Michigan Department of Natural Resources
Status of the Fishery Resource Report 92-11, 1992.

DUCK LAKE

Calhoun County (T1S, R4W, Sections 6, 16, and 21)
Surveyed September 24-26, 1991

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Duck Lake supports one of the best warmwater fisheries in Michigan. It is included in*Michigan's 50 Best Fishing Lakes,* published by Michigan United Conservation Clubs. This lake's reputation for producing large fish has been earned from several decades of sportfishing reports by happy anglers.

Environment

With 629 surface acres of water, Duck Lake is the largest lake in Calhoun County. The small community of Springport lies only 4 miles east of the lake. Three large metropolitan areas are nearly equidistant (25 miles) from Duck Lake: Lansing is north-northeast; Battle Creek is west-southwest; and Jackson is southeast. The smaller City of Albion is about 12 miles south.

Lake bottom substrates are primarily marl with lesser amounts of sand and peat. The water is usually very clear. Secchi disk readings of up to 25 feet have been recorded in the past. One-third of the water column is less than 5 feet deep, but much of the remainder is greater than 10 feet in depth (see map of Duck Lake). The maximum depth is 50 feet. The basin is rather complex with shoals, "sunken islands", weed beds, and drop-offs. The lake basin map (developed in 1938) has been criticized by anglers for not depicting some of the shallow shoals surrounded by deep water near the center of the lake. An aerial photograph (see photograph) taken in 1988 indicates the presence of at least four of these shoals (some anglers have reported as many as seven).

Aquatic plants are quite sparse near the shore. This is primarily due to extensive beach development around most of the lake. However, weed beds (primarily coontail) are present in deeper water (3-15 feet) and in the shallows to a small degree along the northwestern and far southwestern shores. Large coontail beds appear as dark dots in Figure 2 (in the northern, shallow end of the lake).

There are no inlets of consequence, and only one small outlet (on the north shore). Land use along the shoreline is primarily residential. However, within a mile of the shoreline in nearly every direction the land is either wooded or farmed.

In November of 1971, Calhoun County Health Department studies documented pollution in Duck Lake apparently from seeping (and some direct flow) septic systems. Federal and State grants were acquired for the construction of a sewage treatment plant. The

Duck Lake Wastewater Treatment Plant was built during the 1980's and now collects and treats the sewage in the Duck Lake area of Clarence Township.

In 1947, the Department of Natural Resources developed an access site on the northwest shore. In 1974, this site was enlarged and developed with concrete ramps, skid piers, vault toilets, and paved parking areas. The parking area is large enough for 28 cars with trailers. An entrance fee is charged for using the access on summer weekends and holidays when parking congestion can occur unless an attendant is present. This site completely fills with cars by 7:00 A.M. on fair-weather weekend days during the summer. Even on this large lake, powerboat wakes by 10:00 A.M. make fishing more challenging than most anglers are willing to endure. Few anglers attempt to use this fishery during the middle of the day.

Management History

Much of the past fishery management of Duck Lake has centered around attempts to develop a substantial walleye population. Walleyes were stocked from 1934 through 1942 and several times since 1955. Walleye size-at-stocking has varied from fry (1 to 3 days old) to adult. During the last decade spring-fingerling (1.4 to 2 inches) plants were made in 1982, 1984, and 1986 totaling nearly 70,000. And, in 1988, over 17,500 fall fingerlings (3.5 inches) were stocked. Follow-up surveys have indicated poor survival of these stocked fish. However, some have survived and provided at least an incidental fishery for walleyes.

Historically, some age studies have indicated that walleye are occasionally successful at natural reproduction (age determinations of some captured fish have not matched stocking dates). However, these fish may have resulted from unrecorded walleye plants-perhaps by lake riparians. Natural reproduction of walleyes is very unusual for an inland lake in southern Michigan.

The earliest recorded fish survey in the files was conducted with gill nets in 1938. That net catch, combined with observations, indicated the presence of a very diverse fish population. Twenty-two species of fish were identified.

An intensive week-long survey was conducted in June 1961. Several hauls were made with a 1,600 x 30 foot seine resulting in the capture of over 10,000 fish. According to that survey report, panfish (especially bluegill and yellow perch) were in very good condition. Many largemouth bass were captured, but the vast majority were sublegal (94%). A few walleye and smallmouth bass were captured. Interviewed anglers reported good fishing for bass and panfish. A few anglers knew how to catch walleyes and they were quite successful. Age-and-growth studies indicated that largemouth bass and small (ages 2 and 3) bluegill and pumpkinseed were growing below state average growth rates. Even so, there were ample large, catchable fish and the population was said to be in very good condition. It was suggested that no further management was needed. Similar conclusions were made after electrofishing surveys in 1967 and 1977.

Age-and-growth analysis in 1982 indicated that growth patterns of Duck Lake fish had not changed in 20 years. Bluegills, yellow perch, and largemouth bass were found to be slow growing when compared to state average growth rates. Older, larger fish, however, experienced some "growth compensation" at ages 3 and 4. This is rather common in area lakes. It may be that a specific food source becomes available to larger fish which cannot be used by smaller individuals.

Several electrofishing surveys were completed in the 1980's primarily to ascertain the survival of stocked walleye. Very few walleye were found and it was concluded that a significant walleye fishery should not be expected from plants made during that decade.

Redear sunfish, also referred to as shell-crackers because of their preference for snails as food, were stocked in this lake in 1984, 1986, and 1988 by MDNR, Fisheries Division. Redear are not hybrids, but are a unique species in the sunfish family (Centrarchidae). Redear are not indigenous to Michigan, but seem to survive in limited numbers when stocked as fingerlings. They typically grow very rapidly and attain larger sizes than native bluegills and pumpkinseeds. Redear were stocked to provide a trophy panfish fishery and not to replace bluegill or pumpkinseed.

May 14 and 15, 1987, marked the first trap-net survey in the history of Duck Lake fishery management. An intensive effort of 10 trap-net nights and 6 experimental net nights resulted in a significant catch of fish. Sixteen redear sunfish were captured averaging 8.2 inches and nearly 1/2 pound. These fish were only 3 years old-entering their fourth summer of growth. The trap nets captured seven walleyes ranging from 19 to 23 inches and the gill nets caught one 23-inch walleye. These fish were in excellent condition and age/growth analysis (using their scales) indicated very rapid growth rates. Six of these fish were 4 years old and corresponded to our fingerling plant in 1982. The others may have come from natural reproduction. The remainder of the catch brought few surprises. The average sizes of most game fish species was very impressive. Growth rates of some species, especially bluegill and pumpkinseed, had increased slightly since previous studies were conducted. It was encouraging to see that the introduction of redear had not appeared to cause any major impacts to the fish population.

Fishery Resource

Duck Lake has had a reputation for being populated with large healthy fish since records have been kept. However, these fish are also known for being difficult to catch. Fishing success is said to be either "feast or famine". When the fish are biting, or when just the right techniques are used, this lake can produce some of the best bass, panfish, and perch catches in the state. But, more often, anglers report days of fishing with poor success. Yet, these same anglers keep fishing the lake because when success does occur the quality of their catch is truly exceptional.

Two fishery surveys were conducted on Duck Lake in 1991. The first, on June 6, was designed primarily to evaluate the redear sunfish population. Time and manpower

constraints limited that survey to only one night and few fish were captured. Later, a survey was completed that was designed to evaluate the survival of stocked walleyes. This September 24 through 26 survey resulted in a better catch of all species (Table 1) and will be used as the focus for the following discussion.

In the spring or early summer, the average size for trap-netted bluegills in most area lakes is 6.0 to 6.2 inches. In Duck Lake this average was 6.8 inches in the June survey and 6.1 inches in the September survey. While relatively few bluegills were captured, in each case at least half of the catch was 6 inches or longer. While rather impressive, these average sizes were somewhat small for Duck Lake. For example, in 1987, bluegills averaged 7.2 inches. Apparently, many of the larger bluegills were in deep water during the 1991 survey and were not susceptible to capture in trap nets. The gill net average was 7.2 inches. Bluegill growth in 1991 was above the state average rate (Table 2) and quite similar to that observed in the 1987 catch. Some bluegills were found to be 8 to 10 years old demonstrating unusually good longevity (Table 3).

Bluegills are targeted for sampling in inland lakes because of their role in determining fish community structure and overall sportfishing quality (Schneider 1981). Recently, a ranking system has been developed that allows fish managers to get an idea of the relative quality of a lake's fish population (Schneider 1990). On a scale of 1 to 7 (with 7 the highest rank) the quality of the bluegill population in Duck Lake was calculated from to 1991 survey results as 4.6 or "good". However, most anglers would consider this an excellent bluegill fishery.

Twenty-three redear sunfish were captured in June and 46 in September, 1991. These fish averaged 7.3 and 6.9 inches. The largest individual was 10.4 inches. Scale analysis indicated that these fish were growing nearly 1 inch above the state average growth rate. Two age groups were present which did not correspond to previously stocked fish-indicating natural reproduction.

Beginning in the summer of 1987 anglers reported catching large redear sunfish. However, many anglers have failed to correctly identify redear. Large panfish are typical in Duck Lake. Because of this, and the fact that redear have few distinguishing characteristics, anglers have caught redear but thought they were large bluegills or pumpkinseeds. Some fisherman have reported catching large "strange looking" sunfish. During the 1991 June survey, every party of anglers interviewed had at least one redear in their catch. One party had five fish and four of them were redear. Three of these fish were from 9.0 to 9.8 inches and one was 10.1 inches long.

The Fisheries Division's Master Angler Program was changed in 1992 to include a qualifying category of 1 pound instead of 1.25 pounds for redear. We hope that anglers will report these fish with greater frequency in the future. This will give us a better idea of redear survival and angler success.

In the September 1991 survey 31 largemouth bass were captured in the trap nets. These averaged 10.3 inches and 0.6 pounds. Results were quite similar in 1987. In that survey 36 bass averaged 11.5 inches. This has long been known as a good bass lake; however, anglers have often complained of too many small, but near legal-sized, largemouth bass. Historically the bass in Duck Lake have been slow growing-nearly 1 inch below the state average growth rate. Survey catches have always indicated a large bass population with good recruitment. The 1991 results were consistent with those trends.

The trap and gill nets captured only five walleye in September. These ranged in length from 19.6 to 23.1 inches. The catch was quite similar to what was observed in 1987 (see Management History section). This small catch was further proof that poor survival resulted from the large fingerling walleye stocked in the 1980's.

Over the last half century, it seems there has always been a small group of Duck Lake anglers who specifically fish for walleyes with a fair amount of success. One DNR employee reported taking about 15 legal-sized walleyes during the summer of 1987 while trolling at night. These fish ranged from 16 to 24 inches in length. The ice fishery for walleyes is perhaps better known than the open-water fishery. Usually tip-ups baited with minnows are used at the south end of the lake. The ice fishery is most successful during the night. Over the years, there have been several reports of 8- to 10-pound walleyes taken in this manner. One very large walleye weighing 11.3pounds was caught on January 12, 1989.

This fishery has always been well known for large yellow perch. The gill nets captured 33 perch which ranged in length from 6 to over 13 inches. This catch averaged 10.1 inches and over 1/2 pound. However, anglers usually find that these large perch are not easily caught.

Once again in 1991, as with nearly every other survey in the past, a few smallmouth bass were captured. While this sample consisted entirely of sublegal-sized fish, a few anglers have reported very large smallmouth bass in the past, some over 6 pounds.

Pumpkinseed averaged a very impressive 7.4 inches. Pumpkinseed growth continued to be well above the state average (+1.6 inches) and indicated no ill effects from redear competition.

The black crappie catch included fish ranging from 4 to 12 inches. The average size in the trap nets was 7.3 inches and in the gill nets an impressive 10.4 inches. Early spring anglers have reported catching crappies up to 17 inches in length.

The bullhead population in 1987 appeared to be underfished. However, very few bullhead were captured in 1991. I have no good explanation for this phenomenon. It is extremely doubtful that a great surge of angling interest for bullheads has depleted the population in the last 4 years. Generally, few people fish for bullheads even though they are an excellent eating fish. I suspect the bullhead population was still intact, but for

some reason they were not moving during the 1991 surveys and so were not susceptible to capture in trap or gill nets.

Trap nets and gill nets combined to capture 8 northern pike between 12 and 26 inches long. Four of these were legal-sized (20 inches or longer). Past surveys of Duck Lake have resulted in the capture of very few northerns. Beach development has eliminated almost all of the shallow-water marshy habitat which pike need for spawning. However, even though pike are present in low numbers, they have always exhibited slow growth. Therefore, if more pike were present, via stocking for example, even slower growth might result.

Eight longnose gar, from 25 to 42 inches, were also taken. These fish are present in most lakes and are often seen feeding near the surface over deep water. Very few gars are caught by anglers.

Management Direction

Duck Lake is a jewel among southern Michigan lakes. This system has produced plentiful large game fish since records have been kept. No major fishery problems have occurred in recent history. Rather, management efforts have centered around improving and already good fishery.

Recent walleye research has indicated that fingerling plants, either made in the spring with 2-inch fingerlings or in the fall with 3.5- inch fingerlings, do not produce significant results. However, if a source of inexpensive large walleye fingerlings (8 inches plus) becomes available, this lake should be considered an excellent choice for an experimental plant.

Redear sunfish appear to have survived in substantial numbers and reproduced. This population should be surveyed again in 1994. If a self-sustaining population has not developed by that time the lake should be stocked with redear for 3 years in succession in accordance with the Redear Sunfish Management Plan (Towns 1991).

Angler familiarity with redear has increased over the last few years. However, more needs to be done to publicize the redear program and educate anglers regarding the identification of this species.

This lake should be considered for re-mapping. Apparently several basin features, especially shallow shoals surrounded by deep water, were not recorded during the 1938 soundings.

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References

Schneider, J. C. 1981. Fish communities in warmwater lakes. Michigan Department of Natural Resources, Fisheries Research Report 1890, Ann Arbor.

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

Towns, G. L. 1991. Redear sunfish management plan. Michigan Department of Natural Resources, Fisheries Division, Jackson.

Table 1.-Number, weight, and length indices of fish collected from Duck Lake with trap nets, September 24-26, 1991.

Species	Number	Percent by number	Weight (pounds)	Percent by weight	Length range (inches)[1]	Average length	Percent legal size[2]
Bluegill	133	38.4	20.9	15.1	4.5-9.5	6.1	50
Pumpkinseed	18	5.2	3.7	2.7	4.5-8.5	7.4	83
Yellow perch	5	1.4	3.0	2.2	8.5-13.5	10.7	100
Black crappie	18	5.2	3.9	2.8	4.5-12.5	7.3	44
Redear sunfish	46	13.3	11.8	8.5	4.5-10.5	6.9	83
Walleye	3	0.9	10.4	7.5	20.5-23.5	21.5	100
Northern pike	2	0.6	3.8	2.7	16.5-24.5	20.5	50
Largemouth bass	31	9.0	18.2	13.1	3.5-19.5	10.3	16
Rock bass	62	17.9	13.5	9.7	2.5-11.5	6.5	77
Smallmouth bass	2	0.6	0.3	0.2	3.5-8.5	6.0	0
Green sunfish	3	0.9	0.3	0.2	4.5-7.5	6.2	67
Bullhead	4	1.2	3.4	2.5	11.5-12.5	12.0	100
Warmouth bass	11	3.2	1.8	1.3	4.5-8.5	6.0	46
Bowfin	4	1.2	33.1	23.9	25.5-28.5	27.0	0
Longnose gar	4	1.2	10.5	7.6	25.5-36.5	33.0	0
Total	346	100.0	138.6	100.0			

[1]Note 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.
[2]Percent legal size or acceptable size for angling.

Table 2.-Average total length (inches) at age, and growth relative to the state average, for six species of fish sampled from Duck Lake with trap nets, September 24-26, 1991. Number of fish aged is given in parentheses.

	Age										Mean Growth
Species	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**	**index[1]**
Bluegill	-	5.0	6.4	7.4	7.4	8.5	8.8	9.1	9.3	9.9	+0.5
	-	(17)	(22)	(5)	(5)	(5)	(2)	(3)	(2)	(2)	
Largemouth bass	4.9	8.1	10.2	12.3	14.0	-	-	-	-	-	-0.9
	(3)	(7)	(18)	(5)	(1)	-	-	-	-	-	
Yellow perch	-	7.7	9.5	-	10.7	11.2	12.9	13.7	-	-	+1.6
	-	(8)	(5)	-	(9)	(10)	(3)	(1)	-	-	
Redear sunfish	-	6.4	8.8	9.9	10.4	-	-	-	-	-	+0.8
	-	(35)	(4)	(2)	(1)	-	-	-	-	-	
Black crappie	5.1	6.8	8.6	10.0	10.3	10.6	-	-	-	12.5	-0.3
	(6)	(7)	(2)	(2)	(3)	(8)	-	-	-	(1)	
Pumpkinseed	-	5.1	6.7	7.6	8.0	-	-	-	-	-	+1.6
	-	(4)	(2)	(7)	(1)	-	-	-	-	-	

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

Table 3.-Estimated age frequency (percent) of six species of fish caught from Duck Lake with trap nets, experimental gill nets, and small-mesh fyke nets, September 24-26, 1991.

	Age										Number
Species	**O**	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**	**caught**
Bluegill	5	14	43	20	4	3	6	2	1	1	1	209
Largemouth bass	5	10	23	51	8	3	-	-	-	-	-	43

Yellow perch	-	-	24	14	-	26	26	7	3	-	-	38
Redear sunfish	-	-	85	9	4	2	-	-	-	-	-	52
Black crappie	-	21	24	7	7	10	28	-	-	-	3	30
Pumpkinseed	-	-	24	9	57	10	-	-	-	-	-	23

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Questions, comments and suggestions are always welcome! Send them to tinchert@michigan.gov