Michigan Department of Natural Resources
Status of the Fishery Resource Report
No. 2001-1, Year 2001

BIG TWIN LAKE

Kalkaska County (T28N, R05W, Section 18, and T28N, R06W, Section 13)
Surveyed May 1999

Ralph L. Hay and Mark A. Tonello

Environment

Big Twin Lake is a kettlehole lake located in northeast Kalkaska County within the Pere Marquette State Forest, Traverse City Area. The lake is located about 12 miles northeast of the Village of Kalkaska. Rolling hills characterize the surrounding shoreline. The sand and sandy loam soils are well drained and of low fertility. These soils support beech-maple or aspen-pine (red, jack, or white pine) forests. There are no inlet or outlet streams. However, the lake is connected to Little Twin Lake by culverts. Big Twin Lake lies within the Manistee River watershed.

Big Twin Lake is 215 acres in area with a maximum depth of 80 feet (Figure 1). The lake has steep drop-offs, with the shoal area comprised mostly of sand. In the deep water, the bottom is mostly pulpy peat with some marl. Mean depth of the lake is 35.8 feet. Vegetation is sparse, consisting of submergent rooted macrophytes, including muskgrass (genus *Chara*) and several species of pondweed (genus *Potamogeton*), in water less than 20 feet deep. The shoreline of Big Twin Lake is well developed with homes and cottages. There is a public access site on the northwest corner of the lake.

Water quality conditions were last monitored on July 15, 1999. The waters of Big Twin Lake are clear with a Secchi disc reading of 16 feet. This reading indicated slightly more turbidity than in 1993, when the Secchi disc reading was 25 feet. However, in 1947 and 1953, Secchi disc depths of 12 feet were recorded. Alkalinity was 110 ppm at mid-depth in 1999, which is similar to values found in 1993. This hard-water lake is well buffered. Water temperatures ranged from 73°F at the surface to 43°F near the bottom. The lake stratifies, with a thermocline developing between 20 and 35 feet. Oxygen concentrations ranged from 1.0 ppm in the deepest water to 8.9 ppm at the surface. The oxygen concentration in the thermocline was 9.1 ppm, which is more than adequate to support coldwater species. Overall, the water quality is excellent for supporting a two-story fishery, with a combination of warmwater fish in the upper layer and trout and cisco in the mid-water zone.

Fishery Resource

Historical records at the Department of Natural Resources (DNR) office in Cadillac show that Big Twin Lake has been actively managed by the State since 1929 (Table 1), when yellow perch were stocked. Bluegill, smallmouth bass, largemouth bass, walleye and yellow perch were stocked in varying numbers during the next nine years. Rainbow trout fingerlings and adults were stocked for the first time in 1947 in an attempt to create a trout fishery.

The rainbow trout stockings were evaluated via creel survey in 1952 and 1953 (Schneider and Lockwood 1979), and with gill nets in 1953. Only two rainbow trout were collected in the gill nets, and very few were observed in the creel survey. One brown trout was collected in the gill nets but its origin is unknown, since there are no records of brown trout being stocked prior to 1953. Due to poor survival of the rainbow trout, stockings were discontinued in 1953. The lake was stocked with lake trout (legal size) from 1954 through 1957, and stockings of legal or yearling size brown trout have been made in most years since 1959. Annual

plantings have ranged from 1,000 to 15,000 with an average of about 5,000.

The fish communities in the 1950s and 1960s consisted mainly of yellow perch, cisco (lake herring), white sucker, emerald shiner, common shiner, and various other minnow species. Gill net surveys in 1962 and 1963 were conducted to evaluate the stockings. Decent numbers of both lake trout and brown trout were collected in the survey. In 1963, seven lake trout were captured that averaged almost 31" in length. The first verified catch of rainbow smelt occurred in 1963. Exactly how and when rainbow smelt were introduced to Big Twin Lake is unknown. Rock bass, smallmouth bass, pumpkinseed, and brown trout were also available to anglers in low numbers. Brown trout were planted for the first time in 1959. One brook trout of unknown origin was captured in a 1970 survey.

Big Twin Lake was also surveyed in 1985 and 1993. In 1985, gill nets were used to assess the brown trout stockings. A total of ten brown trout up to 13 inches and representing three year classes were captured. One rainbow trout (14") and three lake trout (27-28") were also captured. Other species present in good numbers in the 1985 survey included cisco, yellow perch, rock bass, smallmouth bass, and white suckers. In the 1993 survey, only three brown trout were captured. Rock bass, bluegill, largemouth bass and smallmouth bass appeared to have increased in numbers. The first brown bullhead and black crappie captured from Big Twin Lake were recorded in the 1993 survey.

The fish community was most recently surveyed on May 24-28, 1999. The netting effort entailed overnight sets of fyke and gill nets. The most numerous species captured in the survey were yellow perch and rock bass (Table 2). Almost 1,500 yellow perch and nearly 500 rock bass were captured. The yellow perch population observed in 1999 appeared to be much larger than that observed in 1993. The inland gill net catch per unit effort (CPUE) for yellow perch was 75.6 yellow perch per net-night in 1999, compared to only 7.9 yellow perch per net-night in 1993. The cause for such an increase in the yellow perch population is unknown, but yellow perch are known for having cyclical population trends, with large ups and downs in population size. In the 1999 survey, the yellow perch averaged 6.7 inches in length, while the rock bass averaged about 5.9 inches. Growth for yellow perch was 0.6 inches slower than the state of Michigan average, while the rock bass were 0.4 inches larger than the Michigan average (Table 3). Growth for both yellow perch and rock bass was similar to the 1993 survey. The only other panfish species encountered in the survey was bluegill; only 17 individuals up to 7 inches in length were captured. Pumpkinseed sunfish and black crappie have been observed in previous surveys, but were not seen in 1999.

A total of 19 largemouth bass and 26 smallmouth bass were captured in the 1999 survey. The largemouth bass ranged from 11-20 inches in length, with 74% exceeding the minimum legal size of 14 inches. Although not enough largemouth bass from any age group were captured to make statistical inferences regarding growth, most of them exceeded the State average length for their respective age. The smallmouth bass ranged from 7.3-19.8 inches in length, with 50% exceeding the minimum legal size of 14 inches. The smallmouth bass from age classes 4, 5, and 6 were growing 0.6 inches slower than the Michigan average (Table 3). Despite the below-average growth for smallmouth bass in Big Twin Lake, fishing for both largemouth and smallmouth bass should be very good.

Despite the fact that around 5,000 brown trout are stocked each year, only three were captured in this survey. They were 7-8 inches in length, and most likely were fish that had just recently been stocked in the spring of 1999. Brown trout are notoriously difficult to catch in nets. Angler reports regarding the brown trout stocking program have been very positive, with catches of brown trout exceeding 20 inches. In the 1993 survey, only three brown trout were captured. They were 13, 18, and 22 inches in length, and represented three different year classes. Although not a large sample, this provides evidence that brown trout are capable of surviving and growing to large size in Big Twin Lake. Brown trout most likely do not reproduce in Big Twin Lake; therefore, the population must be supported through stocking.

Other species captured in the survey included cisco, and rainbow smelt. A total of 67 cisco, ranging from 12-15 inches, were captured in gill nets. Cisco and rainbow smelt are valuable forage species for brown trout, as well as providing sport fisheries, especially through the ice. Only two rainbow smelt were captured, but the gear used in the survey was not designed to catch them.

Fishing on Big Twin Lake is enjoyable, as the lake is not heavily fished. The water is clear and aquatic vegetation is not a problem. Water quality and habitat have not changed appreciably in the last 50 years. Because of increased shoreline development it is important that property owners protect the water quality and habitat of the lake. Stocked brown trout should continue to provide a good fishery. Yellow perch, largemouth bass, smallmouth bass, and cisco should also continue to provide good angling opportunities.

Management Direction

Big Twin Lake will continue to be managed as a two-story fishery. The long, successful history of brown trout in the lake suggests that the fishery should continue. The presence of smelt and cisco provide the necessary forage for brown trout survival and growth. Therefore, brown trout yearlings should continue to be stocked at a rate of about 50 per acre (10,800) annually.

Goals for the Big Twin Lake will be to maintain the brown trout fishery through stocking, maintain the warmwater fishery, and protect the water quality and habitat of the lake for these species. One way in which the water quality will be protected is by working with the Michigan Department of Environmental Quality (DEQ) to ensure that only environmentally sound development projects are permitted on or near Big Twin Lake.

To further measure the success of the brown trout stocking program in the future, a creel survey should accompany biological sampling. The creel survey should also target ice anglers. In the meantime, any informal angler reports regarding fishing in Big Twin Lake should be recorded and placed in the file.

Report completed March 28, 2001.

References

Schneider, J. C., and R. L. Lockwood. 1979. Effects of regulations on the fisheries of Michigan Lakes, 1946-65. Michigan DNR Fisheries Research Report 1872, Ann Arbor.

Table 1.–Fish stocked into Big Twin Lake, Kalkaska County, 1929-2000.

Year	Species	Number	Size	Strain
1929	Yellow perch	48,000	fry	
1930	Smallmouth bass	2,000	?	
	Yellow perch	255,000	fry	
	Bluegill	2,400	?	
1935	Walleye	68,000	?	
1936	Largemouth bass	100	yearlings	
	Largemouth bass	600	fingerlings	
	Walleye	150,000	?	
	Bluegill	200	yearlings	
	Bluegill	5,000	fingerlings	
1937	Walleye	150,000	?	
1938	Largemouth bass	2,000	?	
	Yellow perch	12,000	fingerlings	
	Bluegill	10,000	?	
1947	Rainbow trout	5,000	7-mo. fingerlings	
	Rainbow trout	2,500	adult	
1948	Rainbow trout	15,000	3-5" fingerlings	
1949	Rainbow trout	15,000	4" fingerlings	
1950	Rainbow trout	20,000	3" fingerlings	
1951	Rainbow trout	30,000	3" fingerlings	
1952	Rainbow trout	15,000	3" fingerlings	
1954	Lake trout	5,000	2 yr.	
1955	Lake trout	5,000	legal	
1956	Lake trout	5,000	legal	
1957	Lake trout	2,000	legal	
1959	Brown trout	7,075	legal	
1960	Brown trout	4,000	legal	
1961	Brown trout	4,000	legal	
1963	Brown trout	4,000	legal	
1964	Brown trout	2,000	legal	
1965	Brown trout	14,725	legal	
1966	Brown trout	10,750	fingerlings	
1968	Brown trout	5,000	yearlings	
1969	Rainbow trout	5,000	yearlings	
1970	Brown trout	5,000	yearlings	
1971	Brown trout	4,000	yearlings	
1973	Brown trout	5,010	yearlings	
1974	Brown trout	2,500	yearlings	
1976	Brown trout	1,505	yearlings	
1977	Brown trout	2,500	yearlings	
1978	Brown trout	1,000	yearlings	
1982	Brown trout	5,400	yearlings	
	Steelhead	5,672	yearlings	
1983	Brown trout	5,400	yearlings	
1984	Brown trout	5,400	yearlings	
	Lake trout	400	adult	
1985	Brown trout	4,090	yearlings	
1986	Brown trout	4,380	yearlings	
1987	Brown trout	5,000	yearlings	

Table 1.–Continued.

Year	Species	Number	Size	Strain
1988	Brown trout	4,860	yearlings	
1989	Brown trout	5,400	yearlings	
1990	Brown trout	4,860	yearlings	
1991	Brown trout	5,400	yearlings	
1992	Brown trout	5,300	yearlings	Wild Rose
1993	Brown trout	5,400	yearlings	Wild Rose
1994	Brown trout	5,400	yearlings	Wild Rose
1995	Brown trout	4,997	yearlings	Seeforellen
1996	Brown trout	5,197	yearlings	Wild Rose
1997	Brown trout	5,378	yearlings	Wild Rose
1998	Brown trout	5,300	yearlings	Wild Rose
1999	Brown trout	5,400	yearlings	Wild Rose
2000	Brown trout	10,800	yearlings	Wild Rose

Table 2.–Number, weight and length (inches) of fish collected from Big Twin Lake with small-mesh fyke nets, large-mesh fyke nets, and inland gill nets, May 24-28, 1999.

Species	Number	Percent by number	Weight (pounds)	Percent by weight	Length range (inches)[1]	Average length (inches)	Percent legal size[2]
Bluegill	17	0.8	0.7	0.1	1-7	5.1	12 (6")
Bluntnose minnow	4	0.2	0.1	0.0	3-3	3.5	100
Brown trout	3	0.1	0.7	0.1	7-8	8.2	67 (8")
Cisco	67	3.1	44.3	6.1	12-15	14.0	100
Largemouth bass	19	0.9	43.2	5.9	11-20	15.8	74 (14")
Rainbow smelt	2	0.1	0.2	0.0	6-9	19.4	100
Rock bass	472	21.6	92.0	12.6	1-10	5.9	55 (6")
Smallmouth bass	26	1.2	37.5	5.2	6-19	10.9	52 (14")
White sucker	144	6.6	329.6	45.3	6-22	18.0	100
Yellow perch	1,436	65.6	179.2	24.6	3-9	6.7	26 (6")
Total	2,190	100	727.5	100			

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

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

Table 3.–Average weighted total length (inches) at age, and growth relative to the State average, for fish sampled from Big Twin Lake with small-mesh fyke nets, large-mesh fyke nets, and inland gill nets, May 24-28, 1999. Number of fish aged is given in parentheses.

	Age										Mean growth
Species	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**index**
Bluegill				6.9	7.8						---
				(1)	(1)						
Brown trout	7.9										---
	(3)										
Cisco			13.3	14.0	13.9	14.6					+2.4
			(2)	(10)	(7)	(3)					
Largemouth bass			12.2	13.2	14.7	16.1	17.1	18.5	19.7		---
			(4)	(3)	(3)	(3)	(1)	(3)	(3)		
Rainbow smelt		6.8	9.8								---
		(1)	(1)								
Rock bass			4.7	6.2	7.6	8.9	9.8	10.6	10.6		+0.4
			(15)	(16)	(18)	(14)	(1)	(2)	(3)		
Smallmouth bass		6.8	8.0	11.9	13.2	15.5	16.3	17.8	19.8		-0.6
		(1)	(4)	(5)	(5)	(5)	(4)	(1)	(1)		
Yellow perch		4.3	5.5	6.9	8.6						-0.6
		(10)	(11)	(22)	(12)						

Table 4.–Estimated age frequency (percent) of fish caught from Big Twin Lake with small-mesh fyke nets, large-mesh fyke nets, and inland gill nets, May 24-28,1999.

	Age										Number
Species	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**0**	**10**	**caught**
Bluegill				50	50						17
Brown trout	100										3
Cisco			9	45	32	14					67
Largemouth bass			20	15	15	15	5	15	15		19
Rainbow smelt	50	50									2
Rock bass			22	23	26	20	1	3	4		69
Smallmouth bass		4	15	19	19	19	15	4	4		26
Yellow perch		18	20	40	22						1436

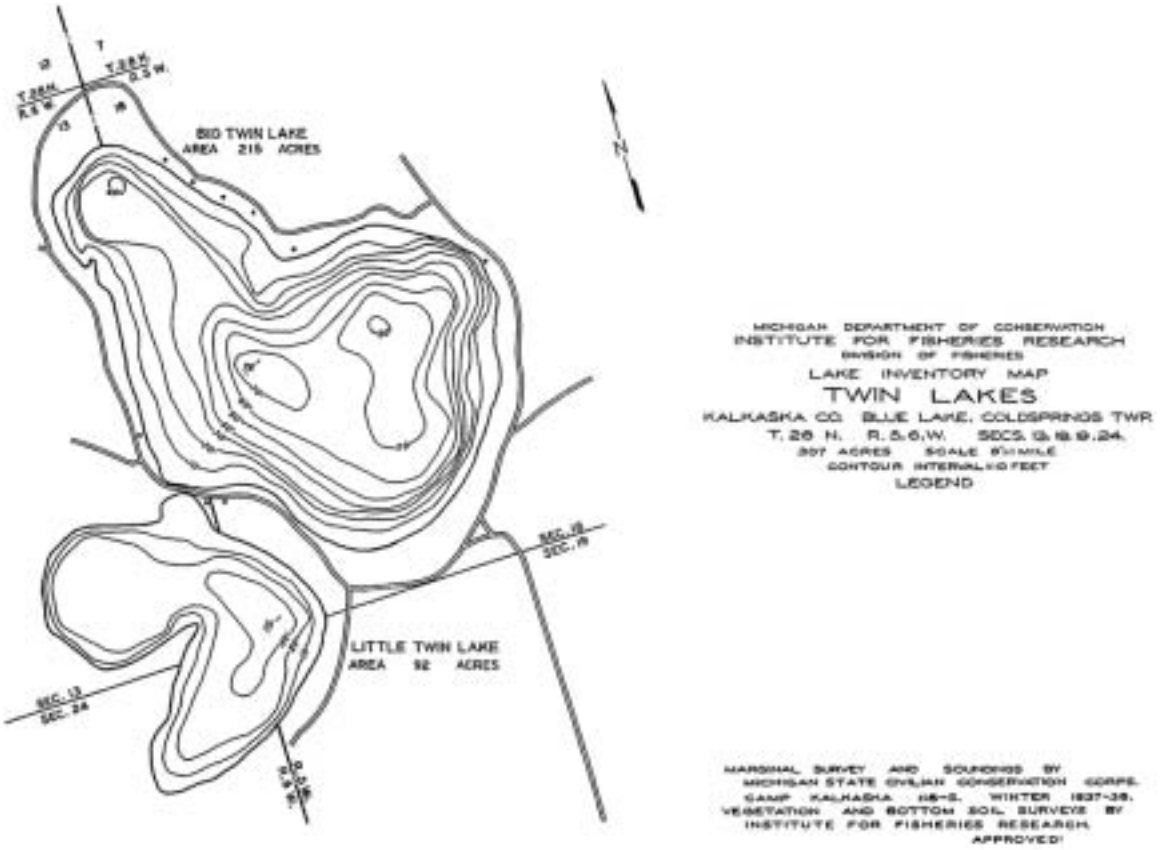

Figure 1.–Map of Big Twin Lake, Kalkaska County, showing depth contours in feet.