

MAPLE LAKE

*Van Buren County (T3S, R14W, Sections 1, 12)
and (T3S, R13W, Section 6)
Surveyed September 17-19, 1991*

James L. Dexter, Jr.

Environment

Maple Lake is a small reservoir on the south branch of the Paw Paw River. Located in east-central Van Buren County, it is found in the Village of Paw Paw.

The south branch of the Paw Paw River upstream of the lake drains over 60,000 acres (94 square miles). Rolling hills and sandy soils characterize the geography of the area. The soils of the immediate lake area are primarily loamy sands which are very well drained. The basin of the south branch of the Paw Paw River is characterized by Adrian and Houghton muck soils. Most of the watershed is agricultural (54%); of lesser importance are forested land (20%), urban land (11%), open field (9%), water bodies (4%), and wetland (2%). Both branches of the Paw Paw that feed Maple Lake are designated trout streams. Ackley Lake (62 acres) is connected to Maple Lake via a 10-foot arch culvert under M-40 located at the northeast corner of Maple Lake. The outlet for Maple Lake is blocked by a retired hydropower dam 27-feet high (17-foot head), constructed in 1907 on the north side of the lake. It is owned by the Village of Paw Paw.

Maple Lake is 172 acres in size and has a maximum depth of about 15 feet. Depths can vary over time because the flow-through system acts as a sediment basin. The deepest areas are associated with the old river channel. *Chara* is common in the lake, and little if any emergent vegetation is present. Floating vegetation is sparse. Submergent vegetation (milfoil and coontail) becomes quite thick in most areas.

Bottom substrates are made up of primarily sand and organic material. The south end of the lake contains a thick organic bottom that is mostly deposition from the inlet. It is sufficiently deep to impede some boat traffic in the very south end.

Water quality parameters were measured August 20, 1991. Secchi disc readings were 4.5 feet. Dissolved oxygen levels were greater than 6 ppm to at least 10 feet. Alkalinity ranged from 149 ppm at the surface to 165 ppm at the bottom, while pH was 9.0. These parameters indicate the water is hard and well buffered. Temperature varied from 72°F at the surface to 64°F at the bottom. The lake does not stratify because of the flow-through system and shallow depth. The water retention time of the lake is very short, about 7 days (Southwest Regional Planning Commission 1978).

Overall water quality in Maple Lake is rated as fair to poor. While there have been no problems with fish kills, the environment of the lake is far from good. Phosphorus loading of the lake has been estimated at 11,900 pounds annually. This is an excessive amount, but detrimental effects are reduced by the very short retention time of the impoundment. In addition to the heavy nutrient loadings, the physical characteristics of the lake (many channels, bays, peninsulas, and shallow depths) make it highly susceptible to eutrophication.

Residential development around Maple Lake is almost total. It sits in the middle of an urban area and has practically no undeveloped shoreline left. A cement boat launch (township-owned) is located on the north shore off M-40 and can handle 20-30 vehicles and trailers. Shore-fishing access (and parking) is available at the dam and at Maple Isle (a small city-owned island with pedestrian bridge access, beach house, and picnic facilities). Future shore access is planned at the south end of the lake off Red Arrow Highway.

Fishery Resource

According to historical records, Maple Lake fish have been actively managed by the State since at least 1934. Between 1934 and 1945, combinations of bluegill, largemouth bass, yellow perch, and black crappie were stocked. No additional stocking occurred until 1954 when walleye fingerlings were introduced. Between 1954 and 1956 about 21,200 walleye fingerlings were stocked. Walleyes were not stocked between 1957 and 1979, but stocking was re-initiated in 1980 on an annual basis (Table 1). Stocking rates in the 1980s were about 20/acre. They were increased to 50/acre, minimum, starting in 1990 to meet DNR Region III walleye stocking guidelines.

In 1945 the first documented complaint on Maple Lake was received. A few years before (exact date unknown) the dam, or some portion of it, washed out. During the subsequent low-water period carp had a very successful spawn. By 1945 anglers complained of poor fishing for everything except carp. An abundance of carp continued to plague the lake through the 1960s.

The first fishery investigations on Maple Lake occurred in 1955 and 1956. Gill net surveys were conducted to evaluate the success of walleye introduction. Gamefish captured included bluegill, largemouth bass, black crappie, yellow perch, and walleye. Unexpectedly, nine net lifts took only took one carp. All gamefish were growing at or above the state average growth rate.

A follow-up survey in 1962 did show a large number of carp (43% of the total weight collected). All gamefish were, however, still exhibiting average to good growth rates. Though the gamefish population appeared to be in good shape (including holdover walleye), the extreme abundance of carp led to a management proposal to eradicate the fishery and start anew. A public hearing was held regarding the proposal and it was soundly defeated by a lack of public support.

Electroshocking surveys were conducted in 1974 and 1984 to further evaluate the status of the fishery. In 1974 the gamefish population was still in good shape, but there were many carp and white suckers. The 1984 survey, targeting only walleye, evaluated the success of walleye stocked in 1980-1984. Only three walleyes were collected. Hundreds of white suckers and "lots" of carp were observed in that survey.

In the spring of 1972, the Village of Paw Paw drew the lake down for maintenance of the dam and to allow lake owners to clean their beaches. The Village tried to set up a schedule of fall drawdowns every 3 years to provide for dam and shore maintenance. Apparently this never occurred, for the hydro plant at the dam was retired in the mid-1970s, and no further references were made regarding drawdowns until 1979.

In 1980, concern mounted over the poor spring fishery. The cause of the poor fishing may have been the fall 1979 drawdown for dam repairs that left levels low throughout the winter. Since walleye had been shown to grow and survive well in the lake from stocking in the 1950s, it was recommended to restock walleye. It was thought that under the circumstances of the prolonged drawdown (and loss of fish over the dam) that walleye would have a good chance to succeed.

In 1990 the Maple Lake Association began a campaign to convince lake property owners that it was time to dredge the lake out. In addition to dredging, the Village of Paw Paw wanted to continue enhancement of certain lakeshore areas for recreational purposes. The Lake Association took the lead and proceeded to contact DNR representatives over the required permits and grant

possibilities. At the time of this writing, no permits or grants have been issued. The Fisheries Division has suggested it would allow a short window period (fall) for a drawdown to remove lake sediments at the south end of the lake. We also support the idea of using a hydraulic dredge on the rest of the lake. The estimated amount of material to be removed from the lake is over 1 million cubic yards. Obviously, any work involving a drawdown or hydraulic dredging will have some impact on the fishery, and we want to reduce that impact as much as possible.

The latest survey, conducted in September 1991, used 6'x3'x1.5" standard trap nets, 3/16" full-size fyke nets, experimental gill nets (125 feet long), and the DC boomshocking boat. The fish community revealed by this survey is little different from that of 40 years ago.

Bluegill dominated the total catch by number, but white suckers accounted for most of the biomass (Table 2). In addition to these species, good numbers of largemouth bass, yellow perch, black crappie, and walleye were also collected. Each species of gamefish had good proportions of catchable-sized fish, ranging from 9.6% for walleye to 90.3% for yellow perch. Northern pike, rock bass, grass pickerel, chub sucker, and common shiner were the only species not collected in 1991 that were present in previous surveys but low in numbers. Shorthead redhorse, bluntnose minnow, and blackside darter were captured in 1991 but not in previous surveys.

The bluegill fishery in Maple Lake can be rated as excellent. Schneider (1990) developed five criteria for ranking bluegill populations from survey catches in Michigan. These bluegills rank 6.0 (excellent) on a scale of 1-7 using the trap netting data. No other District 12 lakes in the last 3 years have ranked this high. Growth of bluegill is excellent, with the population averaging a full inch above the State average growth rate (Table 3). Recruitment of bluegills appears variable (Table 4). While young-of-the-year recruitment in 1991 was excellent, there were severe recruitment problems with the 1989 and 1990 year classes. I don't believe that these cohorts were undersampled, but that the estimated age frequency represents a true picture of the population. The 1989 and 1990 age classes may have suffered excessive predation. There were strong 1987 year classes of bluegill, yellow perch, and black crappie, and these may have had a significant impact on bluegill recruitment. Also, the 1990 year class of stocked walleye was very high as determined by fall electrofishing. Largemouth bass data reveals no problem with recruitment and shows normal mortality (Table 4).

The present yellow perch population in Maple Lake is characterized by a very large cohort of four-year olds. This age group averages 9.1 inches, almost a full inch above the State average (Table 3). Because of the strong presence of this year class, over 90% of the perch caught were of acceptable size to anglers. Younger perch were poorly represented in the catch (Table 3). Ages 0 and I were probably undersampled by the gear because they were small, but age II and III perch should have been collected in a representative amount. Thus, it appears that low recruitment of perch occurred in 1988 and 1989.

Growth of black crappie was at the State average rate (Table 3). Black crappie were also variable in year class strengths as determined from our catch. Over 40% of the crappie collected were of catchable size. Once again, the 1987 year class was very strong, while cohorts I-III were practically failures. Age 0 crappies recruited well in 1991 (Table 4).

Growth of walleye in Maple Lake is excellent, averaging almost 3 inches above the State average (Table 3). Six year classes of walleye were collected. Survival of 2.0- inch spring fingerlings stocked at the rate of 52 per acre in June was very good (Table 4). This was confirmed by a fall 1991 electrofishing sample and SERNS indexing (Serns 1982). The calculated density of young walleye was 9.2 per acre, higher than any other southern Michigan lake examined to date. Age I and II walleye were also well represented. A very good walleye population has been established in Maple Lake.

Additional SERNS index sampling was accomplished in fall of 1990 and 1992. Although this information was not collected for this survey, it is presented here because of its importance to walleye management. In 1990, survival of stocked walleye was excellent (estimated density of 5.5 per acre). The stocking rate that year was 79 spring fingerlings/acre (1.5" in June). This was the first year of higher stocking levels. Sampling during fall of 1992 (after a spring fingerling stocking of almost 63 per acre, size of 1.9 inches) revealed very poor survival. Estimated fingerling walleye density was only 0.7 per acre. Growth also appears to have declined. This information indicates that we cannot be successful stocking at this rate when there are already two large year classes present.

The gamefish populations in Maple Lake exhibit wide fluctuation in recruitment as determined by the age-frequency table. For most species 1987 was a very good recruitment year. Problems with recruitment rates due to either decreased spawning success or high mortality are apparent for the 1988-1990 cohorts of most species. For the most part, 1991 appears to be another successful year. Wide fluctuations in yearly recruitment levels are to be expected because this is a reservoir with frequently changing environmental conditions due to its low retention time.

Management Direction

Maple Lake should continue to be stocked with spring fingerling walleyes at the rate of 50 per acre. Over the past 12 years the lake has received annual stockings. Now that there is an established walleye population, stocking should occur biannually.

To compliment the fall SERNS indexing completed in 1990-1992, a walleye population estimate will be attempted in 1993. This information will validate the SERNS estimates.

The remainder of the adult gamefish population is in excellent shape at this time. However, there are some recruitment problems which may effect fishing in the future. Fishing in Maple Lake is currently about as good as can be expected for any lake in the District.

The goal of management should be to maintain, rather than improve, the fisheries. This should be possible because of the good growth of fish and the continued high nutrient loading of Maple Lake.

But, several obstacles exist in trying to maintain this fishery. It is very likely that the lake association will be conducting a 6 week drawdown of the lake beginning in mid-September of 1993. While drawn down the extreme south end of the lake will be dredged out for a fishing pier, improved boat use, and a dock for a paddle boat. We do not know what effect this drawdown will have on the fish population of the lake.

The water level will be lowered no more than 6 inches in a 24-hour period, with a limit of 8 feet in total drawdown. This slow withdrawal will hopefully keep most of the fish in the lake and not cause many of them to migrate over the dam. In addition to this project, the lake association is trying to put in a sediment basin in the East Branch of the Paw Paw to trap sediments before they reach the lake.

After this project the lake association will try to procure Recreational Bond grants to conduct hydraulic dredging over a significant portion of the lake. If this project goes through, Fisheries Division should monitor the fish population to document dredging impacts.

Twenty-five years from now Maple Lake may be significantly changed. The lake may be deeper, have less organic sediments, and probably will have improved water quality. However, fish productivity may decline. Since Maple Lake is located in a fairly densely populated area, it will continue to receive significant use by the public and will require our attention to monitor the fishery.

Report completed: February 1993.

References

Schneider, J.C. 1990. Classifying bluegill populations from lake survey data. Michigan Department of Natural Resources, Fisheries Technical Report 90-10. Ann Arbor.

Serns, S.L. 1982. Relationship of Walleye Fingerling density and electrofishing catch per effort in Northern Wisconsin lakes. North American Journal of Fisheries Management 2:38-44.

Table 1.-Walleye stocking history of Maple Lake, Van Buren County.

<u>Year</u>	<u>Number</u>	<u>Age</u> ¹
1954	5,000	SF
1955	14,000	SF
1956	2,200	SF
1980	85	FF
1980	160,000	Fry
1981	160,000	Fry
1982	2,000	SF
1983	1,750	SF
1984	407	A
1985	3,550	SF
1986	4,076	SF
1987	3,552	SF
1988	3,502	SF
1989	3,555	SF
1990	13,658	SF
1991	8,943	SF

¹SF=Spring Fingerling

A=Adult

FF=Fall Fingerling

Table 2.-Number, weight, and length of fish collected from Maple Lake with all gear, September 17-19, 1991.

Species	Number	Percent by number	Weight (pounds)	Percent by weight	Length range (inches) ¹	Average length	Percent legal size ²
Bluegill	1,279	59.3	141.8	22.7	1-8	4.7	38 (6)
Largemouth bass	190	8.8	49.4	7.9	3-20	6.5	11 (12)
Yellow perch	145	6.7	36.9	5.9	3-10	8.2	90 (7)

Black crappie	154	7.1	33.5	5.4	2-10	6.0	40 (7)
Walleye	135	6.3	69.3	11.1	6-26	10.1	10 (15)
Pumpkinseed	48	2.2	6.2	1.0	1-7	4.9	23 (6)
Bullhead	49	2.3	24.4	3.9	6-13	9.9	96 (7)
Hybrid sunfish	1	<0.1	0.1	<0.1	5	5.5	0 (6)
Warmouth	8	0.4	1.4	0.2	4-6	6.1	75 (6)
Green sunfish	9	0.4	0.7	0.1	4-5	4.8	0 (6)
White sucker	89	4.1	175.8	28.1	14-19	17.0	---
Carp	13	0.6	80.7	12.9	17-31	23.1	---
Shorthead redhorse	1	<0.1	3.5	0.6	21	21.5	---
Golden shiner	5	0.2	0.8	0.1	6-8	7.9	---
Bluntnose minnow	20	0.9	0.1	<0.1	2	2.5	---
Blackside darter	10	0.5	0.1	<0.1	3	3.5	---
Total	2,156	99.8	624.7	99.9			

¹Note some fish were measured to 0.1 inch, others to inch group: e.g. "5" = 5.0 to 5.9 inches, "12" = 12.0 to 12.9 inches; etc.

²Percent legal size or acceptable size for angling. Legal size or acceptable size for angling is given in parentheses.

Table 3.-Average total length (inches) at age, and growth relative to the state average, for fish sampled from Maple Lake with all gear September 17-19, 1991. The upper average is weighted by length frequency distribution, the lower average is not weighted. Number of fish aged is given in parentheses.

Species	Age								Mean growth index ¹
	0	I	II	III	IV	V	VI	VII	
Bluegill	2.3	4.5	6.2	7.3	7.8	8.2	8.3	-	
	(22)	(17)	(9)	(8)	(14)	(1)	(2)	-	
	2.5	4.6	6.1	7.0	7.8	8.2	8.3	-	+1.0
Largemouth bass	4.3	8.7	11.0	12.3	12.3	-	-	-	
	(31)	(23)	(12)	(2)	(3)	-	-	-	
	4.5	8.8	10.6	12.3	12.4	-	-	-	+1.2

Yellow perch	3.7 (10)	5.7 (1)	7.4 (5)	8.3 (10)	8.8 (23)	9.6 (1)	-	-	
	3.7	5.7	7.5	8.2	9.1	9.6	-	-	+0.8
Black crappie	3.5 (20)	6.1 (2)	-	10.3 (1)	9.7 (19)	-	-	-	
	3.6	6.1	-	10.3	9.9	-	-	-	+0.6
Walleye	8.1 (5)	14.1 (27)	15.5 (6)	18.2 (1)	20.1 (5)	-	26.8 (1)	-	
	8.5	14.1	15.8	18.2	20.1	-	26.8	-	+2.8

¹Mean growth index is the average deviation from the state average length at age.

Table 4.-Estimated age frequency (percent) of fish caught from Maple Lake with all gear September 17-19, 1991.

Species	Age								Number caught
	0	I	II	III	IV	V	VI	VII	
Bluegill	51.8	7.8	4.3	10.5	21.9	1.3	2.6	-	1,279
Largemouth bass	68.1	14.6	11.9	3.4	2.0	-	-	-	190
Yellow perch	6.9	0.7	5.2	26.7	58.5	2.0	-	-	145
Black crappie	58.7	1.3	-	0.7	39.3	-	-	-	154
Walleye	60.9	27.9	5.1	0.9	4.3	-	0.9	-	135

MAPLE LAKE

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and (T3S, R13W, Section 6)*

Management Plan

based on

Status of the Fishery Resource Report 93-5

James L. Dexter, Jr.

The management goals for Maple Lake are based on the results of the 1991 survey, 1990-1992 fall YOY walleye surveys, and the proposed drawdown of Maple Lake in 1993. Our first goal is to maintain the walleye population and fishery at its present level. In order to achieve this goal several objectives must be met. Objective one is to continue the stocking of walleye spring fingerlings at the rate of 50-100 per acre on an every other year basis. Objective two is to complete a mark-and recapture population estimate of the walleye population (using jaw tags) in 1993 to validate the use of the SERNS Index method for yoy walleye survival. The third objective is determine the effects the fall 1993 drawdown has had on the fishery by conducting another extensive survey utilizing all gear types in 1995.

Obstacles to achieving the first goal include significant migration of fish over the dam during drawdown and failure to stock spring fingerling walleyes on the proposed schedule. Data collected in 1995 will be compared to 1991 data to determine any effects of the drawdown. Our second goal

will be to maintain the high quality warmwater fishery. This goal will be accomplished by maintaining high predator numbers in the system (i.e. walleye), that should help control young perch and bluegill recruitment. Again, obstacles to achieving this goal include the potential loss of fish over the dam during drawdown, and perhaps the unbalancing of the population as a whole.

It is expected that the drawdown will have little negative effect on the fishery because of the slow rate of drawdown. If this holds true, the Maple Lake fishery can be expected to be as good in the year 2000 as it is now. The expected yield of stocked walleye from Maple Lake is 1-2 adults per acre per year. This amounts to a yield of 175-350 fish/year. Most walleyes will be harvested between 15-20 inches, but there will be a significant number of walleye caught over 5 pounds, as has happened in past years.

Plan completed: February 1993.

Approved by: Richard O'Neal, District Biologist, March, 1993.
Eugene Trimberger, Acting Regional Biologist, March, 1993.

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Questions, comments and suggestions are always welcome! Send them to
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