

**LAKE DIANE**  
*Hillsdale County (T8-9S, R3W, Sections 34, 3, 4)*  
**Surveyed May 2001**

**Jeffrey J. Braunscheidel**

**Environment**

Lake Diane is located near the southern edge of Hillsdale County and lies approximately four miles due south of the town of Woodbridge and about 13 miles due south of the city of Hillsdale. This large, man-made reservoir was created by the construction of a dam on a tributary to Clark Fork Creek. Two natural lakes located on the tributary, Goforth and Hagerman, were inundated when the reservoir was created as part of a real estate venture in 1966. This lake sprawls over approximately 283 surface acres and has not been hydrologically mapped. Lake Diane is located in the Maumee River watershed and has an outlet to Clark Fork Creek at the dam noted above.

The average depth of the lake is approximately 8 feet with a maximum depth of 52 feet (based on depth readings during fish surveys and topography information from before the lake's creation). The lake has two major basins where the inundated lakes were located. The lake water is turbid due to suspended clay sediments with Secchi disk readings varying from 1.5 to 2 feet during previous surveys and water quality sampling. During the summer dissolved oxygen below about 8 feet of depth is insufficient to support fish (1.0 ppm). Other limnological parameters with information available included alkalinity, which in the summer of 2001 ranged from 152 at the surface down to 200 on the bottom, and pH, ranging from 8.5 on the surface down to 6.7 on the bottom. Historical sampling showed an alkalinity of 142 at mid-depth in April of 1987 and pH ranging from 8.5 on the surface down to 7.3 at the bottom in September of 1987 (U.S. EPA 2002).

Most of the shoreline is developed with permanent homes. The Michigan Department of Natural Resources (MDNR) public boat launch and access site was developed in the early 1980's on tax-reverted property from the failed housing development project. The access site has a concrete boat ramp, dock, rest rooms, and a modest parking area with parking for about 15-20 vehicles. It is located off of Woodbridge Road about 2 miles south of Camden Road. High speed boating and water skiing are prohibited between the hours of 6:30 p.m. and 10:00 a.m. the following day.

**History**

The fish population of Lake Diane was first surveyed by MDNR Fisheries Division in 1984. This early survey was conducted with trap nets, fyke nets, and a boomshocker boat. A variety of gamefish was collected including bluegill, largemouth bass, black crappie, brown bullhead, and pumpkinseed sunfish. Rough fish included gizzard shad and carp. Black crappie dominated the trapnet catch and comprised 78% of the total sample by number with most of them in the 5- and 6-inch groups. They exhibited poor growth in the early age groups. Largemouth bass and bluegill were observed growing at or near state average rates and appeared to be in good condition.

In an attempt to provide increased sport fishing opportunity, an average of 2,500 tiger muskellunge fingerlings (a hybrid of northern pike and northern muskellunge) were stocked in Lake Diane each year from 1984 through 1991. Northern muskellunge fingerlings were preferred, but these were unavailable and tiger muskellunge were stocked instead. It was hoped that these large predatory fish would survive well in Lake Diane because of its similarities to nearby Lake Hudson which (after stocking) had developed into one of southern

Michigan's best muskellunge lakes. Surveys conducted to evaluate the success of the tiger muskellunge stocking program in Lake Diane indicated their survival has been very low and relatively few angler reports have been received since their introduction. Muskellunge stocking in Lake Diane ended in 1991 with the statewide cessation of the tiger muskellunge rearing program.

A fisheries survey using only trap nets was conducted in April of 1995 to evaluate the muskellunge stocking program as well as to observe other gamefish populations (Herman and Tolles 1996). Similar species were collected as in the 1984 survey, with the addition of tiger muskellunge, white crappie, and channel catfish appearing in the catch. White crappie were likely present in the earlier survey, but the two species were not separated and were all recorded as black crappie. Black and white crappie together dominated the catch in the 1995 survey (as in the previous one) comprising over 65% of the total catch by number. Growth patterns and size ranges for all species were similar to those observed in the 1984 survey. Panfish were growing at or slightly below state average with size distributions below average. Only five tiger muskellunge were captured in the 1995 survey ranging from 28 to 36 inches. Channel catfish had been introduced to the lake from unknown sources with 15 individuals captured ranging from 8 to 23 inches. All appeared to be in very good health. Management recommendations from this survey were to stock additional channel catfish and introduce walleye if larger fall fingerlings became available. There is no record of channel catfish being stocked either by the State or private individuals.

### **Fishery Resource**

The most recent fisheries survey was conducted on Lake Diane in May of 2001. It utilized six standard trap nets (pot size 8ft x 5ft x 3ft with 1.5-inch mesh) over three nights and one 125-foot experimental gill net for one night in an attempt to evaluate the current fish populations and determine future management needs of the fishery.

A total of 14 fish species were collected during this survey with over 4,600 fish handled in total. Panfish such as black and white crappie, bluegill, green sunfish, pumpkinseed sunfish, warmouth and yellow perch comprised almost 90% of the total catch by number and over 50% by weight. Larger gamefish such as channel catfish and largemouth bass made up 8% of the catch by number and almost 40% by weight. Rough fish species such as carp, gizzard shad, and white sucker were only 2% of the catch by number and 10% by weight. Other species caught included golden shiner and yellow bullhead (Tables 1a and 1b).

Black and white crappie were by far the most abundant fish species caught during this survey. Collectively they comprised over 67% of the total catch by number (3,100 total crappie) and 40% by weight with black crappies present in slightly higher numbers (1800 vs. 1300). The black crappies averaged only 6.5 inches in the trapnet catch with 10% exceeding the minimum acceptable size to anglers of 7 inches and only one individual exceeding 8 inches (Table 1a and Table 4). Growth rates were very poor with a mean growth index of 2.5 inches below state average (Table 2). White crappies averaged only slightly larger at 7.2 inches with 56% exceeding the 7-inch minimum acceptable size, although over 96% were less than 8 inches. There were 27 white crappie exceeding 10 inches with 2 over 14 inches. Overall growth of white crappies was also poor with a mean growth index 1.0 inches below state average. A wide range of age groups with adequate numbers in each were present for both crappie species (Table 3) indicating consistent reproductive success and multi-year survival has occurred in this lake.

Bluegill were the only other panfish present in significant numbers (989 caught). They made up 22% of the trapnet catch by number and 11% by weight with an average length of 5.6 inches and 27% exceeding the minimum acceptable size of 6.0 inches. Only 5 individuals exceeded 7 inches and none were over 8 inches in length. Growth rates were only slightly below state average with a mean growth index of -0.2 inches. The quality of the bluegill population in Lake Diane was evaluated using Schneider's Index. This index provides a ranking system that describes the quality of a bluegill population in a lake using a scale of 1 to 7 (Schneider 1990). The index calculated for Lake Diane based on this survey is 2.2, or a "poor" rating.

Other panfish collected during this survey (Tables 1a and 1b) included 21 pumpkinseed sunfish (4-7 inches), 3 green sunfish (5-6 inches), 2 warmouth (6 inches), and 1 yellow perch (6 inches).

Channel catfish dominated the larger gamefish caught during this survey, comprising almost 8% of the total catch by number and over 36 % by weight (Table 1a). They averaged 15 inches in the trapnet catch, with 91% exceeding the minimum legal size limit of 12 inches. Of the 349 caught in the trapnets, 31 catfish exceeded 20 inches with the largest measuring 28 inches and weighing an estimated 8 pounds. Every age class from one to eleven was present in the catfish collected during this survey (Table 2). The large number of fish present compared to the 1995 survey, and the wide range of age classes, indicates the channel catfish are reproducing naturally in this system and surviving well despite growth rates well below state average (average growth index of -3.2 from this survey). The high number of catfish caught during this survey, along with the large average size and high percentage exceeding the minimum legal size limit, indicates that an excellent catfish fishery has developed in Lake Diane.

Largemouth bass were the only other large predator found during this survey with a total of 8 individuals caught ranging from 7 to 20 inches in length. Although not enough bass were caught in each age group for the result to be statistically significant, they did tend to exceed the state average for length-at-age so growth of those present seems to be adequate.

Rough fish species caught during this survey included the common carp (33 fish ranging from 15 to 24 inches), gizzard shad (75 fish ranging from 5 to 12 inches), one white sucker, and one yellow bullhead.

### **Analysis and Discussion**

Comparison with the two earlier surveys conducted at Lake Diane in 1984 and 1995 show most aspects of the fish community have remained relatively stable with one significant change occurring since the 1995 survey. Channel catfish numbers have exploded over

recent years since the first finding of only 15 individuals in the 1995 survey (none were found in the 1984 survey). Stocking of this species is not occurring to our knowledge, so the changes are most likely due to natural reproduction. Efforts to make anglers aware of the presence of this excellent fishery resource should be taken as opportunities arise.

Small and slow-growing crappie still dominate the fish population in the lake. Bluegills have remained fairly stable with overall slightly smaller sizes and about average growth rates. Older and larger bluegills seem to experience a high mortality rate, although fishing mortality is not comparatively high. This same situation seems to be present in nearby Lake Hudson.

There is an overall imbalance of panfish compared to larger piscivores in Lake Diane. While the success of the channel catfish shows the presence of an adequate forage base to support predators, the extremely large numbers of rather small crappie and bluegill indicate the predator population in the lake is too low and/or not varied enough to maintain a healthy, balanced fish community.

Lake Diane's physical characteristics and fish community (with the exception of the catfish present in Lake Diane) are very similar to Lake Hudson located approximately 25 miles to the northeast in western Lenawee County. Northern muskellunge is the primary predator there, with a few largemouth bass present as well, and the overall fish community is also dominated by small crappies. A small stocking of walleye in Lake Hudson several years ago experienced fair survival, so stocking of this species in Lake Diane could provide an additional predator to help balance the fish community.

### **Management Direction**

Stocking of walleye fingerlings in Lake Diane for several years is recommended to help bring the fish community in Lake Diane into a more reasonable predator-prey balance, with the possibility of providing a small walleye fishery as well. Since lake conditions are very similar to those in Lake Hudson, where northern muskellunge stocking has been very successful, it is further recommended that this species also be stocked to provide further predation of carp and the abundant,

slow-growing crappies and possibly develop another musky fishery in southern Michigan. A general survey of the fish community should be done in 5-6 years to evaluate the effects from the stocking program and determine if the goals of improving the panfish community and enhancing fisheries in the lake are being achieved.

Report completed: March 3, 2003.

## References

Herman, M.P. and Tolles, B. 1996. Report of Fisheries Survey on Lake Dianne, Hillsdale County. Michigan Department of Natural Resources, Fisheries Division Lake File, Livonia.

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

U.S. Environmental Protection Agency (EPA). 2002. STORET Legacy Data Center. Available: [http://oaspub.epa.gov/storpubl/legacy/proc\\_advanced\\_query](http://oaspub.epa.gov/storpubl/legacy/proc_advanced_query) (accessed April 2002, where Station Type = Surface Water, Organization Code for Michigan Department of Environmental Quality = 21MICH, Station ID for Lake Diane = 300173, State = Michigan, County = Hillsdale).

Table 1a.—Number, weight and length indices of fish collected from Lake Diane with trap nets, May 22-25, 2001.

Species	Number	Percent by number	Weight (pounds)	Percent by weight	Length range (inches) <sup>1</sup>	Average length	Percent legal size <sup>2</sup>
Black crappie	1755	39.1	255.3	22.6	4-8	6.5	10
White crappie	1263	28.1	200.7	17.8	5-14	7.2	57
Bluegill	988	22.0	124.2	11.0	3-7	5.6	27
Channel catfish	349	7.8	408.0	36.1	7-28	15.0	91
Gizzard shad	69	1.5	13.4	1.2	5-11	7.9	---
Common carp	32	0.7	97.7	8.7	15-23	18.4	---
Pumpkinseed	21	0.5	3.6	0.3	4-6	5.9	48
Largemouth bass	8	0.2	23.4	2.1	7-20	16.5	75
Green sunfish	3	0.1	0.4	0.0	5-6	5.8	33
Golden shiner	2	0.0	0.2	0.0	6-7	7.0	---
Warmouth	2	0.0	0.4	0.0	6-6	6.5	100
White sucker	1	0.0	2.1	0.2	17-17	17.5	---
Total	4493	100.0	1129.4	100.0			

<sup>1</sup> Note: some fish were measured to 0.1 inch, others to inch group: eg., “5”=5.9 inches, “12”=12.0 to 12.9 inches, etc.

<sup>2</sup> Percent legal size or acceptable for angling.

Table 1b.—Number, weight and length indices of fish collected from Lake Diane with the gill net, May 24, 2001.

Species	Number	Percent by number	Weight (pounds)	Percent by weight	Length range (inches) <sup>1</sup>	Average length	Percent legal size <sup>2</sup>
Black crappie	57	48.6	7.7	29.5	4-7	6.3	7
White crappie	36	30.7	3.8	14.7	5-7	6.5	6
Bluegill	1	0.9	0.1	0.4	5-5	5.5	0
Channel catfish	14	12.0	8.9	34.2	9-15	12.9	64
Gizzard shad	6	5.1	1.7	6.7	7-9	9.2	---
Common carp	1	0.9	3.5	13.6	19-19	19.5	---
Yellow bullhead	1	0.9	0.1	0.5	6-6	6.5	0
Yellow perch	1	0.9	0.1	0.4	6-6	6.5	0
Total	117	100.0	25.9	100.0			

<sup>1</sup> Note: some fish were measured to 0.1 inch, others to inch group: eg., “5”=5.9 inches, “12”=12.0 to 12.9 inches, etc.

<sup>2</sup> Percent legal size or acceptable for angling.

Table 2.—Average total length (inches) at age, and growth relative to the state average, for six species of fish sampled from Lake Diane with trap nets and gill nets, May 22-25, 2001. Number of fish aged is given in parentheses.

Species	Age											Mean growth index <sup>1</sup>	
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI		
Black crappie	4.4 (1)	4.8 (2)	5.8 (11)	6.1 (12)	6.9 (9)	7.1 (15)							-2.5
Bluegill		3.9 (9)	5.0 (19)	5.6 (14)	6.2 (9)	7.0 (3)							-0.2
Channel catfish	7.5 (2)	8.8 (14)	11.3 (11)	12.2 (12)	13.0 (12)	15.0 (20)	16.5 (43)	18.5 (19)	20.2 (14)	22.7 (18)	19 (1)		-3.2
Largemouth bass	7.5 (1)	7.1 (1)	10.0 (1)	16.2 (1)	17.0 (1)		19.6 (1)	19.7 (1)		20.3 (2)			
Pumpkinseed			5.2 (2)	5.5 (12)	6.5 (4)	6.3 (1)							+0.2
White crappie		5.6 (4)	6.6 (1)	7.0 (5)	7.2 (21)	8.2 (15)	9.4 (11)	10.8 (11)	12 (6)	13.1 (8)	13.1 (2)		-1.0

Table 3.—Estimated age frequency (percent) of fish caught from Lake Diane with trap and gill nets, May 21-25, 2001.

Species	Age											Number caught	
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI		
Black crappie	2	4	22	24	18	30							1812
Bluegill		17	35	26	17	6							989
Channel catfish	1	8	7	7	7	12	26	11	8	11	1		363
Largemouth bass	11	11	11	11	11		11	11		22			9
Pumpkinseed			11	63	21	5							21
White crappie		5	1	6	25	18	13	13	7	10	2		1299

Table 4.—Number per inch group of selected fish species collected from Lake Diane with trap nets, May 22-25, 2001.

Inch group	Black crappie	Bluegill	Channel catfish	Carp	Gizzard shad	Golden shiner	Largemouth bass	Pumpkinseed	White crappie
2									
3									
4	3	9						1	
5	141	117			1			10	9
6	1435	596			5	1		10	540
7	175	261	4		42	1	1		667
8	1	5	10		8				14
9			3		11				6
10			5		1		1		9
11			8		1				6
12			39						5
13			63						5
14			83						2
15			52	1					
16			16	5			1		
17			14	8			1		
18			13	8					
19			8	6			2		
20			8	3			2		
21			4						
22			7						
23			3	1					
24			5						
25			3						
26									
27									
28			1						
Total	1755	988	349	32	69	2	8	21	1263

**LAKE DIANE**  
*Hillsdale County (T8-9S R3W Sec 34-3,4)*  
May 2001 Net Locations  
(1992 Aerial Photo)



⇒ = Trapnet location

⇔ = Gillnet location

△ = Limnological sampling site