

Corey Lake

*Cass County (T6S, R13W, Section 24)
St. Joseph County (T6S, R12W, Sections 17, 18, 19, 20, 29)
Surveyed May 23, 1996*

James L. Dexter, Jr.

Environment

Corey Lake is one of the larger natural lakes in southwest Michigan. The majority of the lake lies in St. Joseph County, with only a small portion being located in eastern Cass County. The town of Three Rivers is located 5 miles due east of the lake.

The majority of the Corey Lake watershed lies in an area of undulating to rolling hills on well-drained loamy soils (Hillsdale-Riddles Association). Glacial till plains and moraines are common in the area. The watershed is primarily a combination of active and fallow farmland, followed by small blocks of forest, wetlands and urban areas. The urban areas are actually quite small and are limited to the lake's shoreline.

At 630 acres in size (Figure 1), Corey Lake is the second largest lake in St. Joseph County and the tenth largest lake in District 12 (which encompasses the seven counties in southwestern Michigan). There is one inlet to Corey Lake, located on the eastern shore, which is the outlet for Harwood Lake. There are two outlets, both located on the south shore. These were noted in a 1953 survey to be artificial outlets. The southeastern outlet flows to Kaiser Lake. The south-central outlet flows to a wetland area which is the headwaters of Curtis Creek. These outlets eventually feed the St. Joseph River watershed of Lake Michigan.

The Corey Lake watershed is approximately 4,186 acres (Water Quality Investigators 1994). The lake has a flushing rate of about 4.4 years. It's maximum depth is 80 feet. Approximately 45% of the lake area can be considered shoal (15 feet deep). Most of the Corey Lake basin has a marl bottom with sand and gravel deposits. Limited shoreline areas have pulpy peat. Water quality information was collected by the Fisheries Division in 1948, 1953, 1978, 1985, and 1996. There have been no significant changes in Secchi disk, pH, surface alkalinity, or temperature/oxygen profiles over that period.

Residential development is heavy along the southern and eastern shores and around the western basin of Corey Lake. Much of the north shore is still in its natural condition because a large portion is owned by the YMCA organization. There is also a large wetland area. A state-owned, public access site exists at the western end with enough parking for nine vehicles with trailers.

Fishery Resource

Corey Lake was first surveyed by the State in August 1887. Using gill nets, this inventory survey found cisco, yellow perch, bluegill, largemouth bass and sucker (species unreported). Interestingly, the survey report indicated there were no inlets or outlets to the lake at that time. Because of the large expanses of deep water habitat, gravel bottom, and a good cisco population, it was recommended that the lake be stocked with lake trout, smallmouth bass, and walleye.

Between 1934 and 1945, bluegill and largemouth bass were stocked on an annual basis. Yellow perch were also stocked in 1934, 1935, 1938, and 1939. In 1948, after a favorable limnological survey, it was recommended that rainbow trout stocking be initiated. This began in 1949 and continues today. Trout were stocked in all but 3 years since 1949. For the first couple of decades of trout planting rainbows were stocked at about the rate of 8/acre.

The next biological surveys of Corey Lake were not conducted until 1953 and 1956. Survey results were similar to the 1887 survey, with the exception that rainbow trout were now considered common, smallmouth bass were rated as few, and there was no mention of cisco. Forage and coarse fish appeared to be quite numerous. In 1966, another gill net survey was conducted for 2 days in July. Overall results were similar, but one cisco was netted. This is the last official record we have on file of cisco presence. There are unconfirmed reports that cisco are still present, and on that basis Latta (1995) recorded the cisco population as "declining".

In 1980 an electroshocking survey was conducted. Results showed a typical warmwater fish community similar to that found in previous surveys. Northern pike have never been found in the lake. Overall, the Corey Lake fish community has always appeared healthy, with good growth rates and good numbers of game fish available to anglers.

During the early 1980's a petition was received from area anglers to initiate walleye stocking. This petition, in addition to a letter of support from the Corey Lake Association, proved to be very timely as district personnel were busy developing a walleye management plan for the area and were looking for candidate lakes.

The stocking of walleye was initiated in 1985. Original stocking rates were low (about 20 spring fingerlings/acre). A total of 39,764 spring fingerling walleye were stocked between 1985 and 1988. In 1988, regional stocking levels were raised to 50/acre (1-2" size). At the same time regional walleye management was focused on stocking each year for 3-5 years, and then switching to alternate years. This was the plan prescribed for Corey Lake, and alternate year stockings occurred in 1990 (32,199 stocked) and in 1992 (30,309 stocked).

Evaluations of the walleye program were conducted in 1990 and 1992. Fall nighttime electroshocking of the shoreline area (Serns Index) for a total of 6 hours resulted in no walleye being collected or even seen. During 1992 and 1993 a voluntary postcard creel

survey was conducted at Corey Lake to assess the walleye fishery. Similar post card surveys were being conducted with good success at other area lakes stocked with walleye. However, during the 2-year period, only six cards were returned from Corey Lake, most of them from the same angler. A total of 10 walleye were reported caught. Apparently, few, if any, anglers were targeting the walleye being stocked. Low returns, in combination with the two unsuccessful fall surveys, prompted the walleye program at Corey Lake to be discontinued.

Historically, the rainbow trout stocking program has been very successful at Corey Lake. From 1955 to 1961, on-site surveys of anglers indicated that 1,000 to 2,700 rainbows were caught each winter, not to mention the harvest during the other seasons (Schneider and Lockwood 1979). However, success may have declined in recent years. Hook and line surveys for trout were conducted in 1991 and 1996. In 1991, seven trout were collected, and there were many reports of excellent angling. In 1996, no trout were caught, and angling reports have been very poor for at least 2 years now. Rainbows have been stocked for the last 15 years at the rate of about 21.5/acre. In 1996, the stocking was split between equal numbers of two strains, Eagle Lake and Shasta. The Eagle Lake strain may utilize shallower habitat than the Shasta, and was thought they might restore the fishery. Split-strain stocking will continue for the near future.

The fish community present today is slightly different from that of 110 years ago. Rainbow trout have been added, but are not permanent members since they do not reproduce in the lake. Cisco may be extirpated, but that will have to be verified by a full survey in the future. There are still no pike present, and the warmwater fishery remains good overall with one exception-largemouth bass.

The present survey was conducted in late-May 1996 specifically to evaluate the largemouth bass population. In June of 1995, it was brought to our attention by the Corey Lake Association that the bass population was potentially overabundant and slow growing. Since that initial contact with the Association, we have heard from numerous riparians and anglers regarding both the poor bass fishery and the apparent lack of minnows. These two issues will be discussed separately.

Using nighttime 240-V DC electroshocking, we sampled bass (only) for 2 hours. A total of 2 smallmouth and 414 largemouth bass were collected. Figure 2 shows the length frequency distribution of all the largemouth bass. It is obvious there was a considerable stockpiling of small bass in the 7-10 inch range.

Corey Lake appears to have an overabundance of bass, especially when compared to four other area lakes of large size (Figure 3). Catch per hour (CPH) of bass at Corey Lake in 1996 was three or more times higher. Bass growth rate comparisons among these five waters are shown in Figure 4 and Table 1. Corey Lake bass growth was poor compared to these reference lakes and to the State of Michigan average.

Largemouth bass age and growth information has been collected from Corey Lake three times, in 1955-58 (Schneider and Lockwood 1979), 1980, and 1996 (Table 2). Growth

index has declined from State average in the mid 1950s to -1.7" in the mid 1990s. Now, Corey Lake bass are well short of the state average length by age II and they remain slow growing for life. Another change is that CPH from nighttime electrofishing in 1996 was about double the CPH in 1980. (Note: this statistic may not be accurate because bass were targeted in the 1996 survey but not in the 1980 survey). I conclude that bass abundance has increased and that bass growth has greatly declined.

Weights of individual fish were also collected during the 1996 survey. A graph of bass length versus weight, transformed to logarithmic scale to form a straight line, is shown in Figure 5. The 95% confidence limit lines indicate that Corey Lake bass are significantly lighter in weight and in poorer condition than state average bass.

Age frequency analysis also may indicate a problem (Table 3). Here it appears that there may be poor recruitment of bass from the 1994 and 1995 year classes. This may be a biological compensation made by the bass population to high abundance. However, other studies have shown that capture efficiency of small bass is low up to about age II-III. There is certainly an abundance of bass stockpiled at ages III-V. This "bottleneck" suggests that poor bass growth is due to bass overabundance.

The Indiana Department of Natural Resources (IDNR), Fish and Wildlife Division, has been actively conducting largemouth bass research during the last decade (Neil Ledet, IDNR, personal communication). A large database has been assembled to analyze the effects of raising size limits. Included are electrofishing CPH data for 20 large natural lakes over 500 acres. Corey Lake bass CPH ranked as extremely high by comparison. This was true for all size groups up to 14 inches. The reverse was true for CPH of larger bass, it was very low relative to the Indiana lakes. This comparison further strengthens the argument that there are too many bass in Corey Lake.

Stockpiling of slow growing bass may be due to the current, relatively high, minimum legal size limit for bass. From 1909 to 1975, the bass size limit was set at 10 inches statewide. In 1976, the limit was raised to 12 inches, then in 1993, to 14 inches. The last change may have increased population density enough to intensify competition for food, slow growth, reduce condition, and cause stockpiling. Such a response was expected for some waters of the state. An appropriate management technique to correct the imbalance is to reduce the minimum size limit and promote harvest of bass by anglers.

Regarding minnow trapping at Corey Lake, the issues raised by the lake association and by residents seem to be: 1) decline in the sightings of schools of minnows that apparently used to be quite abundant; and 2) riparians are upset that commercial minnow trappers use their shoreline areas to harvest minnows with glass jars. District Fisheries staff conducted 1 hour of nighttime electrofishing in October 1996 to evaluate forage fish. Results were not particularly encouraging. The field crew reported that over 90% of the observed "forage" was from the killifish (topminnow) family. No one on the crew had ever observed so many killifish in one lake.

In 1986 the State of Michigan Attorney General's office issued an opinion regarding the trapping of minnows in Birch Lake, Cass County. That opinion reaffirmed the right of commercial minnow dealers to harvest in public waters.

Minnows are harvested from Corey Lake from May through October. The vast majority of the harvest is by a license holder out of Benton Harbor. Catch reports are submitted to Lansing each month (Act 165 PA 1929 requires that all commercial bait catchers report all harvesting activity). From the data submitted from 1994 to 1996, it is apparent that the catch of minnows is not declining (Figure 6). In this 3-year period, only of 56.5 gallons of minnows were collected (roughly 450 pounds). In addition, 3 gallons of wigglers were harvested in July 1995 and 2,000 crayfish were removed in July 1994.

All the harvested minnows were reported to be emerald shiners, which seems unlikely. Therefore, either Fisheries or Law Enforcement personnel should accompany the minnow dealer in June/July 1997 to evaluate the catch and record the species. This information, coupled with a full fishery survey in 1998, will enable us to make a sound biological decision on the issue of minnow trapping in Corey Lake. The evidence on hand now is not sufficient to justify closing the lake to minnow trapping.

Management Direction

Rainbow trout stocking at Corey Lake is scheduled through 1997, the last year of the current stocking program. Results of the 1997 fish survey, coupled with angler contacts, will determine the future course of action. If the 1997 survival of stocked trout is low, a 3-year resting period would be appropriate for the lake. Trout stocking is the only active fisheries management program at this time.

Four goals have been established for the Corey Lake fishery: 1) obtain better information by conducting a full survey of the lake; 2) improve size structure and growth rate of largemouth bass; 3) restore the trout fishery; 4) resolve the minnow harvesting issue. The objectives necessary to meet these goals are outlined in the attached management plan for Corey Lake.

There are many potential obstacles to achieving these goals. These include: 1) lack of time and personnel to conduct an adequate full survey; 2) potential lack of acceptance by the public if a lower limit is proposed; 3) insufficient harvesting of small bass, leading to little or no change in size structure or growth; 4) lack of understanding of the biological issues that may be affecting survival of stocked trout; 5) lack of enough hard information to make a good decision on the potential impacts of the minnow harvesting issue.

All of these potential obstacles can be overcome with good communication with the public and if District 12 personnel are able to make these goals high priority.

Report completed: May 1997

References

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MANAGEMENT PLAN

based on

Status of the Fishery Report 97-2

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The management plan and goals for Corey Lake are based on the 1996 special study of the bass population, numerous angler and riparian contacts, and hook and line evaluations for trout. I have identified four separate management goals that will need to be addressed over the next several years. These goals are outlined below with appropriate objectives.

Our first goal will be to conduct an intensive full survey of the lake. This has never been done before and will provide us very useful information on the age and growth of all the other gamefish present. Special attention should be given to cisco, trout, and minnows, and an evaluation of available bass habitat (aquatic weed community). The objective necessary to meet this goal is to schedule this survey into the 1998 work plan.

Our second goal will be to improve the largemouth bass population size structure and growth rates. Under the Natural Resources Environmental Protection Act, 1994, PA 451 Section 324.48719 (legal size of fish) the bass minimum size limit on selected water can be set to any size between 10 and 14 inches. The first objective under this goal is to formally recommend lowering the size limit to 10 inches. This can be done by introducing the proposed change to the Natural Resource Commission by July 1997 so that it can take effect in 1998. A second objective will be to evaluate the effects of this

change by a special bass study (similar to the 1996 evaluation) in the year 2000 or 2001. This would give the bass population 3-4 years to respond to the size limit change.

Our third goal is to restore the trout fishery. The first step, in 1997, is to conduct another hook and line evaluation and contact many anglers. If 1997 is another poor year for trout fishing, the second step will be to discontinue stocking for 3 years (1998-2000) and resume stocking in 2001. This management technique usually works very well in this area, presumably by giving the zooplankton population (an important food for trout) a chance to rebuild.

Our fourth and final goal will be to decide the minnow harvesting issue. Our objectives over the next year will be to assess the minnow harvest by going out with the minnow dealers to see first hand what they are catching, assess 1997 catch reports as submitted to Lansing, and then make a recommendation as to whether minnow trapping should continue.

If these goals and objectives are accomplished, the bass population and fishery will improve, the status of cisco, trout, and warmwater community will be better understood, and a biologically sound recommendation on the future of minnow harvesting can be made.

Table 1.--Largemouth bass average length (inches) for five District 12 lakes that are deep and have similar physical characteristics.

Lake	Acres	Date surveyed	Age							Mean Growth Index
			I	II	III	IV	V	VI	VII	
Corey	630	5/96	4.4	5.9	7.8	10.2	11.1	12.7	13.2	-1.7
Diamond	1,020	5/94	5.4	7.1	9.9	11.7	13.7	14.5		+0.2
Gull	2,050	6/93	--	6.6	9.7	10.3	14.9	14.5		-1.6
Klinger	830	5/96	3.2	6.1	9.1	11.3	12.3	13.1	14.4	-0.6
Long	575	5/91	3.0	6.4	9.6	10.6	12.5	--		-0.7
State Average			4.2	7.1	9.4	11.6	13.2	14.7	16.3	--

Table 2.--Average length (inches) by age group for three studies of largemouth bass from Corey Lake, St. Joseph County. The number of bass aged is given in parenthesis. Also shown is total number of bass caught per hour of electrofishing (CPH).

	Age							Mean Growth	CPH
	I	II	III	IV	V	VI	VII	Index	
1955-58	--	10.4	10.9	12.4	13.8	15.7	--	0	--
	--	(1)	(28)	(19)	(14)	(1)	--		--
1980	4.4	7.4	10.6	12.2	12.9	--	--	+0.5	106
	(14)	(34)	(22)	(5)	(3)	--	--		
1996	4.4	5.9	7.8	10.2	11.1	12.7	13.2	-1.7	207
	(4)	(23)	(19)	(19)	(15)	(8)	(3)		
State Average	4.2	7.1	9.4	11.6	13.2	14.7	16.3	--	--

Table 3.--Estimated age frequency (percent) of largemouth bass caught from Corey Lake using DC boomshocking, May 1996.

	Age										Number
	I	II	III	IV	V	VI	VII	VIII	X	XI	Caught
Largemouth bass	0.9	10.3	25.1	38.5	21.2	22.3	1.2	0.5	0.3	0.2	414

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