minnesota, September 1, 2003-September 30, 2003. Standard errors appear in parentheses.

Species	Harvest per Angler		Release per Angler		Catch per Angler	
	Hour		Hour		Hour	
Targeting Anglers						
Black crappie	1.370	(—)	0.000	(—)	1.370	(—)
Largemouth bass	0.087	(—)	0.186	(—)	0.273	(—)
Northern pike	0.476	(0.082)	0.145	(0.073)	0.621	(0.055)
Rock bass	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
Sunfish	0.224	(—)	0.760	(—)	0.984	(—)
Walleye	0.066	(0.029)	0.007	(0.004)	0.073	(0.029)
All Anglers						
Black crappie	0.003	(0.003)	0.000	(0.000)	0.003	(0.003)
Bullhead spp.	0.028	(0.014)	0.161	(0.054)	0.189	(0.064)
Largemouth bass	0.157	(0.063)	0.311	(0.085)	0.467	(0.099)
Northern pike	0.027	(0.017)	0.064	(0.047)	0.091	(0.048)
Rock bass	0.000	(0.000)	0.007	(0.005)	0.007	(0.005)
Sunfish	0.018	(0.012)	0.286	(0.152)	0.304	(0.148)
Walleye	0.058	(0.008)	0.010	(0.006)	0.067	(0.007)
Yellow perch	0.000	(0.000)	0.005	(0.005)	0.005	(0.005)
All species	0.290	(0.068)	0.843	(0.189)	1.133	(0.195)

Table A24. Harvest, release and catch rate estimates, Pulaski Lake, Minnesota, October 1, 2003-October 31, 2003. Standard errors appear in parentheses.

Species	Harvest per Angler		Release per Angler		Catch per Angler	
	Hour		Hour		Hour	
Targeting Anglers						
Black crappie	0.000	(—)	0.000	(—)	0.000	(—)
Bullhead spp.	0.000	(—)	0.333	(—)	0.333	(—)
Largemouth bass	0.000	(—)	0.170	(—)	0.170	(—)
Northern pike	0.032	(—)	0.175	(—)	0.207	(—)
Sunfish	0.000	(—)	0.062	(—)	0.062	(—)
Walleye	0.056	(0.024)	0.001	(0.001)	0.057	(0.024)
All Anglers						
Black crappie	0.007	(0.008)	0.000	(0.000)	0.007	(0.008)
Bullhead spp.	0.000	(0.000)	0.002	(0.003)	0.002	(0.003)
Largemouth bass	0.000	(0.000)	0.103	(0.043)	0.103	(0.043)
Northern pike	0.042	(0.021)	0.452	(0.109)	0.495	(0.103)
Rock bass	0.000	(0.000)	0.010	(0.006)	0.010	(0.006)
Sunfish	0.000	(0.000)	0.002	(0.003)	0.002	(0.003)
Walleye	0.079	(0.038)	0.002	(0.003)	0.081	(0.039)
Yellow perch	0.000	(0.000)	0.017	(0.016)	0.017	(0.016)
All species	0.128	(0.044)	0.590	(0.119)	0.717	(0.120)

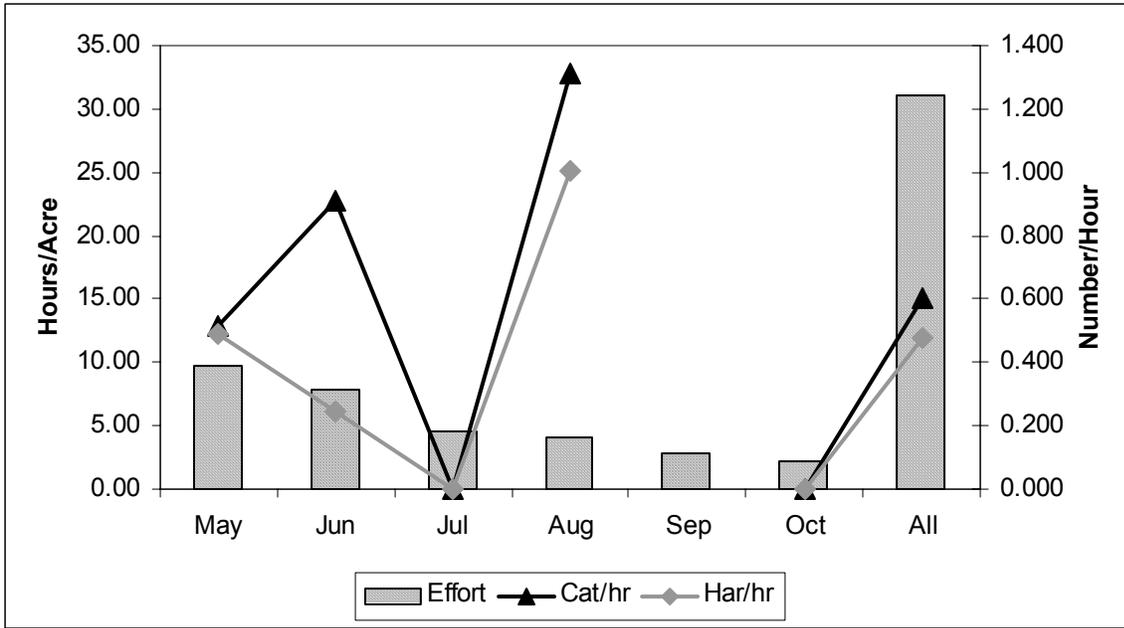


Figure A1. Overall effort and targeting angler catch and harvest rates for black crappie, Pulaski Lake, Minnesota, May 1-October 31, 2003.

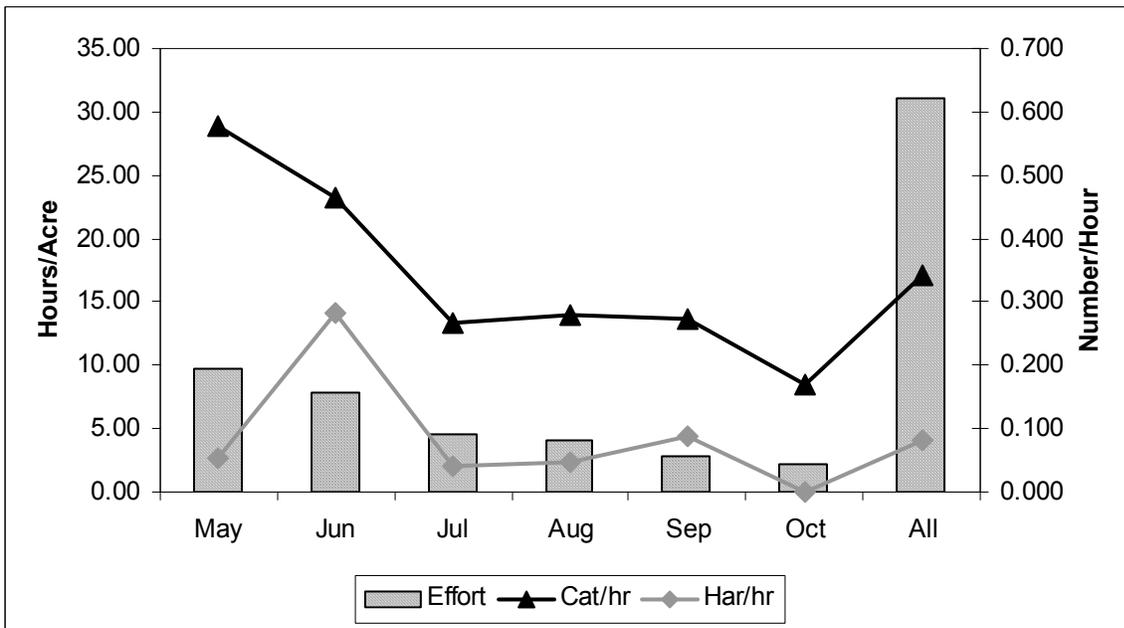


Figure A2. Overall effort and targeting angler catch and harvest rates for largemouth bass, Pulaski Lake, Minnesota, May 1-October 31, 2003.

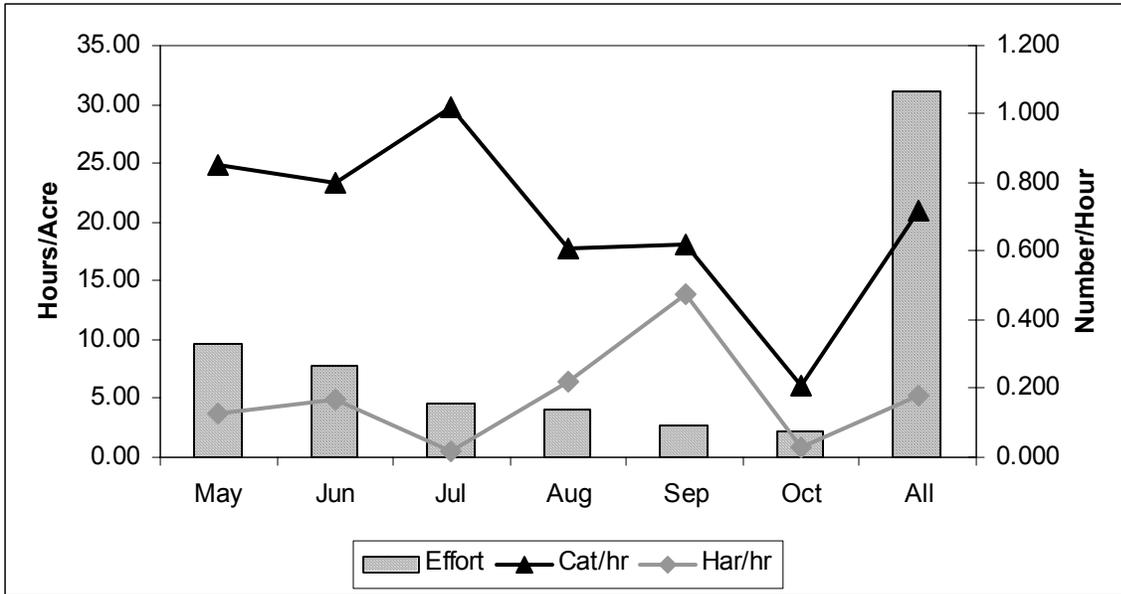


Figure A3. Overall effort and targeting angler catch and harvest rates for northern pike, Pulaski Lake, Minnesota, May 1-October 31, 2003.

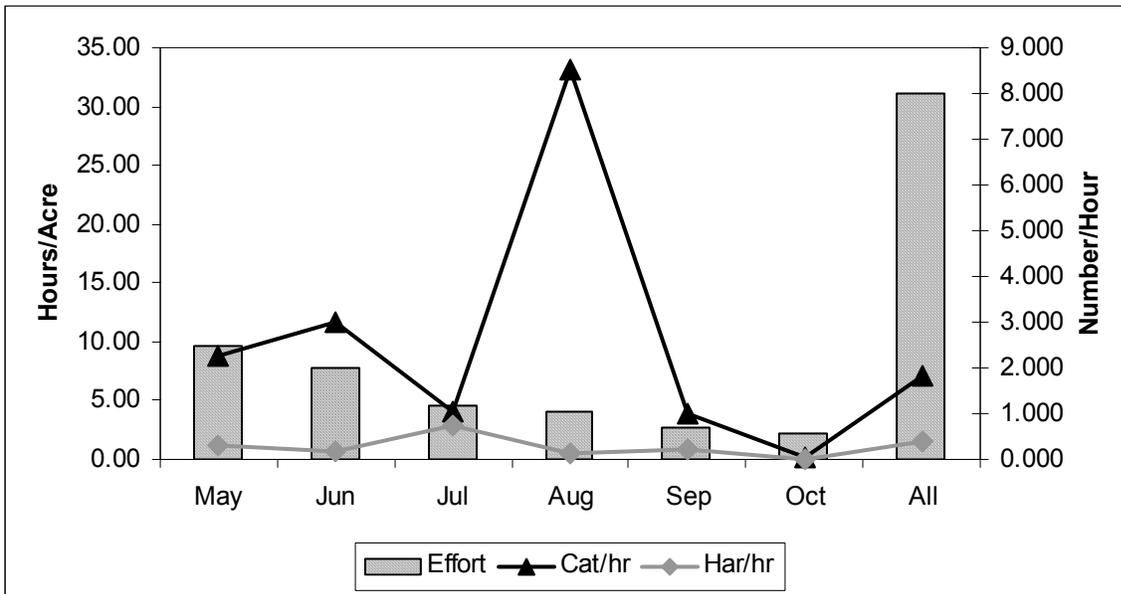


Figure A4. Overall effort and targeting angler catch and harvest rates for sunfish, Pulaski Lake, Minnesota, May 1-October 31, 2003.

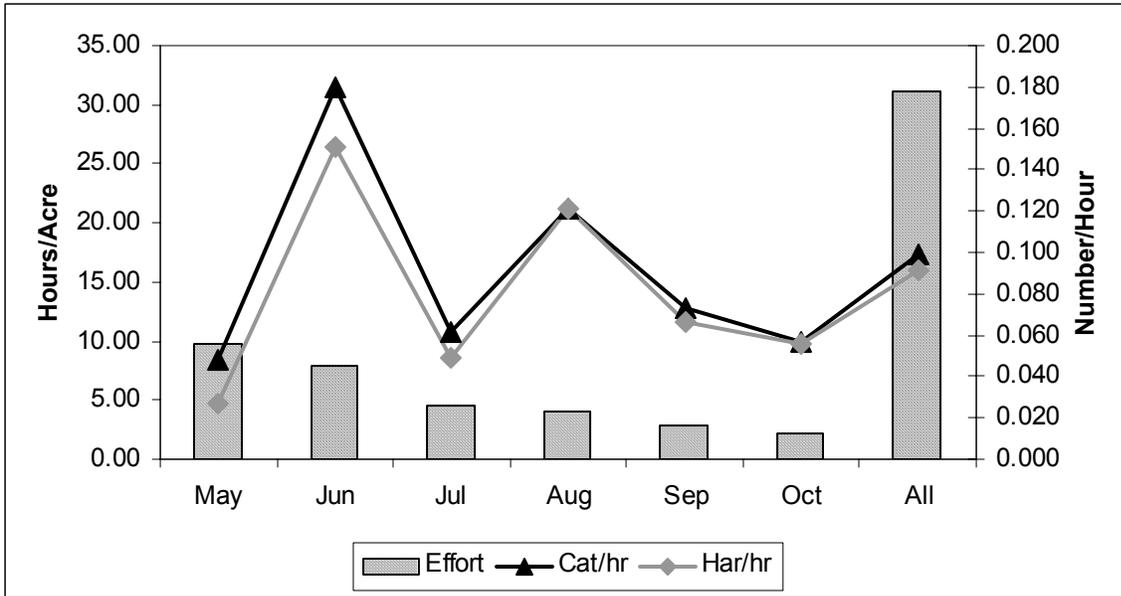


Figure A5. Overall effort and targeting angler catch and harvest rates for walleye, Pulaski Lake, Minnesota, May 1-October 31, 2003.

Minnesota
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Area 340
Study 4
Job 668
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**Minnesota Department of Natural Resources
Division of Fisheries**

Completion Report

**Pulaski Lake Creel Survey
May 1, 2003 to October 31, 2003**

by

**Mark Pelham
Completion Report**

Approved by: _____
Area Supervisor Date

Approved by: _____
Regional Supervisor Date