

## **DUCK LAKE**

*Allegan County (T1 N, R14W, Section 36)*

**Surveyed March and May 1997**

**James L. Dexter, Jr.**

### **Environment**

Located in south-central Allegan County just north of the Van Buren County line, Duck Lake is about 10 miles southwest of the City of Allegan. The surrounding lake area is primarily cultivated farmland, although some large tracts of woods are located on the west and east shores. The soils of the area are made up of various loamy and silty sands that are poorly drained. The topography consists mostly of small hills.

Duck Lake is a 113-acre natural lake ([Figure 1](#)). The maximum depth is 39 feet, and four distinct basins exist. There are two small inlets at the south end (one from Burke Lake and one from a drainage ditch), and one outlet at the north end that drains into Swan Lake. Both the inlets and the outlets are rated as second-quality warm water. No control structure is present. Duck Lake is in the lower Kalamazoo River Watershed.

Water quality parameters were studied July 24, 1990. The water had no color, but was turbid due to a dense plankton bloom. A Secchi disc reading was 5.5 feet. Alkalinities ranged from 100 ppm at the surface to 118 ppm at the bottom of the lake. These values represent good buffering capacity. Surface pH was 8.3. Water temperatures ranged from 76.6°F at the surface to 47.5°F at the bottom. A thermocline was present from 15 to 22 feet. Dissolved oxygen levels in the thermocline were not sufficient to support most game fish. Just over 9 ppm of oxygen was present down to 3 or 4 feet, but oxygen declined to 3.7 ppm at only 11 feet.

Water quality analysis in September of 1975 showed that oxygen levels were sufficient for fish (about 3.7 ppm at 19 feet) down to 20 feet. This was considerably better than what was observed in 1990. A Secchi disc reading was 3.5 feet. The decline in oxygen content may represent a decline in the overall water quality of Duck Lake-perhaps a sign a hyper-eutrophication. There is a history of spring fish kills at this lake.

The shoal areas of the lake are heavily weeded. Submergent, floating, and emergent species of aquatic plants are rated as common to abundant. Structure for game fish species is abundant in the lake, ranging from aquatic plants to steep drop-offs, flats, points, and drowned timber.

Development around Duck Lake is moderate to heavy, with the east and north shores being the least developed. The west shore around the point area is also sufficiently low

and wet to deny further development. A public access site is located at the north end of the lake. This site has a gravel ramp, and parking is limited to seven trailers.

### **Fishery Resource**

Little historical information exists on the fishery of Duck Lake. The first survey was conducted by the State in 1891 using gill nets. A typical warmwater fish community was noted (bluegill, perch, sunfish, bullhead, and pike), and that fish were large and in good condition. Between 1934 and 1945, bluegill, largemouth bass, and yellow perch were stocked almost every year.

The lake was not surveyed again until 1961. A survey with a large seine, conducted by the Lake and Stream Improvement Section of the Fish Division, found bluegill and bass growing well below state average rates, while perch and crappie were growing at average rates.

During the 1970s, lake residents began requesting assistance from the State to improve gamefish populations. Electrofishing surveys were conducted in 1975 and 1979. These surveys found virtually no change in the general status of the fish population. Bluegill, black crappie, and largemouth bass were all growing below state average rates, although they had improved somewhat marginally between 1975 and 1979.

Weed growth was also noted as excessive throughout the lake. Very few of the game fish were of an acceptable size to anglers. Fisheries Division proposed total fish reclamation for the fall of 1982 followed by restocking with largemouth bass, bluegills, pike, and minnows. However, a meeting held with riparians in July 1981 to discuss chemical reclamation did not meet with success because a majority of riparians strongly objected to the proposal.

In 1987, the lake association requested that northern pike be stocked to add another species to catch. It is not clear from records if pike were still available in the lake. The District Biologist agreed to stock after a very lengthy petition arrived in support of the stocking. Northern pike spring fingerlings were then stocked from 1988 to 1995 at an average rate of 10 per acre.

A survey was conducted in 1990 to evaluate the status of the fishery. Using gill nets and trap nets, we found the overall fishery in good shape with the exception of bluegill. The bluegill population ranked 1.7 (poor) using Schneider's index (1990). Of significant interest, the pike population contained several year classes, as old as age 8, and grew above the state average rate. A follow up fall electrofishing survey in 1994 to further evaluate survival of stocked pike resulted in the collection of 16 pike. These fish ranged from 8 to 27 inches in length.

The most recent survey was conducted in the spring of 1997 to make a final determination regarding the future of pike stockings. This survey was conducted in March (trap nets, 6' x 3' with 1.5" mesh) and May (boomshocker, 240-V DC). Fingerling

pike stocked in 1994 and 1995 had been identified by pulling out certain fins. Pike that had been intensively reared on pelleted food at the Wolf Lake Hatchery were identified with a LV clip, and fingerlings reared in marshes on natural forage were identified with a RV clip (Table 1).

The fish community in 1997 was not much different from that a century ago (Table 2). Bluegill, largemouth bass, sunfish, yellow perch and bullheads were the most common game fish collected. Two walleye were also collected (23-24 inches), and were presumably from a private stocking of which we have no record.

Bluegills 1-7 inches long were collected. Trap net results showed that 82% were of acceptable size (6 inches or larger). Using Schneider's index (1990) to rank the population, they scored a 3.4 (average). This is a significant improvement compared to previous surveys. Overall growth rates for bluegill were just below state average (Table 3). Eight age groups were identified (ages 1-9). The 1992 year class was missing (as it was in many other regional waters), most likely due to the cool and wet spring from the effects of the Mt. Pinatubo volcanic eruption (Table 4).

Largemouth bass were collected from 3 to 19 inches in length. About 14 percent were of legal size (14+ inches). Overall growth rates were at state average, which is an improvement over previous surveys. A total of seven year classes were identified (ages 1-7). As with bluegill, the 1992-year class was weak.

Black crappie were 4.7-10.9 inches long. Seventy-five percent were of acceptable size (7+ inches). Their overall growth rate was at state average. The estimated age frequency for crappie appeared normal.

A total of 63 northern pike were collected, from 17 to 40 inches, an excellent sample. Over 80% were of legal size (24+ inches). Age groups 3-8 were represented. Growth rates of northern pike were well above state average rates. Only five of these fish could be identified by fin pulls as the 1994 year class that had been intensively reared. The rest of the 1994-year class samples (15 out of 20 pike, 75%) were unmarked fish originating from natural recruitment. Based on this sample of pike, we believe that natural recruitment is strong.

No yellow perch were collected in this survey. In 1990, we used gill nets to collect a small sample of 17 fish. Age groups 2-4 were represented, and growth rates were at state average.

Duck Lake is presently providing a good fishery. Forage species are abundant. Anglers are fairly happy overall. This lake compares satisfactorily with other area warmwater fisheries such as Baseline and Eagle lakes (Allegan County).

## **Management Direction**

In December 1997, it was decided to discontinue all future pike stockings into Duck Lake. There is a significant amount of natural reproduction occurring, and it is sufficient to sustain the existing fishery. No other management activities need to be undertaken at this time. Most game fish species have improved over the last few decades, perhaps due to the annual removal of aquatic vegetation by the riparians (spot treatment, not whole lake) or to higher size limits on bass since the late 1970s. Our management goal into the next century should be to maintain the present fishery. Obstacles to attaining this goal include increased pressure to develop wetland areas around the lakeshore, potentially reducing spawning habitats and leading to further decline in water quality.

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Figure 1

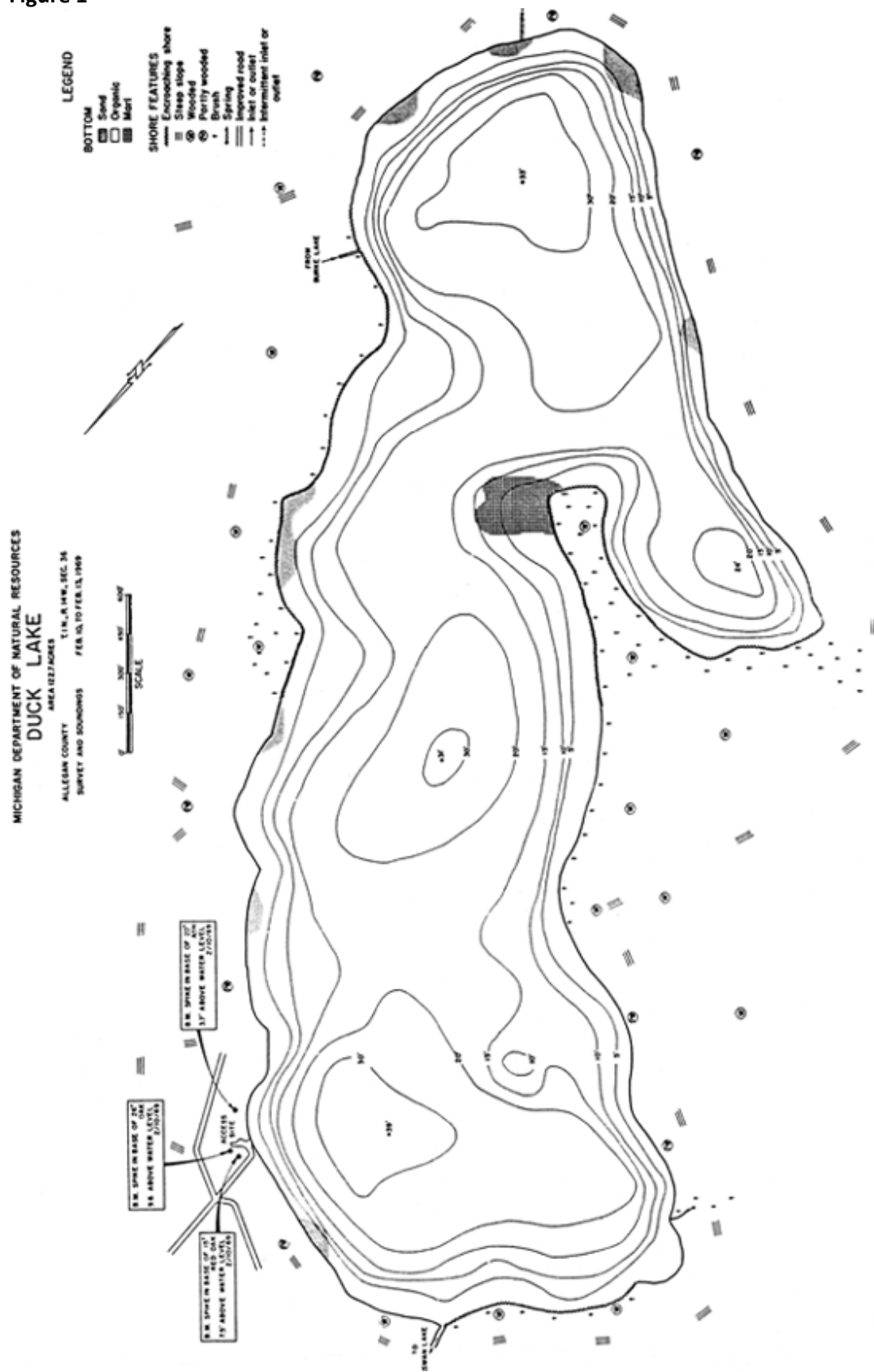


Figure 1—Map of Duck Lake, Allegan County, showing depth contours in feet and other features.

## References

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

**Table 1** Northern pike stocked in Duck Lake, Allegan County.

Year	Number stocked and fin clip	Number per acre	Length (inches)
1988	1,200	10.6	3.2
1989	492	4.4	3.0
1990	850	7.5	4.3
1991	1,250	11.0	3.7
1992	2,500	22.1	2.2
1993	1,200	10.6	3.9
1994	800 LV	7.1	4.2
1995	800 RV	7.1	4.1

**Table 2** Number, weight, and length (inches) of fish collected from Duck Lake with trap nets and DC boom shocker, March and May 1997.

Species	Number	Percent By number	Weight (lb.)	Percent by weight	Length range (inches)*	Percent legal size**
Black crappie	41	2.6	14.1	1.6	4-10	75
Bluegill	693	44.6	116.2	12.8	1-7	59
Bluntnose minnow	28	1.8	0.2	0.0	2-2	100
Bowfin	24	1.5	109.8	12.1	16-29	100
Brook silverside	66	4.2	0.0	0.0	3-5	100
Bullhead catfishes (family)	90	5.8	0.0	0.0	3-14	100
Common carp	16	1.0	172.3	19.0	22-32	100
Fathead minnow	5	0.3	0.1	0.0	3-3	100
Golden shiner	7	0.5	1.0	0.1	6-8	100
Lake chubsucker	8	0.5	1.9	0.2	3-9	100
Largemouth bass	251	16.2	146.2	16.1	3-19	14
Northern pike	63	4.1	302.9	33.3	17-40	84
Pumpkinseed	94	6.0	17.3	1.9	3-7	58
Sand shiner	8	0.5	0.0	0.0	1-1	100
Walleye	2	0.1	9.1	1.0	23-24	100
Warmouth	37	2.4	4.4	0.5	2-6	16

White sucker	1	0.1	1.0	0.1	13-13	100
Yellow perch	120	7.7	12.1	1.3	3-8	57

\* Some fish may be 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.

\*\* Percent legal size or acceptable size for angling.

**Table 3.**-Average weighted total length (inches) at age, and growth relative to the state average, for fish sampled from Duck Lake with trap nets, DC boomshocker, March - May 1997. Number of fish aged is given in parentheses.

Species	Age									Mean growth index
	1	2	3	4	5	6	7	8	9	
Black crappie	-	5.5 (8)	7.5 (4)	8.7 (15)	9.7 (5)	10.1 (3)	-	-	-	-0.0
Bluegill	1.6 (2)	2.9 (15)	4.1 (9)	5.4 (16)	-	6.7 (15)	7.2 (3)	7.3 (2)	7.0 (1)	-0.7
Largemouth bass	4.0 (3)	7.0 (22)	9.2 (13)	10.4 (22)	12.8 (5)	13.4 (13)	14.4 (2)	-	-	-0.6
Northern pike	-	-	23.2 (25)	26.9 (20)	31.3 (7)	35.6 (2)	35.7 (4)	-	-	3.9
Walleye	-	-	-	-	-	-	23.5 (1)	24.1 (1)	-	-

**Table 4.**-Estimated age frequency (percent) of fish caught from Duck Lake with trap nets and DC boomshocker, March - May 1997.

Species	Age									
	1	2	3	4	5	6	7	8	9	10
Black crappie	-	21	11	39	13	8	-	-	3	5
Bluegill	3	24	14	25	-	24	5	3	2	-
Largemouth bass	4	28	16	28	6	16	3	-	-	-
Northern pike	-	-	43	34	12	3	7	-	-	-
Walleye	-	-	-	-	-	-	50	50	-	-

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